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School of Science (SSC)
Department of Mathematics

1. **Riaz, M. B., Ur Rehman, A.,** Wojciechowski, A., & Atangana, A. (2023). Heat and mass flux analysis of magneto-free-convection flow of Oldroyd-B fluid through porous layered inclined plate. *Scientific Reports*, 13(1), 1-15. doi10.1038/s41598-022-27265-w. **Muhammad Bilal Riaz, Aziz Ur Rehman (Mathematics/SSC) Date of Publications: January 2023** **HJRS: W (Platinum)**
The present work examines the analytical solutions of the double duffusive magneto free convective flow of Oldroyd-B fluid model of an inclined plate saturated in a porous media, either fixed or moving oscillated with existence of slanted externally magnetic field. The phenomenon has been expressed in terms of partial differential equations, then transformed the governing equations in non-dimensional form. On the fluid velocity, the influence of different angles that plate make with vertical is studied as well as slanted angles of the electro magnetic lines with the porous layered inclined plate are also discussed, associated with thermal conductivity and constant concentration. For seeking exact solutions in terms of special functions namely Mittag Leffler functions, G-function etc., for Oldroyd-B fluid velocity, concentration and Oldroyd-B fluid temperature, Laplace integral transformation method is used to solve the non-dimensional model. The contribution of different velocity components are considered as thermal, mass and mechanical, and analyse the impacts of these components on the fluid dynamics. For several physical significance of various fluidic parameters on Oldroyd-B fluid velocity, concentration and Oldroyd-B fluid temperature distributions are demonstrated through various graphs. Furthermore, for being validated the acquired solutions, some limiting models such as Newtonian fluid in the absence of different fluidic parameters. Moreover, the graphical representations of the analytical solutions illustrated the main results of the present work and studied various cases regarding the movement of plate.
https://www.nature.com/articles/s41598-022-27265-w

2. **Asjad, M. I.,** Inc, M., **Faridi, W. A.,** Bakar, M. A., Muhammad, T., & Rezazadeh, H. (2023). Optical solitonic structures with singular and non-singular kernel for nonlinear fractional model in quantum mechanics. *Optical and Quantum Electronics,* 55(3), 1-20. doi :10.1007/s11082-022-04488-9. **Muhammad Imran Asjad, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: January 2023** **HJRS: W (Honorable Mention)**
The present study examines the nonlinear time-fractional model in the sense of a solitonic structure. A non-linear Schrödinger equation has applications in light scattering, indirect optical pulses as well as planer waves and to Bose-Einstein condensates enclosed in an anisotropic-shaped cigar, in a mean-field state, etc. A new extended direct algebraic method is utilized to get the soliton solutions with modified M-truncated and Atangana–Baleanu fractional operators which have Mittag-Leffler kernel. The obtained solutions contain new families of functions such as trigonometric, hyperbolic, rational, and exponential functions. The graphical 2D, 3D, contour, and also 3D spherical presentation pictorial the analysis with the feasible parametric values. On the evidence of the acquired solutions, it can be presumed that this technique is more effective and generalized to obtain solutions of many other non-linear partial differential equations that appear in different scientific disciplines.
https://doi.org/10.1007/s11082-022-04488-9

3. **Asjad, M. I., Faridi, W. A.,** Alhazmi, S. E., & Hussanan, A. (2023). The modulation instability analysis and generalized fractional propagating patterns of the Peyrard–Bishop DNA dynamical equation. *Optical and Quantum Electronics*, 55(3), 1-34. doi: 0.1007/s11082-022-04477-y. **Muhammad Imran Asjad, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: January 2023** **HJRS: W (Honorable Mention)**
This research examines the fractional Peyrard–Bishop DNA dynamical governing system, which displays the proliferation of optical pulses in field of plasma and the optical fibre. The analytical method is utilized to find travelling wave solutions because the inverse scattering transform cannot solve the Cauchy problem for this equation. The $\Phi 6\Phi 6$-model expansion method is an efficient and dependable technique for generating the generalised solitonic wave profiles with a wide range of soliton families. The main advantage of the offered analytical strategy is that it specifies a constraint for each solution to guarantee its existence. As a result, solitonic wave structures get attributes such as the Jacobi elliptic function, periodicity, brightness, dark-brightness, singularity, exponential, trigonometry, and rational solitonic structures, among others, under existence conditions that have not been explored previously. The results are represented graphically in 2-D, 3-D, and contour glimpses to illustrate the behavioural responses to pulse propagation by inferring the fitting values of system parameters. The stabilty of the considered model is discussed and develope the stability condition. The fractional parameter is responsible for reducing singularity and continuing to increase the smoothness in wave patterns. It is easy to employ the $\Phi 6\Phi 6$-model expansion method to other complicated non-linear systems and acquire solitary waves pattern.
https://link.springer.com/article/10.1007/s11082-022-04477-y

4. **Farman, M., Jamil, S., Riaz, M. B., Azeem, M., & Saleem, M. U. (2023). Numerical and quantitative analysis of HIV/AIDS model with modified Atangana-Baleanu in Caputo sense derivative.** *Alexandria Engineering Journal,* 66, 31-42. doi: 10.1016/j.aej.2022.11.034. **Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Silver)**

Fractional calculus plays an important role in the development of control strategies, the study of the dynamical transmission of diseases, and some other real-life problems nowadays. The time-fractional HIV/AIDS model is examined using a novel method in this paper. Based on the Atangana-concept Baleanu's of a derivative in the Caputo sense, the current modified fractional derivative operator uses singular and non-local kernels. This new modified fractional operator is given a numerical approximation and applied to the HIV/AIDS model. In the presence of this novel operator, we present some significant analysis for the HIV/AIDS epidemic model. The uniqueness and stability criteria of the model have been demonstrated using the Picard successive approximation approach and Banach's fixed point theory. The Laplace Adomian decomposition method (LADM) was used to obtain the numerical solution for the modified Atangana-Baleanu Caputo derivative model. The convergence analysis is verified for the proposed scheme. Finally, numerical results and simulations are derived with the proposed scheme for HIV/AIDS model. On the dynamics of HIV/AIDS transmission, the effects of many biological parameters are examined.
https://www.sciencedirect.com/science/article/pii/S1110016822007670

5. **Faridi, W. A., Asjad, M. I., Jhangeer, A., Yusuf, A., & Sulaiman, T. A. (2023). The weakly non-linear waves propagation for Kelvin–Helmholtz instability in the magnetohydrodynamics flow impelled by fractional theory.** *Optical and Quantum Electronics*, 55(2), 172. doi:10.1007/s11082-022-04410-3. **Waqas Ali Faridi, Muhammad Ali Asjad (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**

The weakly nonlinear wave propagation that occurs in the presence of magnetic fields, in which energy is concentrated in a narrow band of wave-numbers in a dispersive and dissipative fluid. The main objective of this paper is to analyze the $(2 + 1)$ - dimensional elliptic nonlinear Schrodinger equation under the influence of three different fractional operators. The generalized fractional soliton solutions and propagation of magnetohydrodynamics fluid in sort of solition will be visualized. The Conformable, β and M-truncated fractional operator applied to classical evolution Schrodinger equation. In order to get the analytical closed form solution, one of the generalized approach new extended direct algebraic method is utilized. The fractional nonlinear elliptic Schrodinger equation is developed in three different fractional sense. The similarity transformation technique converted the controlling fractional system to ordinary differential equations. The fractional analytical solutions such as, plane solution, mixed hyperbolic solution, periodic and mixed periodic solutions, mixed trigonometric solution, trigonometric solution, shock solution, mixed shock singular solution, mixed singular solution, complex solitary shock solution, singular solution and shock wave solutions are obtained. The graphical 2-D and 3-D representation of the results is shown to express the propagation of fluid with the magnetic field by assuming the appropriate values of the involved parameters. The graphical performance of the obtained solution at various settings of parametric values and fractional order reveals new perspectives and fascinating model phenomena. The attained outcomes have significant applications and have opened up innovative development areas for research across numerous scientific fields.
https://link.springer.com/article/10.1007/s11082-022-04410-3

6. **Saeed, M., Ahsan, M., Saeed, M. H., Rahman, A. U., Mohammed, M. A., Nedoma, J., & Martinek, R. (2023). An algebraic modeling for tuberculosis disease prognosis and proposed potential treatment methods using fuzzy hypersoft mappings.** *Biomedical Signal Processing and Control*, 80, 104267. doi: 10.1016/j.bspc.2022.104267. **Muhammad Saeed, Muhammad Ahsan, Atique-ur-Rehman (Mathematics/SSC) Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Silver)**

This study aimed to put forward an Avant-guard mathematical model for assisting the diagnostic process of this Mycobacterium (Tuberculosis (TB) bacterium) based on a novel adaptive fuzzy like structure. It is tough to ascertain the specific type of TB from its seriousness after looking at the symptoms as they overlap with numerous other respiratory infections. This structure, i.e., the fuzzy hypersoft set (FHS), extends the fuzzy soft set used to resolve this issue. The FHS is a more generalized, flexible and reliable algebraic model which is capable of managing the shortcomings of existing fuzzy soft set-like models with the entitlement of multi argument based domain for the approximation of TB patients (alternatives) under examination. It tackles the uncertain observations of medical experts for the approximation of patients with the help of fuzzy membership grade within [0,1]. When the measurements possess sub-values, it is problematic to see refinement in the patient's progression timelines and anticipate the prescription term in a clinical appraisal. This novel fuzzy-like theory categorizes the distinct attributes into corresponding disjoint attribute-valued sets for better interpretation. It is difficult to distinguish a single upper-respiratory infection due to the sheer number of infections that influence the lungs and associated breathing organs. This investigation involves monitoring and constructing a bridge between the presented symptoms and the treatment given to the patient. The FHS-mapping will recognize the severity of the disease and the proposition of adequate treatment for the patient.

The presented structure can prove to be an excellent diagnosis aiding tool as it has infinite analysis potential with mathematical interfacing with the patient's condition with time.
https://www.sciencedirect.com/science/article/pii/S1746809422007212

7. **Ur Rehman, M. A., Kazim, M., Ahmed, N., Raza, A., Rafiq, M., Akgül, A., ... & Zakarya, M. (2023). Positivity preserving numerical method for epidemic model of hepatitis B disease dynamic with delay factor.** *Alexandria Engineering Journal*, **64**, **505-515. doi: 10.1016/j.aej.2022.09.013.** **Muhammad Aziz ur Rehman, Muhammad Kazim** (Mathematics/SSC) Date of Publication: February 2023 **HJRS: W (Silver)**
This work attempts to study the numerical solution of nonlinear delayed Immunized Susceptible Latent Infected and Recovered (MSLIR) epidemic model of HBV disease. Reproduction number, equilibria and stability are discussed. Three different numerical techniques, Euler, RK-4 and the non-standard finite difference (NSFD) techniques are used for the numerical solution of the model. The proposed technique is independent of the size of the time step, while forward Euler and RK-4 depend on the size of a time step and retains all essential characteristics of the continuous MSLIR epidemic model like positivity and stability of equilibrium, while well-known forward Euler and RK-4 cannot sustain these characteristics. Therefore, the proposed (NSFD) technique becomes a more efficient and reliable numerical technique than the forward Euler and RK-4 scheme. Numerical simulations are presented for the validation of the obtained results.
https://www.sciencedirect.com/science/article/pii/S1110016822006007

8. **Ahmed, N., Akgül, A., Satti, A. M., Iqbal, Z., Raza, A., Rafiq, M., ... & Park, C. (2023). Analysis of fractional polio model with the Mittag-Leffler kernels.** *Alexandria Engineering Journal*, **64, 957-967. doi: 10.1016/j.aej.2022.08.025.** **Zafar Iqbal** (Mathematics/SSC) Date of Publication: February 2023 **HJRS: W (Silver)**
This article investigates the transmission of polio-virus disease in the human population. The classical model is considered for studying fatal disease. First of all, the model is converted into the fractal fractional epidemic model. Then, the existence of the solution for the said model is ensured with the help of the fixed point theory. Points of equilibria for the model are worked out. The basic reproduction number is described and its role in the disease communication and stability of the model is examined by some standard results. Simulated graphs are also plotted to support the pre-results and claims. Lastly, the findings of the study are presented.
https://www.sciencedirect.com/science/article/pii/S1110016822005555

9. **Nazeer, M., Irfan, M., Hussain, F., Siddique, I., Khan, M. I., Guedri, K., & Galal, A. M. (2023). Analytical study of heat transfer rate of peristaltic flow in asymmetric channel with laser and magnetic effects: Remedy for autoimmune disease.** *International Journal of Modern Physics B*, **37 (03), 2350025.doi: 10.1142/S021797922350025X.** **Muhammad Irfan, Imran Siddique** (Mathematics/SSC) Date of Publication: January 2023 **HJRS: X (Null)**
This paper addresses a hybrid nanoflow of Casson fluid. The theoretical formulation is derived by considering spherical and, as well as, platelet shape nanoparticles. Electro-osmotic flow (EOF) through an asymmetric channel endures the simultaneous effects of Joule heating, viscous dissipation and magnetic fields. Lubrication effects have also been taken into account to subdue the skin friction. Moreover, the contribution of thermal slip boundary conditions and laser radiation articulately devises a theoretical remedy for rheumatoid arthritis. Detailed parametric reveals the promising results for the application of spherical shape nanoparticles to curb autoimmune diseases.
https://www.worldscientific.com/doi/10.1142/S021797922350025X

10. **Siddique, I., Mehdi, K. B., Jarad, F., Elbrolosy, M. E., & Elmandouh, A. A. (2023). Novel precise solutions and bifurcation of traveling wave solutions for the nonlinear fractional (3+ 1)-dimensional WBBM equation.** *International Journal of Modern Physics B*, **37 (02), 2350011. doi: 10.1142/S021797922350011X.** **Imran Siddique, Khush Bukht Mehdi** (Mathematics/SSC) Date of Publication: January 2023 **HJRS: X (Null)**
The nonlinear fractional differential equations (FDEs) are composed by mathematical modeling through nonlinear corporeal structures. The study of these kinds of models has an energetic position in different fields of applied sciences. In this study, we observe the dynamical behavior of nonlinear traveling waves for the M-fractional (3 + 1)-dimensional Wazwaz-Benjamin-Bona-Mohany (WBBM) equation. Novel exact traveling wave solutions in the form of trigonometric, hyperbolic and rational functions are derived using (1/G'), modified (G'/G2) and new extended direct algebraic methods with the help of symbolic soft computation. We guarantee that all the obtained results are new and verified the main equation. To promote the essential propagated features, some investigated solutions are exhibited in the form of 2D and 3D graphics by passing on the precise values to the parameters under the constrain conditions, and this provides useful information about the dynamical behavior. Further, bifurcation behavior of nonlinear traveling waves of the proposed equation is studied with the help of bifurcation theory of planar dynamical systems. It is also observed that the proposed

equation support the nonlinear solitary wave, periodic wave, kink and antikink waves and most important supernonlinear periodic wave.
https://www.worldscientific.com/doi/abs/10.1142/S021797922350011X

11. **Aslam, A., Rehman, A. U., Amin, N., Amman, M., Akhtar, M., Morley, N. A., ... & Arshad, M. I. (2023). To study the structural, electrical, and magnetic properties of M (M= Mg2+, Mn2+, and Cd2+) doped Cu-Ni-Co-La spinel ferrites.** *Materials Chemistry and Physics,* **294, 127034.doi: 10.1016/j.matchemphys.2022.127034.** Muhammad Amman (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)
Tertiary $Cu_{0.25}Ni_{0.15}M_{0.25}Co_{0.35}La_{0.15}Fe_{1.85}O_4$ (M = Mg2+, Mn2+, and Cd2+) spinel ferrites powders were prepared using the cost-effective sol-gel auto combustion route. The lattice parameters, absorption and vibrational bands, energy band gap, AC conductivity, and dielectric loss of the as-prepared ferrites were all measured. The Cd2+ doped ferrite has a minimum crystallite size (D) of 50.9 nm, which is smaller compared to Mg2+ and Mn2+ doped ferrites. Furthermore, the X-ray diffraction (XRD), as well as Fourier transform infrared radiation (FTIR) and Raman analysis confirmed the doping of Mg2+, Mn2+, and Cd2+ ions on their respective lattice sites. The resistivity of the divalent ions (Mg2+, Mn2+, and Cd2+) doped ferrites decreased in the para region and increased in the ferro region as the temperature increased. Moreover, the resistivity of the Cd2+ doped ferrite was smaller when compared to the ferrites doped with Mg2+ and Mn2+ ions. From Arrhenius plots, the minimum activation energy (Δ E) 0.8671 eV was observed for Cd2+ doped ferrites. The Cd2+ substituted ferrite also has the smallest AC conductivity and dielectric loss compared to Mg2+ and Mn2+ substituted ferrites. The coercivity and saturation magnetization were 136.41 Oe and 92.29 emu/g for the Cd2+ doped ferrite, respectively. These results suggest that the Cd2+ doped ferrite material could be used in high-frequency and high-power applications.
https://www.sciencedirect.com/science/article/pii/S0254058422013402

12. **Asjad, M. I., Usman, M., Assiri, T. A., Ali, A., & Tag-ElDin, E. M. (2023). Numerical investigation of fractional Maxwell nano-fluids between two coaxial cylinders via the finite difference approach.** *Frontiers in Materials,* **9, 1050767.doi: 10.3389/fmats.2022.1050767.** Muhammad Imran Asjad, Arfan Ali (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)
This study deals with numerical solution of momentum and heat transfer of fractional ordered Maxwell fluids within a coaxial cylinder. It is well known that the complex dynamics of flow regime can be well-described by the fractional approach. In this paper, a fractional differentiation operator (Formula presented.) of Caputo was applied for fractional modeling of magneto-hydro-dynamic (MHD) fluid. A set of appropriate transformations was applied to make the governing equations dimensionless. The finite differences were calculated by the discretization of momentum profile (Formula presented.) and heat profile (Formula presented.). The results obtained for (Formula presented.) and (Formula presented.) were plotted against different physical parameters, such as Prandtl number (Formula presented.), the square of Hartmann number (Formula presented.), thermal Grashof number (Formula presented.) thermal radiation parameter (Formula presented.), and heat source/sink parameter (Formula presented.). The results were verified by comparing data from the proposed method with MAPLE built-in command results. Subjecting the system to a strong magnetic field led to increasing (Formula presented.) and decreasing (Formula presented.). It was found that increasing (Formula presented.) increased the velocity and temperature profiles. Addition of (Formula presented.) nanoparticles to a base fluid of (Formula presented.) enhanced its heat transfer capability. Also, increasing the angular frequency of inner cylinder velocity resulted in a high velocity profile of fractional Maxell nano-fids within a coaxial region (cylinder).
https://www.frontiersin.org/articles/10.3389/fmats.2022.1050767/full

13. **Alrowaili, D. A., Farid, F., & Javaid, M. (2023). Gutman Connection Index of Graphs under Operations.** *Symmetry,* **15(1), 21. doi: 10.3390/sym15010021.** Faiz Farid, Muhammad Javaid (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)
In the modern era, mathematical modeling consisting of graph theoretic parameters or invariants applied to solve the problems existing in various disciplines of physical sciences like computer sciences, physics, and chemistry. Topological indices (TIs) are one of the graph invariants which are frequently used to identify the different physicochemical and structural properties of molecular graphs. Wiener index is the first distance-based TI that is used to compute the boiling points of the paraffine. For a graph F, the recently developed Gutman Connection (GC) index is defined on all the unordered pairs of vertices as the sum of the multiplications of the connection numbers and the distance between them. In this note, the (Formula presented.) index of the operation-based symmetric networks called by first derived graph (Formula presented.) (subdivision graph), second derived graph (Formula presented.) (vertex-semitotal graph), third derived graph (Formula presented.) (edge-semitotal graph) and fourth derived graph (Formula presented.) (total graph) are computed in their general expressions consisting of various TIs of the parent graph F, where these operation-based symmetric graphs are obtained by applying the operations of subdivision, vertex semitotal, edge semitotal and the total on the graph F respectively.
https://www.mdpi.com/2073-8994/15/1/21

14. **Alam, K. H., Rohen, Y., & Saleem, N. (2023). Fixed Points of (α, β, F*) and (α, β, F**)-Weak Geraghty Contractions with an Application.** *Symmetry,* **15(1), 243. doi: 10.3390/sym15010243. Naeem Saleem (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
This study aims to provide some new classes of (Formula presented.) -weak Geraghty contraction and (Formula presented.) -weak Geraghty contraction, which are self-generalized contractions on any metric space. Furthermore, we find that the mappings satisfying the definition of such contractions have a unique fixed point if the underlying space is complete. In addition, we provide an application showing the uniqueness of the solution of the two-point boundary value problem.
https://www.mdpi.com/2073-8994/15/1/243

15. **Abu Bakar, M., Owyed, S., Faridi, W. A., Abd El-Rahman, M., & Sallah, M. (2023). The First Integral of the Dissipative Nonlinear Schrödinger Equation with Nucci's Direct Method and Explicit Wave Profile Formation.** *Fractal and Fractional,* **7(1), 38.doi: 10.3390/fractalfract7010038. Muhammad Abu Bakar, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
The propagation of optical soliton profiles in plasma physics and atomic structures is represented by the (Formula presented.) dimensional Schrödinger dynamical equation, which is the subject of this study. New solitary wave profiles are discovered by using Nucci's scheme and a new extended direct algebraic method. The new extended direct algebraic approach provides an easy and general mechanism for covering 37 solitonic wave solutions, which roughly corresponds to all soliton families, and Nucci's direct reduction method is used to develop the first integral and the exact solution of partial differential equations. Thus, there are several new solitonic wave patterns that are obtained, including a plane solution, mixed hyperbolic solution, periodic and mixed periodic solutions, a mixed trigonometric solution, a trigonometric solution, a shock solution, a mixed shock singular solution, a mixed singular solution, a complex solitary shock solution, a singular solution, and shock wave solutions. The first integral of the considered model and the exact solution are obtained by utilizing Nucci's scheme. We present 2-D, 3-D, and contour graphics of the results obtained to illustrate the pulse propagation characteristics while taking suitable values for the parameters involved, and we observed the influence of parameters on solitary waves. It is noticed that the wave number (Formula presented.) and the soliton speed (Formula presented.) are responsible for controlling the amplitude and periodicity of the propagating wave solution.
https://www.mdpi.com/2504-3110/7/1/38

16. **Zhou, M., Saleem, N., Ali, B., Mohsin, M., & López de Hierro, A. F. R. (2023). Common Best Proximity Points and Completeness of $\mathcal{F}$– Metric Spaces.** *Mathematics,* **11(2), 281.doi: 10.3390/math11020281. Naeem Saleem, Basit Ali, Misha Mohsin (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
In this paper, we introduce three classes of proximal contractions that are called the proximally (Formula presented.) dominated contractions, generalized (Formula presented.) proximal contractions and Berinde-type weak proximal contractions, and obtain common best proximity points for these proximal contractions in the setting of (Formula presented.) metric spaces. Further, we obtain the best proximity point result for generalized (Formula presented.) proximal contractions in (Formula presented.) metric spaces. As an application, fixed point and coincidence point results for these contractions are obtained. Some examples are provided to support the validity of our main results. Moreover, we obtain a completeness characterization of the (Formula presented.) metric spaces via best proximity points.
https://www.mdpi.com/2227-7390/11/2/281

17. **Shaikh, T. S., Akgül, A., Rehman, M. A. U., Ahmed, N., Iqbal, M. S., Shahid, N., ... & De la Sen, M. (2023). Analysis of a Modified System of Infectious Disease in a Closed and Convex Subset of a Function Space with Numerical Study.** *Axioms,* **12(1), 79.doi: 10.3390/axioms12010079. Muhammad Aziz ur Rehman (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
In this article, the transmission dynamical model of the deadly infectious disease named Ebola is investigated. This disease identified in the Democratic Republic of Congo (DRC) and Sudan(now South Sudan) and was identified in 1976. The novelty of the model under discussion is the inclusion of advection and diffusion in each compartmental equation. The addition of these two terms makes the model more general. Similar to a simple population dynamic system, the prescribed model also has two equilibrium points and an important threshold, known as the basic reproductive number..The current work comprises the existence and uniqueness of the solution, the numerical analysis of the model, and finally, the graphical simulations. In the section on the existence and uniqueness of the solutions, the optimal existence is assessed in a closed and convex subset of function space. For the numerical study, a nonstandard finite difference (NSFD) scheme is adopted to approximate the solution of the continuous mathematical model. The main reason for the adoption of this technique is delineated in the form of the positivity of the state variables, which is necessary for any population model. The positivity of the applied scheme is verified by the concept of M-matrices. Since the numerical method gives a discrete system of difference equations corresponding to a continuous system, some other

relevant properties are also needed to describe it. In this respect, the consistency and stability of the designed technique are corroborated by using Taylor's series expansion and Von Neumann's stability criteria, respectively. To authenticate the proposed NSFD method, two other illustrious techniques are applied for the sake of comparison. In the end, numerical simulations are also performed that show the efficiency of the prescribed technique, while the existing techniques fail to do so.
https://www.mdpi.com/2075-1680/12/1/79

18. **Zulqarnain, R. M., Ma, W. X., Eldin, S. M., Mehdi, K. B., & Faridi, W. A. (2023). New Explicit Propagating Solitary Waves Formation and Sensitive Visualization of the Dynamical System.** *Fractal and Fractional,* **7(1), 71.doi: 10.3390/fractalfract7010071. Khush Bukht Mehdi, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
This work discusses the soliton solutions for the fractional complex Ginzburg–Landau equation in Kerr law media. It is a particularly fascinating model in this context as it is a dissipative variant of the Hamiltonian nonlinear Schrödinger equation with solutions that create localized singularities in finite time. The (Formula presented.) -model technique is one of the generalized methodologies exerted on the fractional complex Ginzburg–Landau equation to find the new solitary wave profiles. As a result, solitonic wave patterns develop, including Jacobi elliptic function, periodic, dark, bright, single, dark-bright, exponential, trigonometric, and rational solitonic structures, among others. The assurance of the practicality of the solitary wave results is provided by the constraint condition corresponding to each achieved solution. The graphical 3D and contour depiction of the attained outcomes is shown to define the pulse propagation behaviors while imagining the pertinent data for the involved parameters. The sensitive analysis predicts the dependence of the considered model on initial conditions. It is a reliable and efficient technique used to generate generalized solitonic wave profiles with diverse soliton families. Furthermore, we ensure that all results are innovative and mark remarkable impacts on the prevailing solitary wave theory literature.
https://www.mdpi.com/2504-3110/7/1/71

19. **Asjad, M. I., Karim, R., Hussanan, A., Iqbal, A., & Eldin, S. M. (2023). Applications of Fractional Partial Differential Equations for MHD Casson Fluid Flow with Innovative Ternary Nanoparticles.** *Processes*, **11(1), 218.doi: 10.3390/pr11010218. Muhammad Imran Asjad, Rizwan Karim (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**
This study deals with the modeling issues of the transport problem with a fractional operator. The fractional model with generalized Fourier's law is discussed for Casson fluid flow over a flat surface. The dimensionless governing model is solved with the Laplace transform method, and the different comparisons are plotted from the obtained solutions. Other features of the problem have been analyzed instead of the symmetric behavior of the properties for different values of the fractional parameter. As a result, the ternary nanoparticles approach can be used to improve the fluid properties better than hybrid and mono nanoparticles. Further, it is evident that the law-based fractional model is more accurate and efficient in fitting any experimental data instead of an artificial replacement.
https://www.mdpi.com/2227-9717/11/1/218

20. **Zahra, A., Mardan, S. A., & Noureen, I. (2023). Analysis of heat flow in the post-quasi-static approximation for gravitational collapse in five dimension.** *The European Physical Journal C,* **83(1), 51.doi: 10.1140/epjc/s10052-023-11205-7. Anam Zahra, Syed Ali Mardan (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Platinum)**
In this work, a generalized framework of the post-quasistatic approximation in higher dimensional non-comoving coordinates is presented. We study the evolution of adiabatically radiating and dissipative fluid configuration in higher dimensional post-quasi-static approximation. An iterative method for describing self-gravitating spheres is developed for this purpose. Dissipation is described by free-streaming radiation and heat flux. We match the higher dimensional interior solution, in non-comoving coordinates, with the corresponding Vaidya exterior solution. The generalized form of post-quasistatic approximation leads to a system of higher dimensional surface equations. The surface equations are of significant importance in the understanding of the physical phenomenon like luminosity, Doppler shift and red-shift at the boundary surface of gravitating sources.
https://link.springer.com/article/10.1140/epjc/s10052-023-11205-7

21. **Shaikh, T. S., Akgül, A., Rehman, M. A. U., Ahmed, N., Iqbal, M. S., Shahid, N., ... & De la Sen, M. (2023). A Nonlinear Structure of a Chemical Reaction Model and Numerical Modeling with the New Aspect of Existence and Uniqueness.** *Mathematics*, **11(1), 37.doi: 10.3390/math11010037. Muhammad Aziz ur Rehman (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
In this article, a nonlinear autocatalytic chemical reaction glycolysis model with the appearance of advection and diffusion is proposed. The occurrence and unicity of the solutions in Banach spaces are investigated. The solutions to these types of models are obtained by the optimization of the closed and convex subsets of the function space. Explicit estimates of the solutions for the admissible auxiliary data are formulated. An elegant

numerical scheme is designed for an autocatalytic chemical reaction model, that is, the glycolysis model. The fundamental traits of the prescribed numerical method, for instance, the positivity, consistency, stability, etc., are also verified. The authenticity of the proposed scheme is ensured by comparing it with two extensively used numerical techniques. A numerical example is presented to observe the graphical behavior of the continuous system by constructing the numerical algorithm. The comparison depicts that the projected numerical design is more productive as compared to the other two schemes, as it holds all the important properties of the continuous model.

https://www.mdpi.com/2227-7390/11/1/37

22. **Algehyne, E. A., Abd El-Rahman, M., Faridi, W. A., Asjad, M. I., & Eldin, S. M. (2023). Lie point symmetry infinitesimals, optimal system, power series solution, and modulational gain spectrum to the mathematical Noyes–Field model of nonlinear homogeneous oscillatory Belousov–Zhabotinsky reaction.** *Results in Physics,* **44, 106123.doi: 10.1016/j.rinp.2022.106123**. Waqas Ali Faridi, Muhammad Imran Asjad **(Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

The chemical oscillators are identified as open system that demonstrate periodic changes in the concentration of some reaction species as a result of intricate physico-chemical mechanisms which can lead to bi-stability, the occurrence of limit cycle attractors, the emergence of spiral waves and turing patterns, and finally, deterministic chaos. Objectives: The main objective of this paper is to analyze the simple Noyes–Field governing system of differential equations for the nonlinear Belousov–Zhabotinsky reaction which delineates the non-linear oscillatory behavior of chemical systems that occurs in the homogeneous media. Methodology: The Lie symmetry invariance analysis performed to extract the symmetries infinitesimal generators and the adjoint representation carried out to develop optimal system for the obtained Lie vectors. The significant power series approach applied to obtain the analytical solution. The modulation instability criteria ensured the stability of nonlinear oscillatory Belousov–Zhabotinsky reaction process. Results: The one-dimensional Lie symmetry generators algebra of the mathematical Noyes–Field governing system for oscillatory reaction is established. Furthermore, similarity reductions are carried out as well as the development of an optimal system of the sub-algebras. The similarity transformation technique converted the controlling system to ordinary differential equations and generates the large quantity of analytical traveling wave solutions. Moreover, the closed-form analytical solution for the proposed homogeneous nonlinear oscillatory chemical process is secured. The (MI) gain spectrum graphically visualized with the suitable choice of arbitrary parameters. Conclusion: The graphical performance of the Noyes–Field model solution at various settings reveals new perspectives and fascinating model phenomena. The attained outcomes have significant applications and have opened up innovative development areas for research across numerous scientific fields.

https://www.sciencedirect.com/science/article/pii/S2211379722007379

23. **Alhebshi, R. M., Ahmed, N., Baleanu, D., Fatima, U., Dayan, F., Rafiq, M., . . . Mahmoud, E. E. (2023). Modeling of Computer Virus Propagation with Fuzzy Parameters.** *Computers, Materials and Continua,* **74(3), 5663-5678. doi: 10.32604/cmc.2023.033319.** Fazal Dayan **(Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

Typically, a computer has infectivity as soon as it is infected. It is a reality that no antivirus programming can identify and eliminate all kinds of viruses, suggesting that infections would persevere on the Internet. To understand the dynamics of the virus propagation in a better way, a computer virus spread model with fuzzy parameters is presented in this work. It is assumed that all infected computers do not have the same contribution to the virus transmission process and each computer has a different degree of infectivity, which depends on the quantity of virus.Considering this, the parameters β and γ being functions of the computer virus load, are considered fuzzy numbers. Using fuzzy theory helps us understand the spread of computer viruses more realistically as these parameters have fixed values in classical models. The essential features of the model, like reproduction number and equilibrium analysis, are discussed in fuzzy senses.Moreover, with fuzziness, two numerical methods, the forward Euler technique, and a nonstandard finite difference (NSFD) scheme, respectively, are developed and analyzed. In the evidence of the numerical simulations, the proposed NSFD method preserves the main features of the dynamic system. It can be considered a reliable tool to predict such types of solutions.

https://www.techscience.com/cmc/v74n3/50905

24. **Qureshi, M. Z. A., Raza, Q., Eldin, S. M., Zafar, M., Ali, B., & Siddique, I. (2023). Thermal performance of hybrid magnetized nanofluids flow subject to joint impact of ferro oxides/CNT nanomaterials with radiative and porous factors.** *Case Studies in Thermal Engineering,* **41, 102648.doi: 10.1016/j.csite.2022.102648.** Imran Siddique **(Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Silver)**

We discussed the thermal performance of hybrid nanofluid flow in the presence of ferroxidase and carbon nanotube nanoparticles. Furthermore, under the impact of magnetohydrodynamics and the Reynolds number, which is related to expansion and contraction phenomena. We simultaneously examine the effects of heat radiation and porosity. The suitable similarity transformation is applied and then the mathematical problem has

been solved by employing the numerical shooting method. Plots of the skin friction coefficient, temperature, and Nusselt number on various non-dimensionless parameters are shown via the bottom and upper porous walls. The thickness of the nano-layer, the ionic radii, and the shape of the hybrid nanoparticles with volume fraction, have fruitful results related to industrial sciences. Hybrid nano-fluids, as opposed to conventional nano-fluids, are a good means of heat transmission. Hybrid nanoparticles contain $2 \to 4\%$ volume fractions having a significant effect on skin friction. Overall, the magnitude values of Reynolds number $1 \to 4$, enhance the Nusselt number. Thermal radiation in the presence of nanoparticles with hybrid nanomaterials volume fraction 1% has a fruitful impact on heat transfer rate.
https://www.sciencedirect.com/science/article/pii/S2214157X22008851

25. **Bilal, M., Ramzan, M., Siddique, I., & Sajjad, A. (2023). Magneto-micropolar nanofluid flow through the convective permeable channel using Koo–Kleinstreuer–Li model.** *Journal of Magnetism and Magnetic Materials***, *565* 170288.doi: 10.1016/j.jmmm.2022.170288. Imran Siddique (Mathematics/SSC). Date of Publication: January 2023 HJRS: W (Bronze)**

The major purpose of this paper is to determine the heat and flow properties of a non-Newtonian micropolar nanofluid through a micropolar channel having porous walls in the presence of a changing magnetic field by investigating the hydrothermal behavior. One of the plates gets heated from outside through some external source, while the other, into which the cold fluid is introduced, dilate, or shrinks over time. The effect of aluminum oxide (Al_2O_3) nanoparticles with H_2O as base fluid is studied. The KKL (Koo–Kleinstreuer–Li) model is operated to determine the influence of thermal conductivity and viscosity of the nanofluid. The unsteady Navier–Stokes equations of the problem have been simulated in terms of similarity transformation whose results are reduced to a generalized Proudman–Johnson equation, retaining the effect of wall motion with physical conditions. The mathematical results for the stream function and heat transfer characteristics are determined using the shooting technique. MATLAB software is used for the numerical operations. Graphical outcomes are discussed in detail for the several physical parameters and associated dynamic characteristics especially expansion ratio, power low index, Reynolds number, Prandtl number, angular/microrotation velocity, volume fraction, and Hartman number on the velocity and temperature distribution. As the Hartmann number rises, it is observed that the fluid's velocity reverses from the lower to higher portions of the cylinder. The microrotational velocity also gets higher for the higher Hartmann number.
https://www.sciencedirect.com/science/article/pii/S0304885322011738

26. **Arshad, S., Siddique, I., Nawaz, F., Shaheen, A., & Khurshid, H. (2023). Dynamics of a fractional order mathematical model for COVID-19 epidemic transmission.** *Physica A: Statistical Mechanics and its Applications,* **609, 128383.doi: 10.1016/j.physa.2022.128383. Imran Siddique (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

To achieve the aim of immediately halting spread of COVID-19 it is essential to know the dynamic behavior of the virus of intensive level of replication. Simply analyzing experimental data to learn about this disease consumes a lot of effort and cost. Mathematical models may be able to assist in this regard. Through integrating the mathematical frameworks with the accessible disease data it will be useful and outlay to comprehend the primary components involved in the spreading of COVID-19. There are so many techniques to formulate the impact of disease on the population mathematically, including deterministic modeling, stochastic modeling or fractional order modeling etc. Fractional derivative modeling is one of the essential techniques for analyzing real-world issues and making accurate assessments of situations. In this paper, a fractional order epidemic model that represents the transmission of COVID-19 using seven compartments of population susceptible, exposed, infective, recovered, the quarantine population, recovered–exposed, and dead population is provided. The fractional order derivative is considered in the Caputo sense. In order to determine the epidemic forecast and persistence, we calculate the reproduction number $R0$. Applying fixed point theory, the existence and uniqueness of the solutions of fractional order derivative have been studied. Moreover, we implement the generalized Adams–Bashforth–Moulton method to get an approximate solution of the fractional-order COVID-19 model. Finally, numerical result and an outstanding graphic simulation are presented.
https://www.sciencedirect.com/science/article/pii/S0378437122009414

27. **Faridi, W. A., Asghar, U., Asjad, M. I., Zidan, A. M., & Eldin, S. M. (2023). Explicit propagating electrostatic potential waves formation and dynamical assessment of generalized Kadomtsev–Petviashvili modified equal width-Burgers model with sensitivity and modulation instability gain spectrum visualization.** *Results in Physics***, *44*, 106167.doi: 10.1016/j.rinp.2022.106167. Waqas Ali Faridi, Umair Asghar, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

The major motive of this study is to analyze the nonlinear integrable model which is generalized Kadomtsev–Petviashvili modified equal width-Burgers equation. It can be utilized extensively a weakly non-linear restoring forces, dispersion, small damping and nonlinear media with dissipation to narrate the long wave propagation in chemical theory. This article allocates the partial differential equation by traveling waves transformation into an ordinary differential equation. In order to acquire the analytical propagating structures, one of the

generalized techniques, new extended direct algebraic methodology utilizers. As a consequence, we establish the mixed singular solution, singular solution, mixed shock-singular solution, mixed complex solitary-shock solution, mixed periodic results, mixed trigonometric results have been derived in the formation of a mixed periodic and periodic class, the mixed hyperbolic solution, plane solution, which is derived via Mathematica. The Chaos investigation is carried out to envision the dynamical insights of ocean wave integrable model. The sensitive analysis performed to verify the perceptiveness of model regarding parameters and initial conditions. Modulational instability gain spectrum developed and envisaged with appropriate parametric values and ensured the stability of the considered model. In addition, two-dimension, three-dimension, and contour surfaces are embellished to validate the physical properties of the derived solutions. The developed electro potential soliton structures can reveal the deep atomic insights. The dynamics of physical phenomenon can be controlled by fractional parameter.

https://www.sciencedirect.com/science/article/pii/S2211379722007884

28. **Zulqarnain, R. M., Ma, W. X., Siddique, I., Hussain, S., Gurmani, F. J., & Ahamad, M. I. (2023). Extension of aggregation operators to site selection for solid waste management under neutrosophic hypersoft set.** *AIMS Mathematics*, **8**(2), 4168-4201.doi: 10.3934/math.2023208. **Imran Siddiqui (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)**

With the fast growth of the economy and rapid urbanization, the waste produced by the urban population also rises as the population increases. Due to communal, ecological, and financial constrictions, indicating a landfill site has become perplexing. Also, the choice of the landfill site is oppressed with vagueness and complexity due to the deficiency of information from experts and the existence of indeterminate data in the decision-making (DM) process. The neutrosophic hypersoft set (NHSS) is the most generalized form of the neutrosophic soft set, which deals with the multi-sub-attributes of the alternatives. The NHSS accurately judges the insufficiencies, concerns, and hesitation in the DM process compared to IFHSS and PFHSS, considering the truthiness, falsity, and indeterminacy of each sub-attribute of given parameters. This research extant the operational laws for neutrosophic hypersoft numbers (NHSNs). Furthermore, we introduce the aggregation operators (AOs) for NHSS, such as neutrosophic hypersoft weighted average (NHSWA) and neutrosophic hypersoft weighted geometric (NHSWG) operators, with their necessary properties. Also, a novel multi-criteria decision-making (MCDM) approach has been developed for site selection of solid waste management (SWM). Moreover, a numerical description is presented to confirm the reliability and usability of the proposed technique. The output of the advocated algorithm is compared with the related models already established to regulate the favorable features of the planned study.

http://www.aimspress.com/article/doi/10.3934/math.2023208

29. **Rahman, A. U., Saeed, M., Mohammed, M. A., Al-Waisy, A. S., Kadry, S., & Kim, J. (2023). An innovative fuzzy parameterized MADM approach to site selection for dam construction based on sv-complex neutrosophic hypersoft set.** *AIMS Mathematics*, **8**(2), 4907-4929.doi: 10.3934/math.2023245. **Atiqe ur Rehman, Muhammad Saeed (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)**

Dams are water reservoirs that provide adequate freshwater to residential, industrial, and mining sites. They are widely used to generate electricity, control flooding, and irrigate agricultural lands. Due to recent urbanization trends, industrialization, and climatic changes, the construction of dams is in dire need, which is planning intensive, quite expensive, and time-consuming. Moreover, finding an appropriate site to construct dams is also considered a challenging task for decision-makers. The dam site selection problem (DSSP) has already been considered a multi-criteria decision-making (MCDM) problem under uncertain (fuzzy set) environments by several researchers. However, they ignored some essential evaluating features (e.g., (a) fuzzy parameterized grades, which assess the vague nature of parameters and sub-parameters, (b) the hypersoft setting, which provides multi-argument-based domains for the approximation of alternatives, (c) the complex setting which tackles the periodicity of data, and (d) the single-valued neutrosophic setting which facilitates the decision makers to provide their opinions in three-dimensional aspects) that can be used in DSSP to make it more reliable and trustworthy. Thus this study aims to employ a robust fuzzy parameterized algebraic approach which starts with the characterization of a novel structure "fuzzy parameterized single valued complex neutrosophic hypersoft set (˜λ-set)" that is competent to deal with the above-mentioned features jointly. After that, it integrates the concept of fuzzy parameterization, decision-makers opinions in terms of single-valued complex neutrosophic numbers, and the classical matrix theory to compute the score values for evaluating alternatives. Based on the stages of the proposed approach, an algorithm is proposed, which is further explained by an illustrative example in which DSSP is considered a multiple attributes decision-making (MADM) scenario. The computed score values are then used to evaluate some suitable sites (regions) for dam construction. The computational results of the proposed algorithm are found to be precise and consistent through their comparison with some already developed approaches.

http://www.aimspress.com/article/doi/10.3934/math.2023245

30. **Ihsan, M., Saeed, M., Rahman, A. U.,** Kamacı, H., & Ali, N. (2023). An MADM-based fuzzy parameterized framework for solar panels evaluation in a fuzzy hypersoft expert set environment. *Aims mathematics*, *8*(2), 3403-3427.doi: 10.3934/math.2023175. Muhammad Ihsan, Muhammad Saeed, Atiqe ur Rehman (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)

The selection of parameters plays a vital role in the multi-attribute decision-making process. In some situations, it is observed that the nature of parameters is ambiguous and a multi-decisive opinion is necessary for managing such parametric uncertainty. In the literature, there is no suitable model that can cope with such situations. This study was purposed to develop a novel context called the fuzzy parameterized fuzzy hypersoft expert set (FPFHSE-set), which is capable of managing the uncertain nature of parameters and the multi-decisive opinion of experts collectively in one model. In this way, the proposed model may be described as the generalization of the existing model fuzzy parameterized fuzzy soft expert set (FPFSE-set). Theoretic, axiomatic and algorithmic approaches have been employed for the characterization of the basic notions of the FPFHSE-set. In order to handle multi-attribute decision-making, two algorithms are proposed and then validated by applying them to some real-world scenarios in the FPFHSE-set environment. The merits and superiority of the new algorithms are presented by comparing them with some existing fuzzy decision-making models. According to the proposed FPFHSE-set-based decision-making approaches, the experts have more freedom in specifying their preferences and thoughts according to their expertise, and they can process new types of data. Therefore, this paper presents a state-of-the-art improvement that provides a holistic view to understand and handle the multi-attribute decision-making issues focused on the objective of classifying alternatives according to multiple attributes by multiple experts.

https://www.aimspress.com/aimspress-data/math/2023/2/PDF/math-08-02-175.pdf

31. **Ashraf, A., Javed, F., Zhang, Z., & Fatima, G.** (2023). Traversable wormholes solutions in f ($\mathcal{R}$, φ, χ) gravity under conformal symmetry. *International Journal of Geometric Methods in Modern Physics*, *20*(1), 2350014-412. doi: 10.1142/S0219887823500147. Ghulam Fatima (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)

The present analysis deals with the wormhole (WH) solutions in f($\mathcal{R}$,φ,χ) gravity, where $\mathcal{R}$, χ and φ represent the Ricci scalar, kinetic expression and potential field, respectively. To complete this analysis, we use the WH geometry via spherical spacetime with the anisotropic matter distribution. Further, we consider the Gaussian distribution as non-commutative geometry to complete the analysis under conformal symmetry. We calculate the exact WH shape function by plugging the possible conformal Killing vectors. Further, we have discussed the embedded surface to understand the WH geometry. Furthermore, the Tolman-Oppenheimer-Volkoff equation is considered to discuss the stability of WH configuration with the Gaussian energy density source.

https://www.worldscientific.com/doi/abs/10.1142/S0219887823500147

32. **Ahmad, B., Ahmad, M. O., Farman, M., Akgül, A., & Riaz, M. B.** (2023). A significance of multi slip condition for inclined MHD nano-fluid flow with non linear thermal radiations, Dufuor and Sorrot, and chemically reactive bio-convection effect. *South African Journal of Chemical Engineering*, *43*, 135-145.doi: 10.1016/j.sajce.2022.10.009. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)

The aim of this research is to discuss the significance of slip conditions for magnetized nanofluid flow with the impact of nonlinear thermal radiations, activation energy, inclined MHD, sorrot and dufour, and gyrotactic micro motile organisms over continuous stretching of a two-dimensional sheet. The governing equations emerge in the form of partial differential equations. Since the resultant governing differential equations are nonlinear, the partial differential equations are transformed into ordinary differential equations using a workable similarity transformation. By using the Bvp4c module of the MATLAB program, the simplified mathematical framework can be numerically solved. The computation of Coefficients of skin friction, Nusselt numbers, different patterns of velocity profiles, fluid temperature, and concentration profiles reveals the physical nature of this study. As compared to earlier investigations, it was found that the obtained results demonstrated high degrees of symmetry and precision. A decline observes in velocity for boosted values of MHD, inclination, and rotatory parameter. However thermal transportation increases by increasing brownien motion, thermophoresis, radiation and Sorrot effect. The study has significant application in heat control systems, food factories, thermal exchangers, biomechanics, biomedical engineering, and aero dynamical systems.

https://www.sciencedirect.com/science/article/pii/S1026918522000968

33. **Iqbal, Z., Rehman, M. A. U., Imran, M., Ahmed, N., Fatima, U., Akgül, A., . . . Jarad, F.** (2023). A finite difference scheme to solve a fractional order epidemic model of computer virus. *AIMS Mathematics, 8*(1), 2337-2359. doi: 10.3934/math.2023121. Muhammad Aziz ur Rehman (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)

In this article, an analytical and numerical analysis of a computer virus epidemic model is presented. To more thoroughly examine the dynamics of the virus, the classical model is transformed into a fractional order model. The Caputo differential operator is applied to achieve this. The Jacobian approach is employed to investigate

the model's stability. To investigate the model's numerical solution, a hybridized numerical scheme called the Grunwald Letnikov nonstandard finite difference (GL-NSFD) scheme is created. Some essential characteristics of the population model are scrutinized, including positivity boundedness and scheme stability. The aforementioned features are validated using test cases and computer simulations. The mathematical graphs are all detailed. It is also investigated how the fundamental reproduction number R_0 functions in stability analysis and illness dynamics.

https://www.aimspress.com/article/doi/10.3934/math.2023121

34. Javed, F., **Fatima, G.,** Mustafa, G., & Övgün, A. (2023). Effects of variable equations of state on the stability of nonlinear electrodynamics thin-shell wormholes. *International Journal of Geometric Methods in Modern Physics,* 20(01), 2350010. doi: 10.1142/s021988782350010x. **Ghulam Fatima (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**

This paper explores the role of nonlinear electrodynamics on the stable configuration of thin-shell wormholes formulated from two equivalent geometries of Reissner-Nordström black hole with nonlinear electrodynamics. For this purpose, we use cut and paste approach to eliminate the central singularity and event horizons of the black hole geometry. Then, we explore the stability of the developed model by considering different types of matter distribution located at thin-shell, i.e. barotropic model and variable equations of state (phantomlike variable and Chaplygin variable models). We use linearized radial perturbation to explore the stable characteristics of thin-shell wormholes. It is interesting to mention that Schwarzschild and Reissner-Nordström black holes show the unstable configuration for such type of matter distribution while Reissner-Nordström black hole with nonlinear electrodynamics expresses stable regions. It is found that the presence of nonlinear electrodynamics gives the possibility of a stable structure for barotropic as well as variable models. It is concluded that stable region increases for these models by considering higher negative values of coupling constant α and the real constant n.

https://www.worldscientific.com/doi/epdf/10.1142/S021988782350010X

35. **Siddique, I.,** Khan, Y., **Nadeem, M.,** Awrejcewicz, J., & Bilal, M. (2023). Significance of heat transfer for second-grade fuzzy hybrid nanofluid flow over a stretching/shrinking Riga wedge. *AIMS Mathematics,* 8(1), 295-316. doi: 10.3934/math.2023014. **Imran Siddidue, Muhammad Nadeem (Mathematics)/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**

This investigation presents the fuzzy nanoparticle volume fraction on heat transfer of second-grade hybrid Al_2O_3 +Cu/EO nanofluid over a stretching/shrinking Riga wedge under the contribution of heat source, stagnation point, and nonlinear thermal radiation. Also, this inquiry includes flow simulations using modified Hartmann number, boundary wall slip and heat convective boundary condition. Engine oil is used as the host fluid and two distinct nanomaterials (Cu and Al_2O_3) are used as nanoparticles. The associated nonlinear governing PDEs are intended to be reduced into ODEs using suitable transformations. After that `bvp4c,' a MATLAB technique is used to compute the solution of said problem. For validation, the current findings are consistent with those previously published. The temperature of the hybrid nanofluid rises significantly more quickly than the temperature of the second-grade fluid, for larger values of the wedge angle parameter, the volume percentage of nanomaterials. For improvements to the wedge angle and Hartmann parameter, the skin friction factor improves. Also, for the comparison of nanofluids and hybrid nanofluids through membership function (MF), the nanoparticle volume fraction is taken as a triangular fuzzy number (TFN) in this work. Membership function and σ -cut are controlled TFN which ranges from 0 to 1. According to the fuzzy analysis, the hybrid nanofluid gives a more heat transfer rate as compared to nanofluids. Heat transfer and boundary layer flow at wedges have recently received a lot of attention due to several metallurgical and engineering physical applications such as continuous casting, metal extrusion, wire drawing, plastic, hot rolling, crystal growing, fibreglass and paper manufacturing.

http://www.aimspress.com/article/doi/10.3934/math.2023014

36. **Zahid, M., Siddique, I.,** & Ali, R. (2023). Coating of a viscoplastic material onto a moving porous web during forward roll coating process: A theoretical study. *Journal of Plastic Film & Sheeting,* 39(1), 19-51. doi: 10.1177/87560879221113638. **Imran Siddique (Mathematics/SSC) Date of Publication: January 2023 HJRS: X (Clay)**

In this paper, a mathematical model of forward roll for coating a thin viscoplastic fluid onto a moving porous web is developed when the web passes through a small gap between the two rigid rolls. The conservation equations in the light of lubrication approximation theory are non-dimensionalized and solutions for the velocity profile, flow rate, pressure distribution are calculated numerically by using Range-Kutta-Fehlberg's method. It is found that by changing (increasing/decreasing) the material parameters, one can really control the engineering quantities like velocity distribution, flow rate, pressure distribution, and penetration depth. The velocity graphs show that the gap between the velocity curves decrease, as fluid moves toward the separation point. This has a significant effect on the final volume of fluid flowing as at the separation point the fluid splits evenly. It was also found that the degree of fluid penetration is affected by the web flexibility and permeability.

It has also been found that viscoelastic parameter and ratio of viscous to elastic forces have great impact on the emerging parameters, furthermore, the pressure gradient has been significantly affected with the variation in permeability and deformability. It is worth mentioning that the present study is a quick reference for the engineer working in coating industries and to compare the results with experimental data. Some results are shown graphically.
https://journals.sagepub.com/doi/abs/10.1177/87560879221113638

37. **Manzoor, R., Awais Sadiq, M., & Hussain, I. (2023). The impact of gravity on the evolution of cavity in the cluster of stars.** *Classical and Quantum Gravity,* **40(6), 065007. doi: 10.1088/1361-6382/acbadb. Rubab Manzoor, M. Awais Sadiq, Imdad Hussain (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Gold)**
This paper analyzes the evolution of cavities for the cluster of stars in the context of modified Gauss-Bonnet gravity. For this purpose, we assume a spherically symmetric geometry with locally anisotropic fluid distribution. It is assumed that the proper radial distance among neighboring stellar components stays unchanged during purely areal evolution stage. We provide some analytical solutions by using general formulism in f(G, T) gravitation theory. The thick-shells cavities at one or both boundary surfaces are found to satisfy the Darmois conditions. Moreover, we also investigate the physical behavior of cavity models by considering the stellar 4U1820 − 30. We conclude that the dark matter has a strong impact on the evolution of cavities in the cluster of stars.
https://iopscience.iop.org/journal/0264-9381

38. **Manzoor, R., Sadiq, M. A., Mumtaz, S., & Kausar, H. R. (2023). Cluster of stars in f($\mathcal{G}$, T) gravity.** *Physica Scripta,* **98(2), 025011. doi: 10.1088/1402-4896/acb297. Rubab Manzoor, M. Awais Sadiq (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
This paper is devoted to analyze the dynamical impacts of $f({ \mathcal G },T)$ gravity model on the cluster of stars. For this motive, we consider the spherically symmetric interior geometry with anisotropic fluid as analogous to cluster of stars distributions. We express the modified field equations by taking a particular model of $f({ \mathcal G },T)$, i.e. $f({ \mathcal G },T)=f(T)+f({ \mathcal G })$. In order to explore the evolutionary behavior of cluster of stars, the observational data of a compact star 4U1820 − 30 is used. We construct the modified scalar functions by orthogonal splitting of Riemann tensor in $f({ \mathcal G },T)$ theory of gravity and find the factors causing density irregularities in the framework. We calculate the evolution parameters by using these scalar functions. Moreover, we also investigate the structure scalars for dust ball. The dynamical effects on cluster of stars are examined via structure scalars in the presence of Gauss-Bonnet gravity. It is found that Gauss-Bonnet parameter representing exotic material in the cluster plays a vital role in governing the dynamics of cluster of stars.
https://iopscience.iop.org/article/10.1088/1402-4896/acb297/meta

39. **Manzoor, R., Ramzan, K., & Farooq, M. A. (2023). Evolution of expansion-free massive stellar object in f(R, T) gravity.** *The European Physical Journal Plus,* **138(2), 134. doi: 10.1140/epjp/s13360-023-03734-7. Rubab Manzoor, Kashif Ramzan (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Bronze)**
This paper explores an expansion-free model of a cluster of stars in the f(R, T) gravity. We consider a dissipative anisotropic viscous model of the star cluster. The mathematical modeling of a cluster of stars involving field equations, junction condition and dynamical equations is presented. The circumferential and relative radial velocities of the evolving layers of fluids are used to describe the physical meaning of expansion and shear effects. It is concluded that the expansion-free evolution of the star cluster contains a vacuum cavity within it. The relative velocity between the neighboring layers of fluids determines the cluster's expansion-free and shear-free collapse. The Skripkin model with constant density is equivalent to the non-dissipative expansion-free isotropic star cluster. For the shear-free scenario, this model demonstrates homologous evolution. Finally, it is found that the f(R, T) gravitational terms indicating dark matter's contribution to a star cluster have a significant impact on the dynamics of expansion-free evolution.
https://link.springer.com/article/10.1140/epjp/s13360-023-03734-7

40. **Jawad, A., Zafar, U., Saleem, M., & Manzoor, R. (2023). Impact of exponential entropy on the thermodynamics of 4D charged Einstein-Guass-Bonnet-AdS black hole.** *Physica Scripta,* **98(3), 035022. doi: 10.1088/1402-4896/acbbaa. Muhammad Saleem, Rubab Manzoor (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
In the presence of exponential corrected entropy, we investigate the thermal stability and phase transitions of a charged 4D Einstein-Gauss-Bonnet-AdS black hole by using the formalism known as the deflection angle formalism. Specifically, with the help of the elliptic function analysis, we investigate the phase structure of the black hole by focusing on the optical aspects. This has come to our attention that the thermal variation of the deflection angle can be used to generate both stable and unstable phases. The Hawking-Page phase transition, which is derived from the Gibbs free energy optical dependence, is another issue that we investigate with the

help of exponentially corrected entropy. In addition, there are particular points along the deflection angle that produce a transition between large and small black holes. Our Gibbs free energy versus deflection angle behavior showed that the deflection angle can be utilized as a relevant quantity to determine the critical behavior of AdS black holes. In the presence of exponential corrected entropy, the thermodynamic geometry of a charged 4D Einstein-Guass-Bonnet-AdS black hole is also discussed.
https://iopscience.iop.org/article/10.1088/1402-4896/acbbaa/meta

41. **Faridi, W. A., Asjad, M. I.,** Ahmad, S., Iftene, A., Abd El-Rahman, M., & Sallah, M. (2023). **Deterministic and Fractional-Order Co-Infection Model of Omicron and Delta Variants of Asymptomatic SARS-CoV-2 Carriers.** *Fractal and Fractional,* **7(2), 192. Waqas Ali Faridi, Muhammad Imran Asjad** (Mathematics/SSC) Date of Publication: February 2023 HJRS: X (Clay)

The Delta and Omicron variants' system was used in this research study to replicate the complex process of the SARS-CoV-2 outbreak. The generalised fractional system was designed and rigorously analysed in order to gain a comprehensive understanding of the transmission dynamics of both variants. The proposed dynamical system has heredity and memory effects, which greatly improved our ability to perceive the disease propagation dynamics. The non-singular Atangana–Baleanu fractional operator was used to forecast the current pandemic in order to meet this challenge. The Picard recursions approach can be used to ensure that the designed fractional system has at least one solution occupying the growth condition and memory function regardless of the initial conditions. The Hyers–Ulam–Rassias stability criteria were used to carry out the stability analysis of the fractional governing system of equations, and the fixed-point theory ensured the uniqueness of the solution. Additionally, the model exhibited global asymptotically stable behaviour in some conditions. The approximate behaviour of the fatal virus was investigated using an efficient and reliable fractional numerical Adams–Bashforth approach. The outcome demonstrated that there will be a significant decline in the population of those infected with the Omicron and Delta SARS-CoV-2 variants if the vaccination rate is increased (in both the symptomatic and symptomatic stages).
https://www.mdpi.com/2504-3110/7/2/192

42. **Ullah, N., Asjad, M. I.,** Almusawa, M. Y., & Eldin, S. M. (2023). **Dynamics of Nonlinear Optics with Different Analytical Approaches.** *Fractal and Fractional,* **7(2), 138. Naeem Ullah, Muhammad Imran Asjad** (Mathematics/SSC) Date of Publication: February 2023 HJRS: X (Clay)

In this article, we investigate novel optical solitons solutions for the Lakshmanan–Porsezian–Daniel (LPD) equation, along with group velocity dispersion and spatio-temporal dispersion, via three altered analytical techniques. A variety of bright, singular, dark, periodic singular, and kink solitons solutions are constructed via the Kudryashov method, the generalized tanh method and the Sardar-subequation method. The dynamical behavior of the extracted solutions is demonstrated in graphical form such as 3D plots, 2D plots, and contour plots. The originality of the obtained solutions is recognized by comparison with each other and solutions previously stated in the literature for the LPD model, which displays the efficiency of the methods under consideration.
https://www.mdpi.com/2504-3110/7/2/138

43. **Rashid, I., Zubair, T., Asjad, M. I.,** Irshad, S., & Eldin, S. M. (2023). **The MHD graphene–CMC–water nanofluid past a stretchable wall with Joule heating and velocity slip impact: Coolant application.** *Frontiers in Physics,* **10. doi: 10.3389/fphy.2022.1065982. Muhammad Imran Asjad** (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Bronze)

The heat transport mechanism has an engrossing application in effective heat management for the automobile industry and the biomedical industry. The analysis of the MHD graphene–carboxymethyl cellulose (CMC) solution–water nanofluid past a stretchable wall with Joule heating and velocity slip impact is performed in this regard. A graphene-based nanofluid is considered. The dynamic model is used to simplify the complicated ordinary differential equations into non-dimensional forms, which are then evaluated analytically. Numerical data and graphs are produced to analyze the consequences of a physical entity with the aid of Maple 17. Moreover, the velocity field is decreased, while the magnitude of the magnetic parameter is increased. A decrease in $\theta(\eta)$ is observed as a result of an increase in φ. It is noted that a rise in the magnetic parameter causes a fall in the temperature distribution. It is perceived that $-f''(0)$ is decreased with an augmentation in β_s, and an opposite trend is shown for φ. The velocity profile is the growing function of Mgn, β_s, and Kve, with the reversed mode shown in case of φ. The temperature profile is the declining function of Pr, Ecrt, φ, and χ, with a contradictory trend observed for Mgn and β_s. The flow regime is displayed against the viscoelastic parameter.
https://www.frontiersin.org/articles/10.3389/fphy.2022.1065982/full

44. **Majid, S. Z., Faridi, W. A., Asjad, M. I.,** Abd El-Rahman, M., & Eldin, S. M. (2023). **Explicit Soliton Structure Formation for the Riemann Wave Equation and a Sensitive Demonstration.** *Fractal and Fractional,* **7(2), 102. Sheikh Zain Majid, Waqas Ali Faridi, Muhammad Imran Asjad** (Mathematics/SSC) Date of Publication: February 2023 HJRS: X (Clay)

The motive of the study was to explore the nonlinear Riemann wave equation, which describes the tsunami and tidal waves in the sea and homogeneous and stationary media. This study establishes the framework for the analytical solutions to the Riemann wave equation using the new extended direct algebraic method. As a result, the soliton patterns of the Riemann wave equation have been successfully illustrated, with exact solutions offered by the plane solution, trigonometry solution, mixed hyperbolic solution, mixed periodic and periodic solutions, shock solution, mixed singular solution, mixed trigonometric solution, mixed shock single solution, complex soliton shock solution, singular solution, and shock wave solutions. Graphical visualization is provided of the results with suitable values of the involved parameters by Mathematica. It was visualized that the velocity of the soliton and the wave number controls the behavior of the soliton. We are confident that our research will assist physicists in predicting new notions in mathematical physics.
https://www.mdpi.com/2504-3110/7/2/102

45. **Abbas, S., Ashraf, F., Jarad, F., Sardar, M. S., & Siddique, I.** (2023). A Drone-Based Blood Donation Approach Using an Ant Colony Optimization Algorithm. *CMES - Computer Modeling in Engineering and Sciences,* 136(2), 1917-1930. doi: 10.32604/cmes.2023.024700. **Imran Siddique (Mathematics/SSC) Date of Publication: August 2023 HJRS: X (Clay)**

This article presents an optimized approach of mathematical techniques in the medical domain by manoeuvring the phenomenon of ant colony optimization algorithm (also known as ACO). A complete graph of blood banks and a path that covers all the blood banks without repeating any link is required by applying the Travelling Salesman Problem (often TSP). The wide use promises to accelerate and offers the opportunity to cultivate health care, particularly in remote or unmerited environments by shrinking lab testing reversal times, empowering just-in-time lifesaving medical supply.
https://www.techscience.com/CMES/v136n2/51560

46. **Afzal, S., Qayyum, M., Riaz, M. B., & Wojciechowski, A. (2023). Modeling and simulation of blood flow under the influence of radioactive materials having slip with MHD and nonlinear mixed convection.** *Alexandria Engineering Journal,* 69, 9-24. doi: 10.1016/j.aej.2023.01.013. **Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: April 2023 HJRS: W (Silver)**

Radioactive materials are widely in industry, nuclear plants and medical treatments. Scientists and workers in these fields are mostly exposed to such materials, and adverse effects on blood and temperature profiles are observed. In this regard, objective of the current study is to model and simulate blood based nanofluid with three very important radioactive materials, named as Uranium dioxide (), Thorium dioxide () and Radium (Rd). In this modeling blood based nanofluid is considered under the influence of magneto hydrodynamic effect, non-linear mixed convection and thermal radiation, Joule heating, along with velocity and temperature slip. A three-dimensional fluid model is considered in bounded domain to justify flow geometry in arteries. System of partial differential equations are converted to highly nonlinear coupled ordinary differential equations by using suitable transformations. The obtained system is solved numerically using Fehlberg Runge–Kutta algorithm. Validity and convergence of the obtained solutions are confirmed through residual errors, numerical uncertainties and comparison with experimental data. Moreover, effect of pertinent fluid parameters on the velocity (radial, axial, tangential) and temperature profiles of blood flow are analyzed graphically. Furthermore, Skin friction and Nusselt number are also analyzed graphically against volume fraction of involved radioactive materials for the case of and Rd comparatively. Analysis reveals that increase in volume fraction of radioactive elements results in increased blood flow through walls in both radial and tangential directions. In case of slip at fluid solid-interface, the highest skin fraction is observed in case of Radium nanoparticles.
https://www.sciencedirect.com/science/article/pii/S1110016823000261

47. **Ahmad, M., Jarad, F., Zahid, Z., & Siddique, I.** (2023). Minimal Doubly Resolving Sets of Certain Families of Toeplitz Graph. *CMES - Computer Modeling in Engineering and Sciences,* 135(3), 2681-2696. doi: 10.32604/cmes.2023.022819. **Muhammad Ahmad, Zohaib Zahid, Imran Siddique (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Clay)**

The doubly resolving sets are a natural tool to identify where diffusion occurs in a complicated network. Many real-world phenomena, such as rumour spreading on social networks, the spread of infectious diseases, and the spread of the virus on the internet, may be modelled using information diffusion in networks. It is obviously impractical to monitor every node due to cost and overhead limits because there are too many nodes in the network, some of which may be unable or unwilling to send information about their state. As a result, the source localization problem is to find the number of nodes in the network that best explains the observed diffusion. This problem can be successfully solved by using its relationship with the well-studied related minimal doubly resolving set problem, which minimizes the number of observers required for accurate detection. This paper aims to investigate the minimal doubly resolving set for certain families of Toeplitz graph Tn(1, t), for t ≥ 2 and n ≥ t + 2. We come to the conclusion that for Tn(1, 2), the metric and double metric dimensions are equal and for Tn(1, 4), the double metric dimension is exactly one more than the metric dimension. Also, the double metric

dimension for Tn(1, 3) is equal to the metric dimension for n = 5, 6, 7 and one greater than the metric dimension for n ≥ 8.
https://techscience.com/CMES/v135n3/50493/pdf

48. **Akraam, M., Rashid, T., & Zafar, S. (2023). An image encryption scheme proposed by modifying chaotic tent map using fuzzy numbers.** *Multimedia Tools and Applications,* **82(11), 16861-16879. doi: 10.1007/s11042-022-13941-6. Muhammad Akraam, Tabasam Rashid, Sohail Zafar (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**
Digital images play a crucial role in data communication through the internet or any mode, but their security is a formidable task. Multiple image encryption approaches were conceived, employing chaotic maps to accomplish the security level of digital images. Chaotic maps are deemed suitable for encryption techniques because of their intrinsic properties of randomness, unpredictable behavior, and ergodicity. In this paper, we modify a chaotic map utilizing a fuzzy number and confer the enhancement in chaotic behavior through a bifurcation diagram. Further, we conceive a distinctive image encryption scheme that can uniform the pixel value of a plain image during the diffusion process with the help of a pseudo-random sequence generated from modifying the map. The sum of diffused pixels is used in the discretized tent map to annihilate the correlation among contiguous pixels of the diffused image. Finally, various security and statistical analysis exemplify that our proposed encryption scheme is fast, secure, and efficient against a plethora of threats.
https://link.springer.com/article/10.1007/s11042-022-13941-6

49. **Al Alwan, B., Abu Bakar, M., Faridi, W. A., Turcu, A. C., Akgül, A., & Sallah, M. (2023). The Propagating Exact Solitary Waves Formation of Generalized Calogero–Bogoyavlenskii–Schiff Equation with Robust Computational Approaches.** *Fractal and Fractional,* **7(2). doi: 10.3390/fractalfract7020191. Muhammad Abu Bakar, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: February 2023 HJRS: X (Clay)**
The generalized Calogero–Bogoyavlenskii–Schiff equation (GCBSE) is examined and analyzed in this paper. It has several applications in plasma physics and soliton theory, where it forecasts the soliton wave propagation profiles. In order to obtain the analytically exact solitons, the model under consideration is a nonlinear partial differential equation that is turned into an ordinary differential equation by using the next traveling wave transformation. The new extended direct algebraic technique and the modified auxiliary equation method are applied to the generalized Calogero–Bogoyavlenskii–Schiff equation to get new solitary wave profiles. As a result, novel and generalized analytical wave solutions are acquired in which singular solutions, mixed singular solutions, mixed complex solitary shock solutions, mixed shock singular solutions, mixed periodic solutions, mixed trigonometric solutions, mixed hyperbolic solutions, and periodic solutions are included with numerous soliton families. The propagation of the acquired soliton solution is graphically presented in contour, two- and three-dimensional visualization by selecting appropriate parametric values. It is graphically demonstrated how wave number impacts the obtained traveling wave structures.
https://www.mdpi.com/2504-3110/7/2/191

50. **Alamer, A., Zafar, H., & Javaid, M. (2023). Study of modified prism networks via fractional metric dimension.** *AIMS Mathematics,* **8(5), 10864-10886. doi: 10.3934/math.2023551. Hassan Zafar, Muhammad Javaid (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Honorable Mention)**
For a connected network Γ, the distance between any two vertices is the length of the shortest path between them. A vertex c in a connected network is said to resolve an edge e if the distances of c from its endpoints are unequal. The collection of all the vertices which resolve an edge is called the local resolving neighborhood set of this edge. A local resolving function is a real-valued function is defend as η : V(Γ) → [0, 1] such that η(Rx(e)) ≥ 1 for each edge e ∈ E(Γ), where Rx(e) represents the local resolving neighborhood set of a connected network. Thus the local fractional metric dimension is defined as dimLF(Γ) = min {|η| : η is the minimal local resolving f unction o f Γ}, where |η| = P a∈Rx(e) η(a). In this manuscript, we have established sharp bounds of the local fractional metric dimension of different types of modified prism networks and it is also proved that local fractional metric dimension remains bounded when the order of these networks approaches to infinity.
https://www.aimspress.com/aimspress-data/math/2023/5/PDF/math-08-05-551.pdf

51. **Ali, B., Cobzaş, Ş., & Mabula, M. D. (2023). Ekeland Variational Principle and Some of Its Equivalents on a Weighted Graph, Completeness and the OSC Property.** *Axioms,* **12(3). doi: 10.3390/axioms12030247. Basit Ali (Mathematics/SSC) Date of Publication: February 2023 HJRS: X (Clay)**
We prove a version of the Ekeland Variational Principle (EkVP) in a weighted graph G and its equivalence to Caristi fixed point theorem and to the Takahashi minimization principle. The usual completeness and topological notions are replaced with some weaker versions expressed in terms of the graph G. The main tool used in the proof is the OSC property for sequences in a graph. Converse results, meaning the completeness of weighted graphs for which one of these principles holds, are also considered.
https://www.mdpi.com/2075-1680/12/3/247

52. **Ali, B., Khan, A. A., & De la Sen, M. (2023). Optimum Solutions of Systems of Differential Equations via Best Proximity Points in b-Metric Spaces. *Mathematics,* 11(3). doi: 10.3390/math11030574. Basit Ali (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Bronze)**
This paper deals with the existence of an optimum solution of a system of ordinary differential equations via the best proximity points. In order to obtain the optimum solution, we have developed the best proximity point results for generalized multivalued contractions of b-metric spaces. Examples are given to illustrate the main results and to show that the new results are the proper generalization of some existing results in the literature.
https://www.mdpi.com/2227-7390/11/3/574

53. **Ali, B., Siddique, I., Ahmad, H., & Askar, S. (2023). Influence of nanoparticles aggregation and Lorentz force on the dynamics of water-titanium dioxide nanoparticles on a rotating surface using finite element simulation. *Scientific Reports, 13*(1). doi: 10.1038/s41598-023-31771-w. Imran Siddique (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Platinum)**
This communication briefings the roles of Lorentz force and nanoparticles aggregation on the characteristics of water subject to Titanium dioxide rotating nanofluid flow toward a stretched surface. Due to upgrade the thermal transportation, the nanoparticles are incorporated, which are play significance role in modern technology, electronics, and heat exchangers. The primary objective of this communication is to observe the significance of nanoparticles aggregation to enhance the host fluid thermal conductivity. In order to model our work and investigate how aggregation characteristics affect the system's thermal conductivity, aggregation kinetics at the molecular level has been mathematically introduced. A dimensionless system of partial-differential equations is produced when the similarity transform is applied to a elaborated mathematical formulation. Thereafter, the numerical solution is obtained through a well-known computational finite element scheme via MATLAB environment. When the formulation of nanoparticle aggregation is taken into consideration, it is evident that although the magnitude of axial and transverse velocities is lower, the temperature distribution is enhanced by aggregation.
https://www.nature.com/articles/s41598-023-31771-w

54. **Alqarni, M. M., Rafiq, M., Dayan, F., Awrejcewicz, J., Ahmed, N., Raza, A., . . . Mahmoud, E. E. (2023). New Trends in Fuzzy Modeling Through Numerical Techniques. *Computers, Materials and Continua, 74*(3), 6371-6388. doi: 10.32604/cmc.2023.033553. Fazal Dayan (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Bronze)**
Amoebiasis is a parasitic intestinal infection caused by the highly pathogenic amoeba Entamoeba histolytica. It is spread through person-to-person contact or by eating or drinking food or water contaminated with feces. Its transmission rate depends on the number of cysts present in the environment. The traditional models assumed a homogeneous and contradictory transmission with reality. The heterogeneity of its transmission rate is a significant factor when modeling disease dynamics. The heterogeneity of disease transmission can be described mathematically by introducing fuzzy theory. In this context, a fuzzy SEIR Amoebiasis disease model is considered in this study. The equilibrium analysis and reproductive number are studied with fuzziness. Two numerical schemes forward Euler method and a nonstandard finite difference (NSFD) approach, are developed for the learned model, and the results of numerical simulations are presented. The numerical and simulation results reveal that the proposed NSFD method provides an adequate representation of the dynamics of the disease despite the uncertainty and heterogeneity. Moreover, the obtained method generates plausible predictions that regulators can use to support decision-making to design and develop control strategies.
https://www.techscience.com/cmc/v74n3/50918

55. **Alrowaili, D. A., Raza, M., & Javaid, M. (2023). Bounds on Fractional-BasedMetric Dimension of Petersen Networks. *CMES - Computer Modeling in Engineering and Sciences, 135*(3), 2697-2713. doi: 10.32604/cmes.2023.023017. Muhammad Javaid (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Clay)**
The problem of investigating the minimum set of landmarks consisting of auto-machines (Robots) in a connected network is studied with the concept of location number or metric dimension of this network. In this paper, we study the latest type of metric dimension called as local fractional metric dimension (LFMD) and find its upper bounds for generalized Petersen networks $GP(n, 3)$, where $n \geq 7$. For $n \geq 9$. The limiting values of LFMD for $GP(n, 3)$ are also obtained as 1 (bounded) if n approaches to infinity.
https://www.techscience.com/cmes/v135n3/50496

56. **Amjid, V., Hussain, M. T., & Wu, Z. (2023). On weakly σ -semipermutable subgroups of finite groups. Journal of Algebra and its Applications, 22(2). doi: 10.1142/S0219498823500482. Muhammad Tanveer Hussain (Mathematics/SSC) Date of Publication: February 2023 HJRS: X (Clay)**
Let $\sigma=\{\sigma i | i \in I\}$ ◆=◆◆|◆∈◆} be some partition of the set of all primes P$\mathbb{P}$, G be a finite group and $\sigma(G)=\{\sigma i | \sigma i \cap \pi(G) \neq \emptyset\}$ ◆(◆)={◆◆|◆◆∩◆(◆)≠∅}. A set H$\mathcal{H}$ of subgroups of G◆ is said to be a *complete Hallσ◆-set* of G if every non-identity member of H$\mathcal{H}$ is a Hall σi◆◆-subgroup of G for some i and H$\mathcal{H}$ contains

exactly one Hall σi��-subgroup of *G* for every σi∈σ(G)��∈�(�). Let H𝓗 be a complete Hall σ�-set of *G*. A subgroup *A* of *G* is said to be σ�-*semipermutable* with respect to H𝓗 if AHx=HxA���=��� for all x∈G�∈� and all H∈H�∈𝓗 such that (|H|,|A|)=1(|�|,|�|)=1; σ�-*semipermutable* in *G* if *A* is σ�-semipermutable in *G* with respect to some complete Hall σ�-set of *G*. We say that a subgroup *H* of *G* is *weaklyσ�-semipermutable* in *G* if there exists a σ�-permutable subgroup T� of G� such that *HT* is σ�-permutable in *G* and H∩T≤HσsG�∩�≤����, where HσsG���� is the subgroup of *H* generated by all those subgroups of *H* which are σ�-semipermutable in *G*. In this paper, we study the structure of *G* under the condition that some subgroups of *G* are weakly σ�-semipermutable in *G*.
https://www.worldscientific.com/doi/abs/10.1142/S0219498823500482

57. Arora, G., Chauhan, P., **Asjad, M. I.,** Joshi, V., Emadifar, H., & Jarad, F. (2023). **Particle Swarm Optimization for Solving Sine-Gordan Equation.** *Computer Systems Science and Engineering, 45*(3), 2647-2658. doi: 10.32604/csse.2023.032404. **Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Null)**

The term 'optimization' refers to the process of maximizing the beneficial attributes of a mathematical function or system while minimizing the unfavorable ones. The majority of real-world situations can be modelled as an optimization problem. The complex nature of models restricts traditional optimization techniques to obtain a global optimal solution and paves the path for global optimization methods. Particle Swarm Optimization is a potential global optimization technique that has been widely used to address problems in a variety of fields. The idea of this research is to use exponential basis functions and the particle swarm optimization technique to find a numerical solution for the Sine-Gordan equation, whose numerical solutions show the soliton form and has diverse applications. The implemented optimization technique is employed to determine the involved parameter in the basis functions, which was previously approximated as a random number in the work reported till now in the literature. The obtained results are comparable with the results obtained in the literature. The work is presented in the form of figures and tables and is found encouraging.
https://101.32.70.228/csse/v45n3/50745

58. **Arshad, M., Rahman, A. U., & Saeed, M.** (2023). **An abstract approach to convex and concave sets under refined neutrosophic set environment.** *Neutrosophic Sets and Systems*, 53, 274-296. doi: 10.5281/zenodo.7536029. **Muhammad Arshad, Atiqe Ur Rahman, Muhammad Saeed (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Null)**

A refined neutrosophic set (RNS) is an extension of a neutrosophic set in which all the uncertain belonging-based entities like belonging-grade, non-belonging-grade, and indeterminate-grade are further categorized into their respective sub-belonging grades, sub-non-belonging-grades, and sub-indeterminate-grades, respectively. In other words, the RNS provides multi sub-grades for each uncertain component of theneutrosophic set. This study is aimed to integrate the classical concepts of convexity and concavity with RNS to make the RNS applicable to various optimization problems.Thus, convex RNS and concave RNS are developed. Some of their important aggregation operations and results are investigated and then modified.
https://fs.unm.edu/NSS/ConvexConcaveNeutrosophic17.pdf

59. **Arshad, M., Saeed, M., Khan, K. A., Shah, N. A., Weera, W., & Chung, J. D. (2023). A robust MADM-approach to recruitment-based pattern recognition by using similarity measures of interval-valued fuzzy hypersoft set.** *AIMS Mathematics, 8*(5), 12321-12341. doi: 10.3934/math.2023620. **Muhammad Arshad, Muhammad Saeed (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Honorable Mention)**

Interval-valued fuzzy hypersoft set (IVFHSS) is considered a pertinent fuzzy set-like model that is the combination of an interval-valued fuzzy set and a hypersoft set. It is more flexible and trustworthy for dealing with information-based uncertainties due to the consideration of interval-based hypersoft settings. This kind of setting enables the decision makers to approximate the alternatives in terms of interval-type opinions by considering multiple arguments concurrently. These features make it a fitting model for dealing with uncertain decision-making scenarios like the recruitment process. The vagueness arises in the recruitment process when the data obtained is hesitant. The analogous educational norms among the candidates may increase its complexity. Evaluation techniques focus on leveling hypersoft sets for grading several alternatives based on multi-arguments. When several alternatives have an identical status, such grading systems frequently encounter problems, making it challenging for decision-makers to select the preeminent alternative. This settlement of such an issue is the basis of this article. Thus, in this study, first the axiomatic notions of similarity measures between IVFHSSs are characterized, and then their relevant theorem is proved. In order to provide a consistent decision-support framework for the recruitment process, a robust algorithm is proposed. Finally, the effectiveness, feasibility, and efficiency of the proposed model are demonstrated through the depiction of recruitment-based pattern recognition.
http://www.aimspress.com/aimspress-data/math/2023/5/PDF/math-08-05-620.pdf

60. **Asghar, A., Hussain, A., Ahmad, K., Ishtiaq, U., Al Sulami, H., & Hussain, N. (2023). On Neutrosophic 2-Metric Spaces with Application.** *Journal of Function Spaces, 2023*. **doi: 10.1155/2023/9057107. Khaleel Ahmad (Mathematics/SSC) Umar Ishtiaq (ORIC) Date of Publication: April 2023 HJRS: X (Clay)**
Classical sets, fuzzy sets, intuitionistic fuzzy sets, and other sets are all generalized into the neutrosophic sets. A neutrosophic set is a mathematical approach that helps with challenges involving data that is inconsistent, indeterminate, or imprecise. The goal of this manuscript is to present the notion of neutrosophic 2-metric spaces. In this situation, we prove various fixed point theorems. The findings support previous methodologies in the literature and are backed up by various examples and an application.
https://www.hindawi.com/journals/jfs/2023/9057107/

61. **Asif, F., Kashif, A., Zafar, S., Aljaedi, A., & Albalawi, U. (2023). Mostar Index of Neural Networks and Applications.** *IEEE Access, 11*, **21345-21353. doi: 10.1109/ACCESS.2023.3246734. Fatima Asif, Agha Kashif, Sohail Zafar (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Silver)**
Neural networks are mathematical models that use learning algorithms inspired by the brain to store information. These networks have been extensively used to operate cognitive functions, robustness, fault tolerance, flexibility, collective computation, and ability to deal with fuzzy and inconsistent information. In recent years, probabilistic neural network (PNN) and convolutional neural network (CNN) have been employed in optimization problems such as input normalization and decision making tasks. The flow of data in PNN and CNN will be optimized if its peripherality is minimized. Topological index (TI) is a graph invariant initially introduced to study physiochemical properties of chemical networks. They are further applicable to study certain mathematical aspects of a network such as irregularity, centrality and peripherality. Recently, the Mostar index and edge Mostar index have been introduced to study peripherality of various networks. In the current work, Mostar indices for PNN and CNN have been computed and their application in context of data flow problem together with graphical analysis is presented.
https://ieeexplore.ieee.org/abstract/document/10049112

62. **Asjad, M. I., Majid, S. Z., Faridi, W. A., & Eldin, S. M. (2023). Sensitive analysis of soliton solutions of nonlinear Landau-Ginzburg-Higgs equation with generalized projective Riccati method.** *AIMS Mathematics, 8*(5), **10210-10227. doi: 10.3934/math.2023517. Muhammad Imran Asjad, Sheikh Zain Majid, Waqas Ali Farid (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Honorable Mention)**
The study aims to explore the nonlinear Landau-Ginzburg-Higgs equation, which describes nonlinear waves with long-range and weak scattering interactions between tropical troposperes and mid-latitude, as well as the exchange of mid-latitude Rossby and equatorial waves. We use the recently enhanced rising procedure to extract the important, applicable and further general solitary wave solutions to the formerly stated nonlinear wave model via the complex travelling wave transformation. Exact travelling wave solutions obtained include a singular wave, a periodic wave, bright, dark and kink-type wave peakon solutions using the generalized projective Riccati equation. The obtained findings are represented as trigonometric and hyperbolic functions. Graphical comparisons are provided for Landau-Ginzburg-Higgs equation model solutions, which are presented diagrammatically by adjusting the values of the embedded parameters in the Wolfram Mathematica program. The propagating behaviours of the obtained results display in 3-D, 2-D and contour visualization to investigate the impact of different involved parameters. The velocity of soliton has a stimulating effect on getting the desired aspects according to requirement. The sensitivity analysis is demonstrated for the designed dynamical structural system's wave profiles, where the soliton wave velocity and wave number parameters regulate the water wave singularity. This study shows that the method utilized is effective and may be used to find appropriate closed-form solitary solitons to a variety of nonlinear evolution equations (NLEEs).
http://www.aimspress.com/aimspress-data/math/2023/5/PDF/math-08-05-517.pdf

63. **Ayub, A., Shah, S. Z. H., Asjad, M. I., Almusawa, M. Y., Eldin, S. M., & El-Rahman, M. A. (2023). Biological interactions between micro swimmers and cross fluid with inclined MHD effects in a complex wavy canal.** *Scientific Reports, 13*(1). **doi: 10.1038/s41598-023-31853-9. Muahmmad Imran Asjad (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Platinum)**
The significance of studying biological interactions of micro swimmers in a complex wavy canal with MHD effects lies in its potential to provide insight into the behavior and dynamics of microorganisms in natural environments that contain complex fluid flow and magnetic fields. Current investigation explores the biological interactions between micro swimmers and Cross fluid with inclined MHD effects in a complex wavy canal. There are several factors of medium for micro swimmers like nature, magnetic field, liquid rheology and position. These interactions are hereby witnessed by utilizing the Cross fluid along with Taylor swimming sheet model under the influence of porous and inclined magnetic effect. Furthermore, two-dimensional complex wavy cervical canal is being utilized at inclined angle. By help of lubrication assumption, reduction of momentum equation is made and hence fourth-order differential equation associated with boundary conditions is obtained. Bvp4c command in Matlab is utilized for this boundary value problem. Obtained bvp4c solution is verified with finite difference method and found smooth agreement. Magnetic force enhances the swimming speed and reduction

is seen for the power dissipation and effective role is seen for swimming motion with cross fluid rheology. The channel walls (peristaltic nature) and porous medium can be utilized as alternative factors to control the speed of the propeller.

https://www.nature.com/articles/s41598-023-31853-9

64. **Baleanu, D., Dayan, F., Ahmed, N., Rafiq, M., Raza, A., & Ahmad, M. O. (2023). Computational Investigation of Hand Foot Mouth Disease Dynamics with Fuzziness.** *Computers, Materials and Continua, 75*(2), 4175-4189. doi: 10.32604/cmc.2023.034868. **Fazal Dayan (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Bronze)**

The first major outbreak of the severely complicated hand, foot and mouth disease (HFMD), primarily caused by enterovirus 71, was reported in Taiwan in 1998. HFMD surveillance is needed to assess the spread of HFMD. The parameters we use in mathematical models are usually classical mathematical parameters, called crisp parameters, which are taken for granted. But any biological or physical phenomenon is best explained by uncertainty. To represent a realistic situation in any mathematical model, fuzzy parameters can be very useful. Many articles have been published on how to control and prevent HFMD from the perspective of public health and statistical modeling. However, few works use fuzzy theory in building models to simulate HFMD dynamics. In this context, we examined an HFMD model with fuzzy parameters. A Non Standard Finite Difference (NSFD) scheme is developed to solve the model. The developed technique retains essential properties such as positivity and dynamic consistency. Numerical simulations are presented to support the analytical results. The convergence and consistency of the proposed method are also discussed. The proposed method converges unconditionally while the many classical methods in the literature do not possess this property. In this regard, our proposed method can be considered as a reliable tool for studying the dynamics of HFMD.

https://tsp.techscience.com/cmc/v75n2/52048

65. **Basit, A., Asjad, M. I., & Akgül, A. (2023). Convective flow of a fractional second grade fluid containing different nanoparticles with Prabhakar fractional derivative subject to non-uniform velocity at the boundary.** *Mathematical Methods in the Applied Sciences, 46*(7), 8148-8159. doi: 10.1002/mma.7461. **Abdul Basit, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**

This article disputes the study of convective flow for improved nanofluid along with an erect heated plate via Prabhakar-like energy transport. The governing equations for this mathematical model are obtained by Prabhakar fractional derivative. To attain the generalized results for dimensionless velocity profile and temperature profile, a scheme of Laplace transform is applied. By applying the conditions of nanofluid flow, we develop the constantly accelerated, variables accelerated, and non-uniform accelerated solution of the model. Prabhakar fractional derivative for improved nanofluid based on generalized Fourier's thermal flux is determined for heat transfer. Different structures of graphs are performed for ordinary fractional parameters. As a result, it is found that temperature of $Ag - H_2O$ is higher than $Cu - H_2O$ and $TiO_2 - H_2O$ nanoparticles and the reverse trend can be found for velocity. Furthermore, temperature and velocity can be enhanced by increasing the values of fractional parameters.

https://onlinelibrary.wiley.com/doi/full/10.1002/mma.7461

66. **Bilal, S., Asjad, M. I., Haq, S., Almusawa, M. Y., Tag-ElDin, E. S. M., & Ali, F. (2023). Significance of Dufour and Soret aspects on dynamics of water based ternary hybrid nanofluid flow in a 3D computational domain.** *Scientific Reports, 13*(1). doi: 10.1038/s41598-023-30609-9. **Muahmmad Imran Asjad (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Platinum)**

The prime motive to conduct this communication is to explicate hydrothermal attributes of water by inducing new composition of nanoparticles termed as ternary particles. For this purpose, two differently natured groups one with lesser densities (Carbon nanotubes, Graphene and Aluminium oxide) and with higher densities (Copper oxide, Copper and Silver) are accounted. A 3D permeable surface is considered as a physical configuration of problem by providing dual stretching. Initially, mathematical structuring in dimensional representation expressing the constitutive relations for mass, momentum and energy conservation is manifested. Later on, a set of similar variables are executed to express attained coupled system into ordinary form. Numerical simulations are performed to find solution by employing shooting and RK-4 methods in conjunction. Description about change is displayed through graphical visualization. Subsequently, temperature distribution and heat flux coefficient against sundry variables are also measured and comprehensively discussed in pictorial and tabular format. Wall drag coefficients along (x, y) directions are also computed. It is inferred from the outcomes that velocity, temperature and concentration of base fluid is higher for ternary group 1 containing particles of low densities than for group 2 with more denser particles. It is also deduced that elevation in temperature of fluid is revealed against Soret number whereas contrary aspects is observed in view of concentration distribution. Dufour number has declining impact on temperature profile whereas it upsurges the mass distribution. It is depicted that skin friction in case of group containing particles with less densities are more than other group.

https://www.nature.com/articles/s41598-023-30609-9

67. Bilal, S., Ullah, A., Shah, I. A., **Asjad, M. I.**, Almusawa, M. Y., & Eldin, S. M. (2023). **Analysis of free and forced convections in the flow of radiative viscous fluid with oxytactic microorganisms.** *Frontiers in Materials, 10*. doi: 10.3389/fmats.2023.1138313. **Muahmmad Imran Asjad** (Mathematics/SSC) Date of Publication: March 2023 **HJRS: W (Honorable Mention)**

The prime intend behind the current effort is to explicate flow attributes of magnetically influenced Newtonian fluids toward a stretchable sheet under the novel physical impact of oxytactic microorganisms in a comparative manner for free and forced convections. In addition, modified Fourier and Fick's laws are implemented to examine the change in temperature and concentration distributions in a more realistic manner by accounting thermal and mass relaxation parameters in the flow. The obtained PDEs are reduced into the non-linear ODEs by employing similarity variables. Due to the complexity of parametrically based differential equations, a numerical scheme based on a finite-difference approach is implemented *via* the MATLAB built-in routine known as BVP4C. Flow-controlling parameter effects on associated distributions are evaluated through graphs and tables. Subsequently, the influence of flow-controlling parameters on associated distributions is revealed through pictures in a comparative manner for different convection regimes. Additionally, the quantities such as heat and mass fluxes along with the density of motile microorganisms are also illustrated. From the thorough analysis of the current investigation, it is inferred that velocity distribution enhances for free and forced convections, whereas the temperature of the fluid diminishes against the mentioned convective regimes. It is manifested that the Nusselt number is more in the situation of free convection instead of the forced convection situation. The magnitude of the skin friction factor is more in case of free convection as compared to the forced convection regime. It is also reported that by uplifting the magnitudes of concentration and thermal relaxation parameters, depreciation in associated heat and mass transfer rate arises. In addition, it is also reported that with the increment in the magnetic field, buoyancy ratio, bioconvection parameters, and Rayleigh number skin friction accelerate, while the behavior is quite opposite in case of stretching the ratio parameter. https://www.frontiersin.org/articles/10.3389/fmats.2023.1138313/full

68. Cao, W., **Kaleem, M. M.**, Usman, M., **Asjad, M. I.**, Almusawa, M., & Eldin, S. M. (2023). **A study of fractional Oldroyd-B fluid between two coaxial cylinders containing gold nanoparticles.** *Case Studies in Thermal Engineering, 45*. doi: 10.1016/j.csite.2023.102949. **Muhammad Madssar Kaleem, Muahmmad Imran Asjad** (Mathematics/SSC) Date of Publication: May 2023 **HJRS: W (Silver)**

In this study, momentum and heat transport of fractionally ordered Oldroyd-B bio nanofluid within a coaxial cylinder are solved numerically. It is common knowledge that fractional approaches can successfully deal with the intricate dynamics of flow regimes. Modern basic science sectors like medicine, the use of fluid in brake systems, cooling system in the industry, lowering pollutants and food industry, etc., all have a wide range of applications for the study. In this study, the magneto-hydrodynamic (MHD) Oldroyd-B bio nanofluid is fractionally modeled using the Caputo fractional differentiation operator ���. To make the governing equations dimensionless, a set of suitable transformations is used. The finite differences are used to discretize the momentum �(�,�) profile and heat �(�,�) profile. The obtained results are plotted graphically against different physical parameters such as Hartmann number ��, thermal Grashof number ��, thermal radiation parameter ��, volume fraction parameter of nanoparticles �, fractional parameter �, angular velocity ��, time retardation parameter ��, and heat source-sink parameter �0. By contrasting the findings with those from built-in MAPLE commands, the validation of the results is confirmed. When the system is exposed to a strong magnetic field, temperature profile �(�,�) increases and velocity profile �(�,�) decreases. It is discovered that raising �� and �� raises the temperature and velocity profile. The heat capacity of the base fluid (blood) is improved by the addition of nanoparticles (Gold). The velocity profile of fractional Oldroyd-B nano-fluid increases with the angular frequency of inner cylinder velocity and becomes high in a coaxial region (Cylinder). https://www.sciencedirect.com/science/article/pii/S2214157X23002551

69. **Dayan, F.**, Baleanu, D., Ahmed, N., Awrejcewicz, J., Rafiq, M., Raza, A., & Ahmad, M. O. (2023). **Numerical Investigation of Malaria Disease Dynamics in Fuzzy Environment.** *Computers, Materials and Continua, 74*(2), 2345-2361. doi: 10.32604/cmc.2023.033261. **Fazal Dayan** (Mathematics/SSC) Date of Publication: February 2023 **HJRS: W (Bronze)**

The application of fuzzy theory is vital in all scientific disciplines. The construction of mathematical models with fuzziness is little studied in the literature. With this in mind and for a better understanding of the disease, an SEIR model of malaria transmission with fuzziness is examined in this study by extending a classical model of malaria transmission. The parameters and , being function of the malaria virus load, are considered fuzzy numbers. Three steady states and the reproduction number of the model are analyzed in fuzzy senses. A numerical technique is developed in a fuzzy environment to solve the studied model, which retains essential properties such as positivity and dynamic consistency. Moreover, numerical simulations are carried out to illustrate the analytical results of the developed technique. Unlike most of the classical methods in the literature, the proposed approach converges unconditionally and can be considered a reliable tool for studying malaria disease dynamics.

https://www.techscience.com/cmc/v74n2/50288

70. **Faizi, S., Svitenko, H., Rashid, T., Zafar, S., & Sałabun, W. (2023). Some Operations and Properties of the Cubic Intuitionistic Set with Application in Multi-Criteria Decision-Making.** *Mathematics, 11*(5). **doi: 10.3390/math11051190. Tabasam Rashid, Sohail Zafar (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Bronze)**

This paper proposes some operations on the cubic intuitionistic set along with useful properties. We propose the internal cubic intuitionistic set (ICIS), the external cubic intuitionistic set (ECIS), P-order, R-order order (P-(R-) order), P-union, R-union (P-(R-) union), P-intersection, and R-intersection (P-(R-) intersection). We further investigate several properties of the P-(R-) union and P-(R-) intersection of ICISs and ECISs, and present some examples in this context. Some important theorems related to ICISs and ECISs are also presented with proof. Finally, an application example is given to measure the effectiveness and significance of the proposed operations by solving a multi-criteria decision-making (MCDM) problem.

https://www.mdpi.com/2227-7390/11/5/1190

71. **Saeed, M. J., Tahir, M., Asjad, M. I., ul aabedin, Z., Maqsood, M., Ahmadian, A., & Salimi, M. (2023). Chemically radiative and mixed convection solute transfer in boundary-layer flow of Jeffrey nanofluid along an inclined stretching cylinder with joule heating and double stratification impacts.** *ZAMM - Journal of Applied Mathematics and Mechanics / Zeitschrift für Angewandte Mathematik und Mechanik, 103*(6), **e202200115. doi: https://doi.org/10.1002/zamm.202200115. Muahmmad Imran Asjad (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Clay)**

An endeavor is consummate to study the steady mixed convection solute transfer in two-dimensional viscous fluid. A joule heating incompressible flow along an inclined stretching cylinder and double stratification impact on Jeffrey Nanofluid is scrutinized. Acquired nanomaterial pattern comprises the phenomena of thermophoresis and Brownian motion. By applying rule of approximation transformation, the nonlinear PDEs converted into ODEs. Shooting via Newton Raphson technique is used to solve the ODE'S with boundary conditions into initial conditions, also applying Runge–Kutta–Fehlberg technique of fourth order for numerical purpose. Computation ($-1/ ◄ · ▸$) for skin friction, ($- ◄ · ▸$) for Nusselt, and $◄ () ▸$ for Sherwood number are fetched in table format by using mathematical software Matlab. The results reveal that *M* (0, 0.3, 0.6, 0.9), γ (0.1, 0.3, 0.7, 1.3), and α $◄ () ▸$ will increase ($-1/ ◄ · ▸$) upto 7.51, 8.55, and 10.27%, respectively. The behavior of $◆◆$ on $- ◄ · ▸$ and $◄ () ▸$ falling off upto 11.20 and 28.38%, respectively with the increase of $◆◆$, but in $◆◆$ shows opposite reaction on Sherwood number. It is culminated that $◄ () ▸$ for velocity augments with the value of Deborah number of four different sizes (0.8, 1.1, 1.4, and 1.7) upto 14.28, 16.6, and 20% while situation is reversed in case of magnetic factor (0, 0.3, 0.6, 0.9) upto 20, 28.12, and 39.13%. Effect of $◆f_0(◆)$ for temperature enhanced with the value of Brownian motion on (0.0, 0.2, 0.4, and 0.6), about 16.66, 20, and 25%, respectively. The maximum effect percentage with radiation factor on $◆f_0(◆)$ is 39 and minimum percentage is 25.71. Eckert number on ($-4, 0, 4, 8$) and thermophoresis on $◄ () ▸$ diminished with pile-up Prandtl number on (1.2, 1.5, 1.8, and 2.1). Impact of ($◆f_0(◆)$) for concentration and local Sherwood number showed reverse situation on.

https://onlinelibrary.wiley.com/doi/full/10.1002/zamm.202200115

72. **Ihsan, M., Saeed, M., Khan, K. A., & Nosheen, A. (2023). An algebraic approach to the variants of convexity for soft expert approximate function with intuitionistic fuzzy setting.** *Journal of Taibah University for Science, 17*(1), **2182144. doi: 10.1080/16583655.2023.2182144. Muhammad Ihsan, Muhammad Saeed (Mathematics/SSC) Date of Publication: Jan-Dec 2023 HJRS: X (Clay)**

A new area of research called intuitionistic fuzzy soft expert set is expected to overcome the drawbacks of an intuitionistic fuzzy soft set in terms of eligibility for soft expert-argument approximate function. This type of function views the power set of the universe as its co-domain and the cartesian product of attributes, experts, and their opinions as its domain. The domain of this function is larger as compared to the domain of a soft approximation function. It can manage a situation in which several expert opinions are taken into account by a single model. For the soft expert-argument approximate function with intuitionistic fuzzy setting, concepts such as set inclusion, (α,v)($◆,◆$)-convexity(concave) sets, strongly (α,v)($◆,◆$)-convexity (concave) sets, strictly (α,v)($◆,◆$)-convexity (concave) sets, convex hull, and convex cone are conceived in this paper. Some set-theoretic inequalities are established with generalized properties and results on the basis of these specified notions. Additionally, by using a theoretic cum analytical approach, various elements of computational geometry, such as convex hull and convex cone, are theorized and some pertinent results are generalized.

https://www.tandfonline.com/doi/full/10.1080/16583655.2023.2182144

73. **Saeed, M., Sarwar, M. A., Rahman, A. U., & Maqbool, S. N. (2023). Representation of fuzzy hypersoft set in graphs.** *Palestine Journal of Mathematics, Vol. 12*(1), 836–847. **Muhammad Saeed, Muhammad Amad Sarwar, Atiqe Ur Rahman, Sana Naz Maqbool (Mathematics/SSC) Date of publication: March 2023 HJRS: Y (Null)**

In this study, a novel framework of fuzzy hypersoft graphs (F HS-graphs) is developed which is more flexible as compared to fuzzy soft graphs (F S-graphs) in the sense that it not only generalizes F S-graphs but also tackles its insufficiency for multi-argument approximate function. Some fundamentals, aggregation operations and results are investigated and elaborated with appropriate examples and their graphical depictions.
https://pjm.ppu.edu/paper/1321-representation-fuzzy-hypersoft-set-graphs

74. **Zhao, J., Li, B., Rahman, A. U., & Saeed, M. (2023). An intelligent multiple-criteria decision-making approach based on sv-neutrosophic hypersoft set with possibility degree setting for investment selection.** *Management Decision, 61*(2), 472-485. doi: 10.1108/MD-04-2022-0462. **Atiqe Ur Rahman, Muhammad Saeed (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Gold)**

Purpose – The main purpose of this article is to characterize a novel neutrosophic hypersoft set hybrid called possibility single-valued neutrosophic hypersoft set (psv-NHSS) for evaluation of investment projects by using its aggregation operations and decision-support system. Design/methodology/approach – Two approaches are employed in this article: set-theoretic approach and algorithmic approach. The former one is used to characterize the novel notion of psv-NHSS and its aggregations. The later one is used to construct a decision-support system by using the aggregations like core matrix, maximum-valued decision, minimum-valued decision and scoring-valued decision of psv-NHSS. The adopted algorithm is implemented in real-world scenario of hydroelectric power station project evaluation for investment purpose. Findings – The proposed model is more flexible and reliable as it addresses the limitations of literature on neutrosophic set, neutrosophic soft set and other fuzzy set-like models by considering possibility degree, hypersoft setting and neutrosophic setting collectively. Research limitations/implications – It has limitations for decision-making situations where selection of parameters is of uncertain nature. Practical implications – The scope of this study may cover a wide range of applications in many fields of mathematical sciences like artificial intelligence, optimization, multiple-criteria decision-making (MCDM), theoretical computer science, soft computing, mathematical statistics, etc. Originality/value – The proposed model bears the characteristics of most of the relevant existing models collectively and fulfills their insufficiencies by introducing a novel approximate mapping.
https://www.emerald.com/insight/content/doi/10.1108/MD-04-2022-0462/full/html

75. **Saleem, S., Ibrar, A., Almusawa, M. Y., Eldin, S. M., & Asjad, M. I. (2023). Collapsing cylindrically symmetric filamentary stellar object.** *Frontiers in Astronomy and Space Sciences, 10*. doi: 10.3389/fspas.2023.1161517. **Sana Saleem, Andleeb Ibrar, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Honorable Mention)**

This work investigates the collapsing behavior of filamentary objects under the influence of dark matter. For this purpose, we use f(R,T) gravity as a candidate for dark matter. The collapse equation is obtained by imposing the Darmois junction condition at the collapsing boundary. At the collapsing boundary, it is observed that the radial pressure is non-zero and is proportional to the field timedependent component. Finally, we check the relationship between gravitational waves and dark source terms. It is concluded that the dark source terms disrupt the propagation of gravitational waves.
https://www.frontiersin.org/articles/10.3389/fspas.2023.1161517/full

76. **Saeed, M., Harl, M. I., Saeed, M. H., & Mekawy, I. (2023). Theoretical framework for a decision support system for micro-enterprise supermarket investment risk assessment using novel picture fuzzy hypersoft graph.** *PLoS ONE, 18*(3), e0273642. doi: 10.1371/journal.pone.0273642. **Muhammad Saeed, Muhammad Imran Harl (Mathematics/SSC) Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: March 2023 HJRS: W (Gold)**

TRisk evaluation has always been of great interest for individuals wanting to invest in various businesses, especially in the marketing and product sale centres. A finely detailed evaluation of the risk factor can lead to better returns in terms of investment in a particular business. Considering this idea, this paper aims to evaluate the risk factor of investing in different nature of products in a supermarket for a better proportioning of investment based on the product's sales. This is achieved using novel Picture fuzzy Hypersoft Graphs. Picture Fuzzy Hypersoft set (PFHSs) is employed in this technique, a hybrid structure of Picture Fuzzy set and Hypersoft Set. These structures work best for evaluating uncertainty using membership, non-membership, neutral, and multi-argument functions, making them ideal for Risk Evaluation studies. Also, the concept of the PFHS graph with the help of the PFHS set is introduced with some operations like the cartesian product, composition, union, direct product, and lexicographic product. This method presented in the paper provides new insight into product sale risk analysis with a pictorial representation of its associated factors.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0273642

77. **Saeed, M., Smarandache, F., Arshad, M., Rahman, A. U. (2023). An inclusive study on the fundamentals of interval-valued fuzzy hypersoft set.** *International Journal of Neutrosophic Science,* **20** (2), 135-161. doi: 10.54216/IJNS.200209. **Muhammad Saeed, Muhammad Arshad, Atiqe Ur Rahman (Mathematics/SSC) Date of Publication: April-June 2023 HJRS: Y (Null)**

When compared to its extension, hypersoft set, a soft set only deals with a single set of attributes, while a hypersoft set deals with several attribute-valued disjoint sets that correspond to various attributes. Several researchers have developed models based on soft sets, but the majority of these models suffer from limitations since they are inappropriate for interval-type data or uncertain data. In order to address these issues, a novel model interval-valued fuzzy hypersoft set (IV F HS -set) is presented in this research article. This model not only resolves the inadequacy of soft set for distinct attributes for non-overlapping attribute-valued sets, but also addresses the limitations of soft set-like models with having data in interval environment. This work modifies the current fuzzy hypersoft set concept and introduces certain fundamental ideas, such as subset, not set, whole set, and absolute relative null set, relative absolute set and aggregation operations e.g. intersection, union, extended intersection, restricted union, complement, OR, AND, difference, restricted difference are discussed under IV F HS -set environment with illustrated examples. Some new hybrids of fuzzy hypersoft set under interval-valued settings are also discussed. Moreover, some extensions of IV F HS -set are presented along with different operations.

https://americaspg.com/articleinfo/21/show/1541

78. **Ur Rahman, A., Saeed, M., Saeed, M. H., Zebari, D. A., Albahar, M., Abdulkareem, K. H., . . . Mohammed, M. A. (2023). A Framework for Susceptibility Analysis of Brain Tumours Based on Uncertain Analytical Cum Algorithmic Modeling.** *Bioengineering, 10*(2), 147. **Atiqe Ur Rahman, Muhammad Saeed (Mathematics/SSC) Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Clay)**
Susceptibility analysis is an intelligent technique that not only assists decision makers in assessing the suspected severity of any sort of brain tumour in a patient but also helps them diagnose and cure these tumours. This technique has been proven more useful in those developing countries where the available health-based and funding-based resources are limited. By employing set-based operations of an arithmetical model, namely fuzzy parameterised complex intuitionistic fuzzy hypersoft set (FPCIFHSS), this study seeks to develop a robust multi-attribute decision support mechanism for appraising patients' susceptibility to brain tumours. The FPCIFHSS is regarded as more reliable and generalised for handling information-based uncertainties because its complex components and fuzzy parameterisation are designed to deal with the periodic nature of the data and dubious parameters (sub-parameters), respectively. In the proposed FPCIFHSS-susceptibility model, some suitable types of brain tumours are approximated with respect to the most relevant symptoms (parameters) based on the expert opinions of decision makers in terms of complex intuitionistic fuzzy numbers (CIFNs). After determining the fuzzy parameterised values of multi-argument-based tuples and converting the CIFNs into fuzzy values, the scores for such types of tumours are computed based on a core matrix which relates them with fuzzy parameterised multi-argument-based tuples. The sub-intervals within [0, 1] denote the susceptibility degrees of patients corresponding to these types of brain tumours. The susceptibility of patients is examined by observing the membership of score values in the sub-intervals.

https://www.mdpi.com/2306-5354/10/2/147

79. **Saeed, M., & Harl, M. I. (2023). Fundamentals of Picture Fuzzy Hypersoft Set with Application.** *Neutrosophic Sets and Systems, 53* (1)24, 382-400. doi: https://digitalrepository.unm.edu/nss_journal/vol53/iss1/24. **Muhammad Saeed (Mathematics/SSC) Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: June 2023 HJRS: X (Null)**
Theory of picture fuzzy soft set and generalized picture fuzzy soft sets(GPFSS) extended to picture fuzzy hypersoft sets (PFHSS) and generalized picture fuzzy hypersoft set (GPFHSS) respectively handle the uncertainties and multi-attribute values in the material during evaluation. The main focus of this research work is to initiate and learn new operations, along with properties and examples of PFHSS and GPFHSS. Several basic operations PFHSS are defined and also prove De Morgans laws for PFHSS. Furthermore, we construct an algorithm using GPFHSS and a new expectation score function for the positive value of the score function that is useful for ranking different MADM problems. We conclude from this study the proposed outlook used to manipulate the uncertainties and multi-attribute values decision-making problems.

https://digitalrepository.unm.edu/nss_journal/vol53/iss1/24/

80. **Ihsan, M., Saeed, M., Rahman, A. U. (2023). An intelligent fuzzy parameterized MADM-approach to optimal selection of electronic appliances based on neutrosophic hypersoft expert set.** *Neutrosophic Sets and Systems, 53* (1)28, 459-481. doi: https://digitalrepository.unm.edu/nss_journal/vol53/iss1/28. **Muhammad Ihsan, Muhammad Saeed, Atiqe Ur Rahman (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Null)**
When compared to its extension, the hypersoft set, which deals with discontinuous attribute-valued sets corresponding to different attributes, the soft set only works with a single set of attributes. Numerous scholars created models based on soft sets to address issues in a variety of domains, including decision-making and medical diagnostics. However, these models only take into account one expert, which causes numerous issues for users, particularly when creating questions. We provide a fuzzy parameterized neutrosophic hypersoft expert set to eliminate this mismatch. In addition to addressing the issue of dealing with a single expert, this approach also addresses the problem of soft sets not being adequate for discontinuous attribute-valued sets

corresponding to different attributes. The notion of fuzzy parameterized neutrosophic hypersoft expert sets, which combines fuzzy parameterized neutrosophic sets and hypersoft expert sets, is first introduced in this work. Examples are provided to help illustrate some key fundamental concepts, aggregation operations and results. A decision-making application is shown at the end to demonstrate the viability of the suggested theory. https://digitalrepository.unm.edu/nss_journal/vol53/iss1/28/

81. **Hussain, M. T. (2023). Finite groups with σ-Abnormal or-subnormal σ-primary subgroups.** *Journal of Algebra and its Applications, 22*(5). doi: 10.1142/S0219498823501013. **Muhammad Tanveer Hussain (Mathematics/SSC) Date of Publication: May 2023 HJRS: X (Clay)**

Let σ={σi|i∈I}�={��|�∈�} be some partition of the set of all primes $\mathbb{PP}$, G� a finite group and σ(G)={σi|σi∩π(G)≠∅}�(�)={��|��∩�(�)≠∅}. A set H$\mathcal{H}$ of subgroups of G� is said to be a *complete Hallσ�-set* of G� if every non-identity member of H$\mathcal{H}$ is a Hall σi��-subgroup of G� for some σi∈σ��∈� and H$\mathcal{H}$ contains exactly one Hall σi��-subgroup of G� for every σi∈σ(G)��∈�(�). A subgroup H� of G� is said to be σ�-*primary* if it is a finite σi��-group for some i�; σ�-*abnormal* in G� if K/LK�/�� is not σ�-primary whenever H≤L<K≤G�≤�<�≤� and L� is a maximal subgroup of K�. A subgroup H� of G� is called F$\mathfrak{F}$-*subnormal* if there is a chain of subgroups H=H0<·H1<·…<·Ht=G�=�0<·�1<·…<·��=� such that Hi/(Hi−1)Hi∈F��/(��−1)��∈�$\mathfrak{F}$ for all i�. This is equivalent to HFi≤Hi−1��$\mathfrak{F}$≤��−1. In this paper, we study the structure of a finite group G� in which every σ�-primary cyclic subgroups are σ�-quasinormal or σ�-abnormal. We also describe the structure of a finite group G� with self-normalizing or F$\mathfrak{F}$-subnormal σ�-primary cyclic subgroups for a subgroup-closed saturated lattice formation F$\mathfrak{F}$ containing all σ�-nilpotent groups. https://www.worldscientific.com/doi/abs/10.1142/S0219498823501013

82. **iqbal, M. S., Ahmed, N., Akgül, A., Satti, A. M., Iqbal, Z., Raza, A., . . . Park, C. (2023). Analysis of the fractional polio model with the Mittag-Leffler kernels.** *Alexandria Engineering Journal, 64*, 957-967. doi: 10.1016/j.aej.2022.08.025. **Zafar Iqbal (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Silver)**

This article investigates the transmission of polio-virus disease in the human population. The classical model is considered for studying fatal disease. First of all, the model is converted into the fractal fractional epidemic model. Then, the existence of the solution for the said model is ensured with the help of the fixed point theory. Points of equilibria for the model are worked out. The basic reproduction number is described and its role in the disease communication and stability of the model is examined by some standard results. Simulated graphs are also plotted to support the pre-results and claims. Lastly, the findings of the study are presented. https://www.sciencedirect.com/science/article/pii/S1110016822005555

83. **Javaid, M., Alamer, A., & Sattar, A. (2023). Topological Aspects of Dendrimers via Connection-Based Descriptors.** *CMES - Computer Modeling in Engineering and Sciences, 135*(2), 1649-1667. doi: 10.32604/cmes.2022.022832. **Muhammad Javaid, Aqsa Sattar (Mathematics/SSC) Date of Publication: May 2023 HJRS: X (Clay)**

Topological indices (TIs) have been practiced for distinct wide-ranging physicochemical applications, especially used to characterize and model the chemical structures of various molecular compounds such as dendrimers, nanotubes and neural networks with respect to their certain properties such as solubility, chemical stability and low cytotoxicity. Dendrimers are prolonged artificially synthesized or amalgamated natural macromolecules with a sequential layer of branches enclosing a central core. A present-day trend in mathematical and computational chemistry is the characterization of molecular structure by applying topological approaches, including numerical graph invariants. Among topological descriptors, Zagreb connection indices (ZCIs) have much importance. This manuscript involves the establishment of general results to calculate ZCIs, namely first ZCI (FZCI), second ZCI (SZCI), third ZCI (TZCI), modified FZCI, modified SZCI and modified TZCI of two special types of dendrimers nanostars, namely, poly propylene imine octamin (PPIO) dendrimer and poly (propyl) ether imine (PPEtIm) dendrimer. Furthermore, we provide the numerical and graphical comparative analysis of our calculated results for both types of dendrimers with each other. https://techscience.com/CMES/v135n2/50167

84. **Khalid, I., Shah, T., Eldin, S. M., Shah, D., Asif, M., & Saddique, I. (2023). An Integrated Image Encryption Scheme Based on Elliptic Curve.** *IEEE Access, 11*, 5483-5501. doi: 10.1109/ACCESS.2022.3230096. **Imran Saddique (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Silver)**

Due to the extensive demand for digital images across all fields, the security of multimedia data over insecure networks is a challenging task. The majority of the existing modern encryption schemes are merely developed that ensure the confidentiality of the image data. This manuscript presents a new image encryption scheme that ensures confidentiality, user authentications, and secure key sharing among the communicating parties. Initially, the users share a secret parameter using Diffie-Hellman over the elliptic curve and pass it through SHA-256. Afterwards, the proposed scheme uses the first 128-bits for the confidentiality of the data, while the

remaining 128-bits are for authentication. In the encryption algorithm, the confusion module is achieved by affine power affine transformation. At the same time, the diffusion module is attained through highly nonlinear sequences, which are generated through the elliptic curve. Experimental testing and the latest available security tools are used to verify the effectiveness of the proposed algorithm. The simulation findings and the comparison of the proposed scheme with the existing image encryption techniques reveal that the suggested scheme offers a sufficient degree of security. Furthermore, the outcome of the simulation results divulges several advantages of the proposed scheme, including a large key space, resistance to differential attacks, high efficiency, and strong statistical performance.

https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9991126

85. **Khan, A. R., Zhang, H. J., Jun, Z., Maosheng, Z., Eldin, S. M., & Siddique, I. (2023). Electrochemical corrosion protection of neat and zinc phosphate modified epoxy coating: A comparative physical aging study on Al alloy 6101.** *Frontiers in Chemistry, 11*. **doi: 10.3389/fchem.2023.1142050. Imran Saddique (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Silver)**

Optimizing the pigment volume concentration of zinc phosphate pigments can protect Al alloy 6101 from alkaline media. Additionally, zinc phosphate pigments form a shielding film on the substrate and facilitate stopping the penetration of aggressive corrosion ions. The efficiency of eco-friendly zinc phosphate pigments is almost 98% during the corrosion analysis. A comparative study of physical aging of neat epoxy and Zinc Phosphate (ZP) pigment-modified epoxy coatings on Al alloy 6101 was conducted in Xi'an, China, for one year in all four seasons, where in summer for 3 months, results degraded more due to high UV radiation and humidity; it is found that peeling force of ZP pigments modified epoxy coatings is 50% higher of than that of the neat epoxy coatings though both peel-off adhesion strength and scratch test visibility decreased in both coatings; The electrochemical resistance of ZP pigments modified epoxy coatings is about 30% higher of than that of neat epoxy coatings, the corrosion rate of ZP pigments modified epoxy coatings is about 70% lower of than that of neat epoxy coatings, moreover the gloss retention is 20% higher in the modified epoxy; Optical surface observation of the coatings showed that the ZP modified epoxy coating could effectively restrict the crack and shrinkage in coatings after aging experimentation in the natural environment.

https://www.frontiersin.org/articles/10.3389/fchem.2023.1142050/full

86. **Khan, Y., Abdal, S., Hussain, S., & Siddique, I. (2023). Numerical simulation for thermal enhancement of h2o + ethyl glycol base hybrid nanofluid comprising go + (Ag; aa7072; mos2) nano entities due to a stretched sheet.** *AIMS Mathematics, 8*(5), 11221-11237. **doi: 10.3934/math.2023568. Imran Saddique (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Honorable Mention)**

The evaluation of compact heat density gadgets requires effective measures for heat transportation. Enhancement in thermal transportation of hybrid nanofluids comprising of water plus ethyl glycol with the dispersion of three different nano-entities is considered. The fluids are transported through a porous medium over a permeable elongating sheet. Water and ethyl glycol are (50%–50%). The three cases for hybrid species consist of (a) Graphene oxide (Go) + AA7072, (b) Go + Molybdenum sulfide, (c) Go + silver. The volume fraction of nano-entities is greater than 0.3%. It is presumed that the fluid flow is non-Newtonian. Two on-Newtonian fluids models namely Maxwell fluid and Casson fluid are taken into consideration to present comparative behavior in the existence of the nano-particle mixture. The leading equations are altered into ordinary differential form. A robust numerical procedure embraced with Runge-Kutta methodology and shooting strategy is employed to attain results for the dependent physical quantities. It is noticed that the velocity is diminished against the magnetic field parameter and porosity parameter. The temperature for case (a) Go + AA7072 is the highest and it is lowest for case (c) Go + silver. The temperature and velocity functions of both the fluids (Casson and Maxwell fluids) are incremented with larger inputs of hybrid nano-species. The results can find applications for the better performance of electronic equipment, and heat exchangers.

https://www.aimspress.com/aimspress-data/math/2023/5/PDF/math-08-05-568.pdfl

87. **Mahmood, A., Abbas, M., Akram, G., Sadaf, M., Riaz, M. B., & Abdeljawad, T. (2023). Solitary wave solution of (2+1)-dimensional Chaffee–Infante equation using the modified Khater method.** *Results in Physics, 48*. **doi: 10.1016/j.rinp.2023.106416 Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**

Most of the nonlinear phenomena are described by partial differential equation in natural and applied sciences such as fluid dynamics, plasma physics, solid state physics, optical fibers, acoustics, biology and mathematical finance. The solutions of a wide range of nonlinear evolution equations exhibit the wave behavior corresponding to the underlying physical systems. In particular, solitary wave solutions and soliton solutions are of great interest for researchers owing to many applications in different areas of science. The behavior of gas diffusion in a homogeneous medium is described by the (2+1)-dimensional Chaffee–Infante equation. In the present study, the modified Khater method is used to solve (2+1)-dimensional Chaffee–Infante equation because it provides various forms of solitons. The bright, dark, and periodic traveling wave patterns are produced by choosing different values of parameters. The solutions are presented graphically through 2D, 3D and contour graphs. The

obtained solutions are demonstrated that the modified Khater method is a more useful tool than the existing techniques for solving such nonlinear problems.
https://www.sciencedirect.com/science/article/pii/S2211379723002097

88. **Mahmood, A., Abbas, M., & Murtaza, G. (2023). Multi-Valued Multi-Polar Neutrosophic Sets with an application in Multi-Criteria Decision-Making. Neutrosophic Sets and Systems, 53, 530-561. doi: 10.5281/zenodo.7536084. Ghulam Murtaza (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Null)**
This research directs to obtain optimum fuzzy soft constants through Bonferroni mean and TOPSIS with the initial data represented in terms of multi-valued m-polar neutrosophic soft set. Multi-valued m-polar neutrosophic soft set is defined in this paper, which is the generalization of m-polar neutrosophic soft set, obtained by combining it with multi-valued neutrosophic soft set. Optimum fuzzy soft constants play a fundamental role for the construction of the system of differential equations which helps to observe the experts, future attitudes. Sometimes experts feel a requirement to rethink their choices or decisions due to the observation of others, choice especially when others choose different alternatives. After the individual decisions of experts, an analysis of experts, attitudes is produced by using phase portraits and line graphs of the system of differential equations. This analysis can also be provided by using system of differential equations with fuzzy initial conditions. To find the multi-valued m-polar neutrosophic Bonferroni mean, some basic operations on the elements of the defined set are introduced. An illustrative example is given where a system of two differential equations is developed for attitude analysis of two persons with independent variable t.
https://digitalrepository.unm.edu/nss_journal/vol53/iss1/32/

89. **Mushtaq, I., Siddique, I., Eldin, S. M., Majdoubi, J., Gurmani, S. H., Samar, M., & Zulqarnain, R. M. (2023). Prioritization of thermal energy storage techniques based on Einstein-ordered aggregation operators of q-rung orthopair fuzzy hypersoft sets. Frontiers in Energy Research, 11. doi: 10.3389/fenrg.2023.1119463. Imran Siddique (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Bronze)**
The capability to stock energy and manage consumption in the future is one of the keys to retrieving huge quantities of renewable energy on the grid. There are numerous techniques to stock energy, such as mechanical, electrical, chemical, electrochemical, and thermal. The q-rung orthopair fuzzy soft set (q-ROFSS) is a precise parametrization tool with fuzzy and uncertain contractions. In several environments, the attributes need to be further categorized because the attribute values are not disjointed. The existing q-rung orthopair fuzzy soft set configurations cannot resolve this state. Hypersoft sets are a leeway of soft sets (SSs) that use multi-parameter approximation functions to overcome the inadequacies of prevailing SS structures. The significance of this investigation lies in anticipating Einstein-ordered weighted aggregation operators (AOs) for q-rung orthopair fuzzy hypersoft sets (q-ROFHSSs), such as the q-rung orthopair fuzzy hypersoft Einstein-ordered weighted average (q-ROFHSEOWA) and the q-rung orthopair fuzzy hypersoft Einstein-ordered weighted geometric (q-ROFHSEOWG) operators, using the Einstein operational laws, with their requisite properties. Mathematical interpretations of decision-making constrictions are considered able to ensure the symmetry of the utilized methodology. Einstein-ordered aggregation operators, based on prospects, enable a dynamic multi-criteria group decision-making (MCGDM) approach with the most significant consequences with the predominant multi-criteria group decision techniques. Furthermore, we present the solicitation of Einstein-ordered weighted aggregation operators for selecting thermal energy-storing technology. Moreover, a numerical example is described to determine the effective use of a decision-making pattern. The output of the suggested algorithm is more authentic than existing models and the most reliable to regulate the favorable features of the planned study.
https://www.frontiersin.org/articles/10.3389/fenrg.2023.1119463/full

90. **Naseem, A., Rehman, M. A., Qureshi, S., & Ide, N. A. D. (2023). Graphical and Numerical Study of a Newly Developed Root-Finding Algorithm and Its Engineering Applications. IEEE Access, 11, 2375-2383. doi: 10.1109/ACCESS.2023.3234111. Amir Naseem, M. A. Rehman (Mathematics/SSC) Date of Publication: January 2023 HJRS: W (Silver)**
The primary objective of this paper is to develop a new method for root-finding by combining forward and finite-difference techniques in order to provide an efficient, derivative-free algorithm with a lower processing cost per iteration. This will be accomplished by combining forward and finite-difference techniques. We also detail the convergence criterion that was devised for the root-finding approach, and we show that the method that was recommended is quintic-order convergent. We addressed a few engineering issues in order to illustrate the validity and application of the developed root-finding algorithm. The quantitative results justified the constructed root-finding algorithm's robust performance in comparison to other quintic-order methods that can be found in the literature. For the graphical analysis, we make use of the newly discovered method to plot some novel polynomiographs that are attractive to the eye, and then we evaluate these new plots in relation to previously established quintic-order root-finding strategies. The graphic analysis demonstrates that the newly created method for root-finding has better convergence with the larger area than the other comparable methods do.

https://ieeexplore.ieee.org/abstract/document/10005310

91. **Naz, R., Ikram, M. D., & Asjad, M. I. (2023). Analytical solutions of fractional couple stress fluid flow for an engineering problem.** *Nonlinear Engineering, 12*(1). doi: 10.1515/nleng-2022-0281. **Rabia Naz, Muhammad Danish Ikram, Muhammad Imran Asjad** (Mathematics/SSC) Date of Publication: May 2023 HJRS: X (Null)
In this article, analytical solutions of couple stress fluid flow modeled with a power law fractional differential operator are discussed. Stokes' second problem for an incompressible couple stress fluid is studied for an horizontal plate of infinite length. The governing equations of the flow problem are expressed in terms of a partial differential operator and then converted into a non-dimensional model by using dimensional analysis. Then the integer order problem was formulated in terms of the non-integer order of three types of fractional derivatives and then solved with the help of the Laplace transform method. The obtained solutions are complex and expressed in terms of series. In order to check the memory index of the solutions obtained with three different fractional operators, we have plotted some graphs. It is found that the constant proportional operator provides us a better choice about the memory and maximum enhancement achieved in the comparison of Caputo and Caputo–Fabrizio. Furthermore, in order to check the accuracy of the present results, we have compared the obtained solutions with the existing literature and found a good agreement between them.
https://www.degruyter.com/document/doi/10.1515/nleng-2022-0281/html

92. **Nazeer, M., Irfan, M., Hussain, F., & Siddique, I. (2023). Entropy Generation Analysis in Blood-Gold Casson Nanofluid Through Horizontal Wavy Channel with Velocity and Thermal Slips: Applications in Skin Diseases.** *Journal of Computational Biophysics and Chemistry, 22*(3), 259-272. doi: 10.1142/S2737416523400021. **Muhammad Irfan, Imran Siddique** (Mathematics/SSC) Date of Publication: May 2023 HJRS: Y (Null)
Cancer is known as a deadly disease in which some of the body cells enhance irrepressibly and spread to the other parts of the body. It can start almost anywhere in the human body and these are made up of trillions of cells. Recent researches show that the gold mettle's tiny size particles can be helpful to cure or overcome this disease due to its high atomic number, which can produce the heat that leads to deal with the distortion of tumors. The motivation of this study is to report the entropy generation and heat-transfer analysis in blood flow holding the gold nanoparticles in an asymmetric channel with electro-osmotic phenomena. The mathematical model is developed and simplified by using suitable assumptions. The thermal radiation effects are also incorporated, which are commonly used related to destroying skin diseases. The exact solutions of velocity, shear stress, temperature, stream function, pressure gradient, pressure rise, entropy generation and Bejan number have been obtained. The impact of involved parameters on important physical quantities is highlighted through the graphical method. The results show that the entropy generation and Bejan number enlarge via slip parameter, Casson parameter, Joule heating parameter and heat generation parameter. Results pointed out that the gold nanoparticles enhance the temperature distribution, which makes them capable enough to destroy the cancer cells. It is also noted that the spherical shape is effective in all solutions, but in entropy generation, the platelet shape is more effective than others.
https://www.worldscientific.com/doi/abs/10.1142/S2737416523400021

93. **Noor, Q., Rashid, T., & Beg, I. (2023). Multi-attribute group decision-making based on probabilistic dual hesitant fuzzy Maclaurin symmetric mean operators.** *Granular Computing, 8*(3), 633-666. doi: 10.1007/s41066-022-00346-x. **Tabasam Rashid** (Mathematics/SSC) Date of Publication: May 2023 HJRS: X (Clay)
In this study, we put forward the dual Maclaurin symmetric mean (DMSM) and the Maclaurin symmetric mean (MSM) operators with the context of the probabilistic dual hesitant fuzzy set (PDHFS), which can address the issues in previous probabilistic dual hesitant fuzzy aggregation operators. Some novel operators based on MSM and DMSM for aggregating PDHF information are prepared, followed by several properties and special cases. Namely, the PDHFMSM, weighted PDHFMSM (WPDHFMSM), PDHFDMSM, weighted PDHFDMSM (WPDHFDMSM) operators. Furthermore, some necessary characteristics and exceptional cases concerning different parametric values of these operators are discussed. Additionally, two new methods based on the WPDHFMSM and WPDHFDMSM operators have been developed with the help of COPRAS technique to deal with multi-attribute group decision-making problems. Lastly, the validity and effectiveness of the intended methods are demonstrated through a case study on selecting the best photovoltaic cells.
https://link.springer.com/article/10.1007/s41066-022-00346-x

94. **Qayyum, M., Ahmad, E., Saeed, S. T., Akgül, A., & Riaz, M. B. (2023). Traveling wave solutions of generalized seventh-order time-fractional KdV models through He-Laplace algorithm.** *Alexandria Engineering Journal, 70*, 1-11. doi: 10.1016/j.aej.2023.02.007. **Muhammad Bilal Riaz** (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Silver)
Non-linear evolution equations play a prominent role in describing a wide range of phenomena in optical fibers, fluid dynamics, electromagnetic radiation, plasma and solid state physics. An important category of non-linear evolution models that characterizes shallow wave phenomena are the Korteweg-de Vries (KdV) models.

In this regard, time-fractional Korteweg-de Vries models of seventh order are the main focus of this research. A general KdV seventh-order equation is considered with different coefficients to form Lax, Kaup–Kuperschimdt and Sawada–Kotera–Ito KdV models. An efficient semi-analytical algorithm named as He-Laplace (HLM) is applied for the solution of these models. In this algorithm, Laplace transform is hybrid with homotopy perturbation method (HPM). This study provides important results as non-linear evolution seventh-order models in fractional sense have not been captured through HLM in current literature. Absolute errors are computed and compared with already existing results to confirm the superiority of proposed algorithm over other existing techniques. Numerical and graphical investigations are conducted to evaluate the approximate series form solutions. The dynamic behavior of fractional parameter is observed by calculating residual errors and plotting two dimensional diagrams throughout the fractional-domain. Analysis confirms that the proposed methodology provides an effective and convenient way for solving fractional KdV models.
https://www.sciencedirect.com/science/article/pii/S1110016823001059

95. **Qayyum, M., Khan, A., Saeed, S. T., Akgül, A., & Riaz, M. B. (2023). Closed-form solutions of higher order parabolic equations in multiple dimensions: A reliable computational algorithm.** *Alexandria Engineering Journal, 71*, 479-489. **doi: 10.1016/j.aej.2023.03.031. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Silver)**

Parabolic equations play an important role in chemical engineering, vibration theory, particle diffusion and heat conduction. Solutions of such equations are required to analyze and predict changes in physical systems. Solutions of such equations require efficient and effective techniques to get reasonable accuracy in lesser time. For this purpose, current article proposes residual power series algorithm for higher order parabolic equations with variable coefficients in multiple dimensions. The proposed algorithm provides closed-form solutions without linearization, discretization or perturbation. For efficiency testing of the proposed methodology, initially it is implemented to homogeneous multidimensional parabolic models, and exact solutions are computed. In next stage of testing, proposed algorithm is enforced to three-dimensional non–homogeneous fourth order parabolic equation, and closed form solutions are recovered. The obtained results indicate the validity and effectiveness of proposed methodology, hence proposed algorithm can be extended to more complex scenarios in engineering and sciences.
https://www.sciencedirect.com/science/article/pii/S111001682300193X

96. **Rahman, A. U., Saeed, M., Mohammed, M. A., Abdulkareem, K. H., Nedoma, J., & Martinek, R. (2023). Fppsv-NHSS: Fuzzy parameterized possibility single valued neutrosophic hypersoft set to site selection for solid waste management.** *Applied Soft Computing, 140*. **doi: 10.1016/j.asoc.2023.110273. Atiqe Ur Rahman, Muhammad Saeed (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Platinum)**

The massive increase in urban population has created a slew of socioeconomic and environmental issues. Among these problems, the most notable is the disposal of solid waste and the search for an effective system for it. Many scholars employing various fuzzy set-like methodologies have considered it a fuzzy multi-criteria or multi-attribute decision-making problem due to the involvement of criteria and anticipated uncertainty. The goal of the current study is to use an innovative methodology to tackle the expected uncertainties present in the solid waste site selection problem (SOWSSP). Such uncertainties may be seen in decision-makers' choices of parameters (or subparameters) and the degree to which they accept approximations for various options. Therefore, a novel mathematical structure called fuzzy parameterized possibility single valued neutrosophic hypersoft set (Fppsv-NHSS) is characterized first and then integrated with modified Sanchez's method to resolve the SOWSSP through the proposal of an intelligent algorithm. The steps of the proposed algorithm are explained with a self-explanatory example. The relationship between the suitability of solid waste management systems and sites is discussed, and their rankings are determined with rich descriptions of their feasibility. The preferential aspects of this study are that it is capable of managing uncertainties depicted by the nature of parameters and approximations of alternatives by using the concept of fuzzy parameterization and possibility grades respectively. It employs particular mathematical formulations to determine the fuzzy parameterized degrees and possibility grades that are missing in the existing literature. It facilitates the decision-makers to evaluate the alternatives independently, with the choice being indeterminate. With the help of comparison, the computed results are found to be consistent and reliable due to their preferential features.
https://www.sciencedirect.com/science/article/pii/S1568494623002910

97. **Rahman, R. U., Raza, N., Jhangeer, A., & Inc, M. (2023). Analysis of analytical solutions of fractional Date-Jimbo-Kashiwara-Miwa equation.** *Physics Letters, Section A: General, Atomic and Solid State Physics, 470*. **doi: 10.1016/j.physleta.2023.128773. Riaz Ur Rahman (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**

In this study, the authors solved the -dimensional fractional Date-Jimbo-Kashiwara-Miwa equation for nonlinear dispersive waves in an inhomogeneous medium, which is an extension of the Kadomtsev-Petviashvili hierarchy. A powerful analytical technique, the new auxiliary equation method, is employed to develop the class of soliton solutions to the considered equation which contains dark, bright, and periodic wave solutions. A comparative

analysis is done by using two fractional derivatives, namely, β and Atangana-Baleanu. While using this technique, the nonlinear ordinary differential equation in integer order is formed using chain rule from the fractional Date-Jimbo-Kashiwara-Miwa equation. There is no more a requirement to perform any normalization or discretization because of the chain rule. These obtained results are graphically portrayed such as 3D and 2D using suitable parametric values. The exact solutions to this equation are necessary to comprehend wave behavior in physical models. Moreover, a sensitive analysis to the fractional dynamical system is performed and graphically shown the behavior on initial conditions.
https://www.sciencedirect.com/science/article/pii/S0375960123001536

98. **Raza, Q., Wang, X., Qureshi, M. Z. A., Eldin, S. M., Mousa, A. A. A., Ali, B., & Siddique, I. (2023). Mathematical modeling of nanolayer on biological fluids flow through porous surfaces in the presence of CNT.** *Case Studies in Thermal Engineering, 45*. **doi: 10.1016/j.csite.2023.102958. Imran Siddique (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Silver)**
Because of their unique intrinsic physical and chemical properties, carbon nanotubes (CNT) are being used in biological and biomedical applications. The current study proposes a mathematical model to analyze the effect of interfacial nanolayers on heat and mass transfer processes for nanofluid flow. Furthermore, the presence of carbon nanotubes (CNT) in a biological fluid (non-Newtonian fluid) with a reaction effect is investigated using porous surfaces. The uniform transverse magnetic flux was also included in the current study. Using a similarity transformation, the nonlinear partial differential equation is reduced to a set of ordinary differential equations. A phase simulation based on Brownian and thermophoresis factors have been developed for this problem. Optimal nanoparticles in the range of 2–8% have a significant effect on thermal conductivity as well as the thermal performance of the blood flow system. The numerical procedure supported the shooting method, resulting in the desired accuracy. Utilization of the Cason parameter under the effect of nanolayer thermal conductivity has horrendous results. The increase in nanolayer thickness, h = 3–9 nm, enhanced the effective thermal conductivity and thermal performance significantly.
https://www.sciencedirect.com/science/article/pii/S2214157X23002642

99. **Raziq, H., Batool, M., Riaz, S., Afzal, F., Akgül, A., & Riaz, M. B., (2023). Power quality improvement of a distribution system integrating a large scale solar farm using hybrid modular multilevel converter with ZSV control.** *Ain Shams Engineering Journal, 14*(7). **doi: 10.1016/j.asej.2023.102218. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: July 2023 HJRS: W (Bronze)**
Photovoltaic system is a major source of power generation. Its production is affected by the varying shading conditions that occur due to changing weather and other environmental factors. The modular multilevel converter (MMLC) is a promising selection to achieve high power. However, to achieve more levels of voltages the conventional MMLC requires more cells which eventually increases the complexity and losses. In this paper, the hybrid MMLC is proposed which have fewer IGBT switches for the same number of output level which eventually decreases the losses and improves the voltage output. The production of power is enhanced due to the series and parallel connection of half and full bridge cells in the converter configuration. The power quality issues such as voltage, current, and power are also satisfactorily handled by the converter without using any active or passive filters. However, due to the variation of input irradiation and temperature the output parameters such as Voltage, current and power show disturbance. Mitigation of these unbalances for a grid connected converter is important to stabilize the control and the quality of power injected into the grid. Therefore, zero sequence control (ZSC) is proposed for producing the balanced power during unstable input parameters. For ensuring the balanced power among the phases of the Converter to be fed to the grid zero sequence voltage (ZSV) is injected in each phase of the converter output validating the power balancing among the phases fed to the low voltage grid. Simulation results are presented to assess the output parameters before and after the injection of ZSV in the low voltage (LV) grid connected Hybrid MMLC of a large scale PV system and demonstrate the improved performance. This investigation is verified by simulation results with PSCAD software.
https://www.sciencedirect.com/science/article/pii/S2090447923001077

100. **Rehman, A. U., Riaz, M. B., Khan, I., & Mohamed, A. (2023). Time fractional analysis of Casson fluid with application of novel hybrid fractional derivative operator.** *AIMS Mathematics, 8*(4), 8185-8209. **doi: 10.3934/math.2023414. Aziz Ur Rehman, Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: April 2023 HJRS: W (Honorable Mention)**
A new approach is used to investigate the analytical solutions of the mathematical fractional Casson fluid model that is described by the Constant Proportional Caputo fractional operator having non-local and singular kernel near an infinitely vertical plate. The phenomenon has been expressed in terms of partial differential equations, and the governing equations were then transformed in nondimensional form. For the sake of generalized memory effects, a new mathematical fractional model is formulated based on the newly introduced Constant Proportional Caputo fractional derivative operator. This fractional model has been solved analytically, and exact solutions for dimensionless velocity, concentration and energy equations are calculated in terms of Mittag-

Leffler functions by employing the Laplace transformation method. For the physical significance of various system parameters such as α, β, Pr, Gr, Gm, S c on velocity, temperature and concentration profiles, different graphs are demonstrated by Mathcad software. The Constant Proportional Caputo fractional parameter exhibited a retardation effect on momentum and energy profile, but it is visualized that for small values of Casson fluid parameter, the velocity profile is higher. Furthermore, to validated the acquired solutions, some limiting models such as the ordinary Newtonian model are recovered from the fractionalized model. Moreover, the graphical representations of the analytical solutions illustrated the main results of the present work. Also, from the literature, it is observed that to deriving analytical results from fractional fluid models developed by the various fractional operators is difficult, and this article contributes to answering the open problem of obtaining analytical solutions for the fractionalized fluid models.

http://www.aimspress.com/aimspress-data/math/2023/4/PDF/math-08-04-414.pdf

101. Rizwan, M., Bhatti, A. A., **Javaid, M.,** & Shang, Y. (2023). **Conjugated tricyclic graphs with maximum variable sum exdeg index.** *Heliyon, 9*(5). doi: 10.1016/j.heliyon.2023.e15706. **Muhammad Javaid (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Silver)**

The variable sum exdeg index, initially introduced by Vukicevic (2011) [20] for predicting the octanol water partition co-efficient of certain chemical compounds, is an invariant for a graph *G* and defined as ���(�)=∑�∈�(�)(����), where �� is the degree of vertex �∈�(�), *a* is a positive real number different from 1. In this paper, we defined sub-collections of tricyclic graphs say �2�3,�2�4,�2�6 and �2�7. The graph with maximum variable sum exdeg index is characterized from each collection given above with perfect matching. Consequently, through a comparison among these extremal graphs, we indicate the graph which contains maximum ���-value from �2�.

https://www.sciencedirect.com/science/article/pii/S2405844023029134

102. **Saleem, N., Furqan, S.,** Abuasbeh, K., & Awadalla, M. (2023). **Fuzzy Triple Controlled Metric like Spaces with Applications.** *Mathematics, 11*(6). doi: 10.3390/math11061390. **Naeem Saleem, Salman Furqan (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Bronze)**

In this article, we introduce the concept of a fuzzy triple controlled metric like space in the sense that the self distance may not be equal to one. We have used three functions in our space that generalize fuzzy controlled rectangular, extended fuzzy rectangular, fuzzy *b*—�—rectangular and fuzzy rectangular metric like spaces. Various examples are given to justify our definitions and results. As for the topological aspect, we prove a fuzzy triple controlled metric like space is not Hausdorff. We also apply our main result to solve the uniqueness of the solution of a fractional differential equation.

https://www.mdpi.com/2227-7390/11/6/1390

103. **Saleem, N.,** Javed, K., Uddin, F., **Ishtiaq, U.,** Ahmed, K., Abdeljawad, T., & Alqudah, M. A. (2023). **Unique Solution of Integral Equations via Intuitionistic Extended Fuzzy b-Metric-Like Spaces.** *CMES - Computer Modeling in Engineering and Sciences, 135*(1), 109-131. doi: 10.32604/cmes.2022.021031. **Naeem Saleem (Mathematics/SSC) Umar Ishtiaq (ORIC) Date of Publication: April 2023 HJRS: X (Clay)**

In this manuscript, our goal is to introduce the notion of intuitionistic extended fuzzy b-metric-like spaces. We establish some fixed point theorems in this setting. Also, we plot some graphs of an example of obtained result for better understanding. We use the concepts of continuous triangular norms and continuous triangular conorms in an intuitionistic fuzzy metric-like space. Triangular norms are used to generalize with the probability distribution of triangle inequality in metric space conditions. Triangular conorms are known as dual operations of triangular norms. The obtained results boost the approaches of existing ones in the literature and are supported by some examples and applications.

https://www.techscience.com/cmes/v135n1/50090

104. Samad, A., **Siddique, I.,** & Khan, Z. A. (2023). **Meshfree numerical approach for some time-space dependent order partial differential equations in porous media.** *AIMS Mathematics, 8*(6), 13162-13180. doi: 10.3934/math.2023665. **Imran Siddique (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Honorable Mention)**

In this article, the meshfree radial basis function method based on the Gaussian function is proposed for some time-space dependent fractional order partial differential equation (PDE) models. These PDE models have significant applications in chemical engineering and physical science. Some main advantages of the proposed method are that it is easy to implement, and the output response is quick and highly accurate, especially in the higher dimension. In this method, the time-dependent derivative terms are treated by Caputo fractional derivative while space-dependent derivative terms are treated by Riesz, Riemann-Liouville, and Grunwald-Letnikov derivatives. The proposed method is ¨ tested on some numerical examples and the accuracy is analyzed by ‖L‖∞.

http://www.aimspress.com/aimspress-data/math/2023/6/PDF/math-08-06-665.pdf

105. **Sattar, A., & Javaid, M.** (2023). **Topological aspects of metal–organic frameworks: Zinc silicate and oxide networks.** *Computational and Theoretical Chemistry, 1222*. doi: 10.1016/j.comptc.2023.114056. **Aqsa Sattar, Muhammad Javaid** (Mathematics/SSC) Date of Publication: April 2023 HJRS: X (Clay)

Metal–organic frameworks (MOFs) are intriguing porous materials that are formed by combining organic materials with metals. MOFs have a vast range of utilizations in distinct medical fields with great efficiency. Recently, Zinc-related MOFs have been investigated and are in demand due to their efficient utilization in medical fields such as biosensing, cancer therapy and drug delivery. To mathematically characterize the chemical structures using numerical graph descriptors is the present-day line of research. A numerical graph descriptor or a topological index (TI) is a numerical quantity that is linked with graphs and assists in correlating the topology of a chemical compound. Various distance-based descriptors can be found in the literature. Connection-based TIs, instead of degree-based TIs are considered to be more potent in measuring the chemical aspects of molecular compounds. In this paper, we compute the connection-based TIs of zinc-related MOFs such as zinc oxide and zinc silicate. Further, to examine superiority, we numerically and graphically compare these zinc-related MOFS with each other on the basis of their computed results.
https://www.sciencedirect.com/science/article/pii/S2210271X23000385

106. **Siddique, I., & Akgül, A. (2023). Analysis of blood liquor model via nonlocal and singular constant proportional Caputo hybrid differential operator.** *Mathematical Methods in the Applied Sciences, 46*(7), 7741-7750. doi: 10.1002/mma.7166. **Imran Siddique** (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)

In this study, a physical scheme called the blood liquor absorption model has been examined in its fractional (non-integer) edict form. The constant proportional Caputo (CPC) hybrid fractional operator with singular and nonlocal kernel has been used to fractionalize the blood alcohol model. The logical solutions of the absorptions of liquor in stomach $S(t)$ and the absorptions of liquor in the blood $B(t)$ have been explored by using the Laplace transform technique and are stated in the forms of the generalized G-functions $G_{a,b,c}(\cdot)$ and the bivariate Mittage–Leffler functions. Further, we present a detailed analysis including numerical explanation and stability analysis.
https://onlinelibrary.wiley.com/doi/full/10.1002/mma.7166

107. **Siddique, I., Mehdi, K. B.,** Eldin, S. M., & Zafar, A. (2023). **Diverse optical solitons solutions of the fractional complex Ginzburg-Landau equation via two altered methods.** *AIMS Mathematics, 8*(5), 11480-11497. doi: 10.3934/math.2023581. **Imran Siddique, Khush Bukht Mehdi** (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Honorable Mention)

This work evaluates the fractional complex Ginzburg-Landau equation in the sense of truncated M- fractional derivative and analyzes its soliton solutions and other new solutions in the appearance of a detuning factor in non-linear optics. The multiple, bright, and bright-dark soliton solutions of this equation are obtained using the modified ( ) 2 G G' and (1 ' G) – expansion methods. The equation is evaluated with Kerr law, quadratic –cubic law and parabolic law non-linear fibers. To shed light on the behavior of solitons, the graphical illustrations in the form of 2D and 3D of the obtained solutions are represented for different values of various parameters. All of the solutions have been verified by substitution into their corresponding equations with the aid of a symbolic software package. The various forms of solutions to the aforementioned nonlinear equation that arises in fluid dynamics and nonlinear processes are presented. Moreover, we guarantee that all the solutions are new and an excellent contribution in the existing literature of solitary wave theory.
https://www.aimspress.com/aimspress-data/math/2023/5/PDF/math-08-05-581.pdf

108. **Siddique, I., Nadeem, M.,** Ali, R., & Jarad, F. (2023). **Bioconvection of MHD Second-Grade Fluid Conveying Nanoparticles over an Exponentially Stretching Sheet: A Biofuel Applications.** *Arabian Journal for Science and Engineering, 48*(3), 3367-3380. doi: 10.1007/s13369-022-07129-1. **Imran Siddique, Muhammad Nadeem** (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Bronze)

The current research examines the role of chemical reaction, nonlinear thermal radiation and slippage impact on magnetic second-grade fluid flow with diluted dispersion of nanoparticles using a theoretical bioconvection model over an exponentially stretched sheet. There are also new characteristics such as Brownian motion and thermophoresis. In the problem formulation, the boundary layer approximation is used. Using the suitable transformations, the energy, momentum, micro-organisms and concentration equations are generated into nonlinear ordinary differential equations (ODEs). The solution to the resultant problems was calculated via the Homotopy analysis method (HAM). Environmental parameters' effects on velocity, temperature, microbes and concentration profiles are graphically displayed. When comparing the current results to the previous literature, there was also a satisfactory level of agreement. In comparison with a flow based on constant characteristics, the flow with variable thermal conductivity is shown to be significantly different and realistic. The temperature and motile density of the fluid grew in direct proportion to the thermophoresis motion, buoyancy ratio and Brownian motion parameters. Also, the motile density profile decreases down for Pe and Lb while increasing

when bioconvection Rayleigh number and buoyancy ratio. This work is significant to bioinspired nanofluid enhanced fuel cells and nanomaterials production techniques, according to these research studies.
https://link.springer.com/article/10.1007/s13369-022-07129-1

109. **Sindhu, M. S., & Rashid, T. (2023). Selection of alternative based on linear programming and the extended fuzzy TOPSIS under the framework of dual hesitant fuzzy sets.** *Soft Computing, 27*(4), 1985-1996. **doi: 10.1007/s00500-022-07173-x. Tabasam Rashid (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Silver)**

Everything in the world almost resembles each other which could find out with the help of some measures. Similarity measure (SM) is one of them that play a dominant role in decision-making (DMg��). The higher the value of the SM, the more the things will match perfectly. Weights of criteria appear to specify that the decision-makers (DMs) recognize the significance of public views and their influence on reaching an ideal solution. Sometimes DMs hesitate or they are uncertain to assign the weights to the criteria because of their similar nature. Linear programming (LP) technique has been implemented to evaluate the weights of criteria to reduce the complexity of DMs so that they can avoid biasedness. An extension of fuzzy sets (FSs) named dual hesitant fuzzy sets (DHFSs) is utilized to handle ambiguous and uncertain information. Based on the Hausdorff metric and the Hamming distance, SM is developed to establish the multiple criteria decision-making (MCDM) approach to resolve the problems. Moreover, based on the proposed SM, the technique for order of preference similar to the ideal solution (TOPSIS) is extended to strengthen the obtained outcomes. The effectiveness of the suggested approach is validated by considering a practical example. To support the outcomes obtained by using the proposed model, sensitivity analysis (SA) and time complexity (TC) analysis have been performed. A comprehensive comparison with other techniques is performed to validate the proposed MCDM model.
https://link.springer.com/article/10.1007/s00500-022-07173-x

110. **Ullah, N., Asjad, M. I., Hussanan, A., Akgül, A., Alharbi, W. R., Algarni, H., & Yahia, I. S. (2023). Novel waves structures for two nonlinear partial differential equations arising in the nonlinear optics via Sardar-subequation method.** *Alexandria Engineering Journal, 71*, 105-113. **doi: 10.1016/j.aej.2023.03.023. Naeem Ullah, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Silver)**

In this paper, our aim is to construct the novel wave structures for two non-linear evolution equations which are rising in non-linear optics, mathematical biological models, fluid dynamics, waves theory, mechanics, quantum mechanics, and many more. We employed an efficient analytical technique namely, the Sardar-subequation method to build the wave solutions for the modified Benjamin-Bona-Mahony equation and the Coupled Klein–Gordon equations. We have built the numerous type of soliton wave structures of modified Benjamin-Bona-Mahony equation and the Coupled Klein–Gordon equations via the Sardar-subequation method. Acquired results reveal the dynamics behavior of waves structures including the bright, singular, dark, and periodic singular solitons solutions. To illustrate the behavior of these solutions some selected solutions are sketched in two-, and three-dimensional graphs. On the basis of these results, our technique is suitable, up-to-date, and powerful. The obtained solutions are very efficacious and influential in non-linear optics, mathematical biology, mechanics, fluid mechanics, plasma physics, and many more. This study will assist to predict some new hypothesis and theories in the field of mathematical physics.
https://www.sciencedirect.com/science/article/pii/S1110016823001862

111. **Saleem, N., Ahmad, K., Ishtiaq, U., & De la Sen, M. (2023). Multivalued neutrosophic fractals and Hutchinson-Barnsley operator in neutrosophic metric space.** *Chaos, Solitons & Fractals*, 172, https://doi.org/10.1016/j.chaos.2023.113607. **Naeem Saleem, Khaleel Ahmad (Mathematics/SSC) Umar Ishtiaq (ORIC) Date of Publication: June 2023 HJRS: W (Platinum)**

In this article, we introduce the concept of multivalued fractals in neutrosophic metric spaces using an iterated multifunction system made up of a finite number of neutrosophic B-contractions and neutrosophic Edelstein contractions. Further, we show that multivalued fractals exist and are unique in both complete neutrosophic metric spaces and compact neutrosophic metric spaces and investigate the Collage theorem in order to study multivalued neutrosophic fractals in neutrosophic metric spaces. Also, we establish the neutrosophic contraction characteristics of the Hutchinson-Barnsley operator on the neutrosophic hyperspace and Hausdorff   neutrosophic   metric   spaces.
https://www.sciencedirect.com/science/article/pii/S0960077923005088

112. **Zafar, H., & Javaid, M. (2023). Metric Based Fractional Dimension of Toeplitz Networks.** *Punjab University Journal of Mathematics, 55*(1). https://doi.org/10.52280/pujm.2023.550101. **Hassan Zafar, Muhammad Javaid (Mathematics\SSC) Date of Publication: January 2023 HJRS: Y (Null)**

Metric dimension is one of the distance based graph - theoretic parameters which is widely used in the various disciplines of sciences such as computer science, chemistry, and engineering. The local fractional metric dimension is latest derived form of metric dimension and it is used to find the solutions of integer programming problems. In this paper, we have computed local fractional metric dimension of different families of Toeplitz

networks. It is also proved that the local fractional metric dimension of these Toeplitz networks remain bounded when the order of the networks approaches to infinity.
http://journals.pu.edu.pk/journals/index.php/pujm/article/view/6877

113. Alrowaili, D. A., Ahmad, U., Hameeed, S., & **Javaid, M.** (2023). **Graphs with mixed metric dimension three and related algorithms.** *AIMS Mathematics, 8*(7), 16708-16723. doi: 10.3934/math.2023854. **Muhammad Javaid (Mathematics\SSC) Date of Publication: May 2023** HJRS: W (Honorable Mention)
Let G = (V, E) be a simple connected graph. A vertex x ∈ V(G) resolves the elements u, v ∈ E(G) ∪ V(G) if dG(x, u) , dG(x, v). A subset S ⊆ V(G) is a mixed metric resolving set for Gif every two elements of G are resolved by some vertex of S . A set of smallest cardinality of mixed metric generator for G is called the mixed metric dimension. In this paper trees and unicyclic graphs having mixed dimension three are classified. The main aim is to investigate the structure of a simple connected graph having mixed dimension three with respect to the order of graph, maximum degree of basis elements and distance partite sets of basis elements. In particular to find necessary and sufficient conditions for a graph to have mixed metric dimension 3. Moreover three separate algorithms are developed for trees, unicyclic graphs and in general for simple connected graph Jn Pn with n ≥ 3to determine "whether these graphs have mixed dimension three or not?". If these graphs have mixed dimension three, then these algorithms provide a mixed basis of an input graph.
https://www.aimspress.com/article/doi/10.3934/math.2023854

114. **Arshad, A., Sattar, A., Javaid, M.,** & Abebe Ashebo, M. (2023). **Connection Number-Based Topological Indices of Cartesian Product of Graphs.** J*ournal of Mathematics,* https://doi.org/10.1155/2023/8272936. **Aiman Arshad, Aqsa Sattar, Muhammad Javaid (Mathematics\SSC) Date of Publication: May 2023** HJRS: X (Null)
The area of graph theory (GT) is rapidly expanding and playing a significant role in cheminformatics, mostly in mathematics and chemistry to develop different physicochemical, chemical structure, and their properties. The manipulation and study of chemical graphical details are made feasible by using numerical structure invariant. Investigating these chemical characteristics of to-pological indices (TIs) is made possible by the discipline of mathematical chemistry. In this article, we study with the Cartesian product of complete graphs, with path graphs, and find their general result of connection number (CN)-based TIs, namely, first connection-based Zagreb index (1st CBZI), second connection- based Zagreb index (2nd CBZI), and third CBZI (3rd CBZI) and then modified first connection- based Zagreb index (CBZI) and second and third modified CBZIs. We also express the general results of first multiplicative CBZI, second multiplicative CBZI, and third and fourth multiplicative CBZI, of two special types of graphs, namely, complete graphs and path graphs. More precisely, we arrange the graphical and numerical analysis of our calculated expressions for both of Cartesian product with each other.
https://www.hindawi.com/journals/jmath/2023/8272936/

115. Ismail, R., **Javaid, M., & Zafar, H.** (2023). **Metric-Based Fractional Dimension of Rotationally-Symmetric Line Networks.** S*ymmetry, 15*(5), 1069. http://dx.doi.org/10.3390/sym15051069. **Muhammad Javaid, Hassan Zafar (Mathematics\SSC) Date of Publication: May 2023** HJRS: W (Honorable Mentioned)
The parameter of distance plays an important role in studying the properties symmetric networks such as connectedness, diameter, vertex centrality and complexity. Particularly different metric-based fractional models are used in diverse fields of computer science such as integer programming, pattern recognition, and in robot navigation. In this manuscript, we have computed all the local resolving neighborhood sets and established sharp bounds of a metric-based fractional dimension called by the local fractional metric dimension of the rotationally symmetric line networks of wheel and prism networks. Furthermore, the bounded and unboundedness of these networks is also checked under local fractional metric dimension when the order of these networks approaches to infinity. The lower and upper bounds of local fractional metric dimension of all the rotationally symmetric line networks is also analyzed by using $3D$ shapes.
https://www.mdpi.com/2073-8994/15/5/1069

116. **Rahman, A. U., Saeed, M.,** Mohammed, M. A., Abdulkareem, K. H., Nedoma, J., & Martinek, R. (2023). **An innovative mathematical approach to the evaluation of susceptibility in liver disorder based on fuzzy parameterized complex fuzzy hypersoft set.** *Biomedical Signal Processing and Control, 86*, 105204. https://doi.org/10.1016/j.bspc.2023.105204. **Atiqe Ur Rahman, Muhammad Saeed (Mathematics\SSC) Date of Publication: June 2023** HJRS:W (Silver)
Several liver diseases are collectively termed as liver disorder. Usually the diagnosis of a particular disease is accomplished by considering symptoms as parameters but this is not the case for liver disorder due to the involvement of large number of symptoms relating to several diseases. The most suitable approach is to assess the susceptibility of patients for liver disorder by considering the features of relevant laboratory tests as parameters. In this study the characterization and aggregations of novel mathematical model fuzzy parameterized complex fuzzy hypersoft set (FpcFHSS) are utilized to evaluate the susceptibility of patients for liver disorder. This model is capable to cope with uncertain nature of parameters, the classification of

parameters into their respective sub-parametric values and the periodicity of data collectively. The five appropriate laboratory test features relevant to liver disorder are considered as parameters and their standard ranges are opted as sub-parametric values. The uncertain nature of sub-parametric tuples is managed by assigning them a fuzzy parameterized degree which is determined with the suitable criteria. Using the matrix aggregations of FpcFHSS, an algorithm is proposed for the assessment of the susceptibility of patients for liver disorder and then validated with the help of real-world multi-attribute decision-making application. The reliability and flexibility of proposed model are discussed by its structural comparison with some pre-developed relevant models.
https://www.sciencedirect.com/science/article/abs/pii/S1746809423006377

117. **Arshad, M., Saeed, M., Rahman, A. U.,** **Mohammed, M. A., Abdulkareem, K. H., Alghawli, A. S., & Al-qaness, M. A. (2023). A robust algorithmic cum integrated approach of interval-valued fuzzy hypersoft set and OOPCS for real estate pursuit.** *PeerJ Computer Science, 9,* **e1423.** Muhammad Arshad, Muhammad Saeed, Atiqe Ur Rahman (Mathematics\SSC) Date of Publication: June 2023 HJRS: W (Bronze)

Due to the vast variety of aspects that must be made—many of which are in opposition to one another—choosing a home can be difficult for those without much experience. Individuals need to spend more time making decisions because they are difficult, which results in making poor choices. To overcome residence selection issues, a computational approach is necessary. Unaccustomed people can use decision support systems to help them make decisions of expert quality. The current article explains the empirical procedure in that field in order to construct decision-support system for selecting a residence. The main goal of this study is to build a weighted product mechanism-based decision-support system for residential preference. The said house short-listing estimation is based on several key requirements derived from the interaction between the researchers and experts. The results of the information processing show that the normalized product strategy can rank the available alternatives to help individuals choose the best option. The interval valued fuzzy hypersoft set (IVFHS-set) is a broader variant of the fuzzy soft set that resolves the constraints of the fuzzy soft set from the perspective of the utilization of the multi-argument approximation operator. This operator maps sub-parametric tuples into a power set of universe. It emphasizes the segmentation of every attribute into a disjoint attribute valued set. These characteristics make it a whole new mathematical tool for handling problems involving uncertainties. This makes the decision-making process more effective and efficient. Furthermore, the traditional TOPSIS technique as a multi-criteria decision-making strategy is discussed in a concise manner. A new decision-making strategy,"OOPCS" is constructed with modifications in TOPSIS for fuzzy hypersoft set in interval settings. The proposed strategy is applied to a real-world multi-criteria decision-making scenario for ranking the alternatives to check and demonstrate their efficiency and effectiveness.
https://peerj.com/articles/cs-1423/

118. **Kaleem, M. M., Asjad, M. I.,** **Usman, M., & Inc, M. (2023). Effects of natural convection flow of fractional Maxwell hybrid nanofluid by finite difference method.** *Waves in Random and Complex Media,* **1-16. https://doi.org/10.1080/17455030.2022.2164381.** Muhammad Madsar Kaleem, MUhammad Imran Asjad (Mathematics\SSC) Date of Publication: January 2023 HJRS: W (Honorable Mentioned)

Heat transfer phenomenon occurs in a wide ra.nge of industrial and engineering problems. In this framework, investigating the heat transfer behavior using an efficient mathematical tool is the hot research area in the research community. Therefore, we discussed the impact of fractional Maxwell hybrid nanofluid on heat transfer under the effects of Joules Heating, Magnetic field, and viscous dissipation via porous Medium with Caputo time fractional derivative. We have considered an infinite vertical wall with adaptable temperature moving with jerked motion along -direction. Water is taken as base fluid and nano-sized particles of Copper (Cu) & Alumina ($Al2O3$) are used for the preparation of nanofluid. The governing equations of nonlinear Caputo time fractional model are converted into dimensionless form. A finite difference scheme is developed and applied successfully to get numerical solutions to the problem and to examine the influence of Maxwell hybrid nanofluid, physical parameters, and fractional parameters on velocity and temperature profiles. It can also be observed that the extended finite difference algorithm is very efficient and gives the accurate solution of the discussed model. It can be extended for more numerous types of heat transfer problems arising in physical nature with complex geometry.
https://www.tandfonline.com/doi/full/10.1080/17455030.2022.2164381

119. Ali, J., Bashir, Z., & **Rashid, T.** (2023). A cubic q-rung orthopair fuzzy TODIM method based on Minkowski-type distance measures and entropy weight. *Soft Computing*, 1-25. https://doi.org/10.1007/s00500-023-08552-8. Tabasam Rahid (Mathematics\SSC) Date of Publication: June 2023 HJRS: W (Silver)

The main aim of the present study is to develop a novel TODIM method under cubic q-rung orthopair fuzzy environment, where information about the weights of both decision makers (DMs) and criteria is fully unknown. First, we introduce some novel operations along with their relevant properties. Afterward, we propose a Minkowski-type distance measure for cubic q-rung orthopair fuzzy sets (Cq-ROFSs). We list some properties of the proposed distance measures and some special cases about various parameter values. Next,

the entropy measure between two Cq-ROFSs is disclosed, and part of the proposed entropy measure characteristics is presented. Further, this study put forward the method for finding the weights of DMs and criteria. In the developed method, firstly, weights of DMs are obtained using the proposed distance measure and cubic q-rung orthopair fuzzy weighted averaging operator. Then, the weights of criteria are determined by the developed entropy measure. A novel TODIM method is developed utilizing the proposed Minkowski-type distance measures for ranking alternatives in light of the acquired criteria weights. To demonstrate the applicability and validity of the presented work, we address the talent recruitment problem. Moreover, we discuss the influence of parameters on decision-making results. Finally, a comparative study with existing work is made.

https://link.springer.com/article/10.1007/s00500-023-08552-8#citeas

120. **Akraam, M., Rashid, T., & Zafar, S.** (2023). A chaos-based image encryption scheme is proposed using multiple chaotic maps. *Mathematical Problems in Engineering, 2023*. https://doi.org/10.1155/2023/2003724. Muhammad Akraam, Tabasam Rashid, Sohail Zafar (Mathematics\SSC) Date of Publication: May 2023 HJRS: X (Clay)

Everybody wants to maintain solitariness to some extent or entirely in his dealings with other people during different modes of communication. To retain privacy, researchers materialized distinct image encryption algorithms using chaotic maps. Due to their extraordinary features, most researchers employed multidimensional chaotic maps to barricade clandestine information or digital images from potential invaders. Still, multidimensional chaotic maps have many impediments conferred in the literature review. In this paper, we developed a cryptosystem utilizing multiple chaotic maps to mitigate the shortcoming of multidimensional chaotic maps. A distinctive approach is adopted to sire a key stream using a combination of chaotic maps and create a sequence of random integers linked with the pixels of the plain image to shatter the association between neighboring pixels of a plain image. Finally, diffusion is accomplished using the previously diffused pixels at a decimal level. Security and statistical analysis demonstrate that the presented encryption algorithm is robust against well-known attacks. An ample key space indicates that it is best suited for secure communication.

https://www.hindawi.com/journals/mpe/2023/2003724/

121. **Bashir, M. A.,** Muhiuddin, G., **Rashid, T.,** & Sardar, M. S. (2023). Multicriteria Ordered the Profile Clustering Algorithm Based on PROMETHEE and Fuzzy c-Means. *Mathematical Problems in Engineering, 2023*. https://doi.org/10.1155/2023/5268340. Muhammad Adnan Bashir, Tabasam Rashid (Mathematics\SSC) Date of Publication: May 2023 HJRS: X (Clay)

The purpose of multicriteria clustering is to locate groups of alternatives that have comparable qualities and have been examined across multiple criteria. An ordered profile clustering is a well-known problem, and the fuzzy c-means clustering (FCM) technique is one of the most broadly used in every field of life. At present, FCM is for the partitioning of information into numerous clusters which are still lacking priority relations. To address the problem of finding ranking in clusters based on multicriteria in the fuzzy environment, we propose a multicriteria ordered clustering algorithm based on the partial net outranking flow of the preference organization for enrichment evaluations method (PROMETHEE) and fuzzy c-means. Lastly, we apply the proposed algorithm to solve a real-world targeted clustering problem regarding the human development indexes. To test the efficacy of the proposed algorithm, a comparative analysis of ordered K-means clustering (OKM) and FCM is carried out with it.

https://www.hindawi.com/journals/mpe/2023/5268340/

122. **Akraam, M., Rashid, T., & Zafar, S.** (2023). A novel and secure image encryption scheme based on two-dimensional logistic and Arnold Cat map. *Cluster Computing,* 1-20. https://doi.org/10.1007/s10586-023-04084-w. Muhammad Akraam, Tabasam Rashid, Sohail Zafar (Mathematics\SSC) Date of Publication: June 2023 HJRS: W (Honorable Mention)

Digital images are information carriers in the latest era of technology. Therefore, securing digital images or keeping data, videos, or confidential documents during communication through the internet is challenging because an adversary always endeavors to acquire any related information about digital images or reserved data. Chaotic systems are immaculate for developing new cryptosystems due to their exceptional characteristics. In this paper, our primary focus is to introduce a procedure to generate unique secret key streams using a two-dimensional logistic map and create a sequence of positive integers with the Arnold Cat map. Confusion and diffusion are the two fundamental principles of any image encryption scheme. In our proposed image encryption scheme, confusion is done using a series of positive integers to devastate the correlation among the adjacent pixels of plain images in all directions, and diffusion is done with secret key streams. The consequences of the security and statistical analysis depict that the proposed image encryption scheme is safe against numerous attacks.

https://link.springer.com/article/10.1007/s10586-023-04084-w#citeas

123. Alfwzan, W. F., Baleanu, D., Dayan, F., Ullah, S., Ahmed, N., Rafiq, M., & Raza, A. (2023). Computational Analysis for Computer Network Model with Fuzziness. *Intelligent Automation & Soft Computing, 37*(2). DOI: 10.32604/iasc.2023.039249. Fazal Dayan (Mathematics\SSC) Date of Publication: June 2023 HJRS: X (Null)
A susceptible, exposed, infectious, quarantined and recovered (SEIQR) model with fuzzy parameters is studied in this work. Fuzziness in the model arises due to the different degrees of susceptibility, exposure, infectivity, quarantine and recovery among the computers under consideration due to the different sizes, models, spare parts, the surrounding environments of these PCs and many other factors like the resistance capacity of the individual PC against the virus, etc. Each individual PC has a different degree of infectivity and resistance against infection. In this scenario, the fuzzy model has richer dynamics than its classical counterpart in epidemiology. The reproduction number of the developed model is studied and the equilibrium analysis is performed. Two different techniques are employed to solve the model numerically. Numerical simulations are performed and the obtained results are compared. Positivity and convergence are maintained by the suggested technique which are the main features of the epidemic models.
https://www.techscience.com/iasc/v37n2/53239

124. Nadeem, A., Azhar, K., Zafar, S., Kashif, A., & Zahid, Z. (2023). On the partition dimension of circulant graph Cn (1, 2, 3, 4). *Punjab University Journal of Mathematics, 55*(3), 117-133. https://doi.org/10.52280/pujm.2023.550303. Asim Nadeem, Kamran Azhar, Sohail Zafar, Agha Kashif, Zohaib Zahid (Mathematics\SSC) Date of Publication: March 2023 HJRS: Y (Null)
Let Λ = {B1, B2, . . . , Bl} be an ordered l-partition of a connected graph G(V (G), E(G)). The partition representation of vertex x with respect to Λ is the l-vector, r(x|Λ) = (d(x, B1), d(x, B2), . . . , d(x, Bl)), where d(x, B) = min{d(x, y)|y $\in$ B} is the distance between x and B. If the l -vectors r(x|Λ), for all x $\in$ V (G) are distinct then l - partition is called a resolving partition. The least value of l for which there is a resolving l - partition is known as the partition dimension of G symbolized as pd(G). In this paper, the partition dimension of circulant graphs Cn(1, 2, 3, 4) is computed for n $\geq$ 8
http://pu.edu.pk/images/journal/maths/PDF/Paper_3_55_3_2023.pdf

125. Jamil, F., Kashif, A., Zafar, S., & Ojiema, M. O. (2023). Local Fractional Strong Metric Dimension of Certain Complex Networks. *Complexity,* 2023. https://doi.org/10.1155/2023/3635342. Faiza Jamil, Agha Kashif, Sohail Zafar (Mathematics\SSC) Date of Publication: May 2023 HJRS: W (Bronze)
Fractional variants of distance-based parameters have application in the fields of sensor networking, robot navigation, and integer programming problems. Complex networks are exceptional networks which exhibit significant topological features and have become quintessential research area in the field of computer science, biology, and mathematics. Owing to the possibility that many real-world systems can be intelligently modeled and represented as complex networks to examine, administer and comprehend the useful information from these real-world networks. In this paper, local fractional strong metric dimension of certain complex networks is computed. Building blocks of complex networks are considered as the symmetric networks such as cyclic networks , circulant networks , mobious ladder networks , and generalized prism networks . In this regard, it is shown that LSFMD of and is 1 when is even and when is odd, whereas LSFMD of is 1 when is odd and when is even. Also, LSFMD of is where and .
https://www.hindawi.com/journals/complexity/2023/3635342/

126. Jamil, N., Kirmani, S., Wadeer, S., & Sultan, A. (2023). Intelligent System for Optimal Geometric Design Using Fuzzy Soft PDE. *Mathematical Problems in Engineering,* 2023. https://doi.org/10.1155/2023/2691439. Nosshad Jamil, Syed Kirmani, Alqa Sultan (Mathematics\SSC) Date of Publication: April 2023 HJRS: X (Null)
In this research, a methodology is discussed to develop an intelligent system for optimal geometric design for the culinary product. An optimum geometric design meets certain specified criteria in the most efficient or cost-effective way possible. The criterion for an optimum design will depend on the specific goals and constraints of the specific problem. In this methodology, partial differential equation and weighted Bonferroni mean are consolidated to develop the intelligent system for optimal geometric designs for the required product with the blend of fuzzy soft sets. Fuzzy soft sets allow capturing the incorporation of subjective or personal opinions into decision-making processes, as well as the consideration of multiple conflicting criteria. A parameter known as the smoothness parameter is used to control the shape of the optimal geometric model. The smoothness parameter, used as a fuzzy number, is important in this developed system as it fulfills the requirements for the desired intelligent system for product design according to the industries' demands. To verify the credibility of this system, an illustrated example is presented to design a culinary product, which is profitable for the hotel industry.
https://www.hindawi.com/journals/mpe/2023/2691439/

127. Malik, A., Mardan, S. A., Naz, T., & Khan, S. (2023). Analysis of class I complexity induced spherical polytropic models for compact objects. *Frontiers in Astronomy and Space Sciences, 10*, 1182772.

https://doi.org/10.3389/fspas.2023.1182772. Syed Ali Mardan, Shiraz Khan (Mathematics\SSC) Date of publication: April 2023 HJRS: W (Honorable Mentioned)

In this research, we present a comprehensive framework that uses a complexity factor to analyze class *I* generalized relativistic polytropes. We establish class *I* generalized Lane–Emden equations using the Karmarkar condition under both isothermal and non-isothermal regimes. Our approach considers a spherically symmetric fluid distribution for two cases of the generalized polytropic equation of state: 1) the mass density case μ_o and 2) the energy density case μ. To obtain numerical solutions for both cases, we solve two sets of differential equations that incorporate the complexity factor. Finally, we conduct a graphical analysis of these solutions.

https://www.frontiersin.org/articles/10.3389/fspas.2023.1182772/full

128. **Iqbal, H., Aftab, M. H., Akgul, A., Mufti, Z. S., Yaqoob, I., Bayram, M., & Riaz, M. B. (2023). Further study of eccentricity based indices for benzenoid hourglass network.** *Heliyon.* **https://doi.org/10.1016/j.heliyon.2023.e16956. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Silver)**

Topological Indices are the mathematical estimate related to atomic graph that corresponds biological structure with several real properties and chemical activities. These indices are invariant of graph under graph isomorphism. If top(h1) and top(h2) denotes topological index h1 and h2 respectively then h1 approximately equal h2 which implies that top(h1) = top(h2). In biochemistry, chemical science, nano-medicine, biotechnology and many other science's distance based and eccentricity-connectivity(EC) based topological invariants of a network are beneficial in the study of structure-property relationships and structure-activity relationships. These indices help the chemist and pharmacist to overcome the shortage of laboratory and equipment. In this paper we calculate the formulas of eccentricity-connectivity descriptor(ECD) and their related polynomials, total eccentricity-connectivity(TEC) polynomial, augmented eccentricity-connectivity(AEC) descriptor and further the modified eccentricity-connectivity(MEC) descriptor with their related polynomials for hourglass benzenoid network.

https://www.sciencedirect.com/science/article/pii/S2405844023041634

129. **Qayyum, M., Riaz, M. B., & Afzal, S. (2023). Analysis of blood flow of unsteady Carreau-Yasuda nanofluid with viscous dissipation and chemical reaction under variable magnetic field.** *Heliyon, 9*(6). **https://doi.org/10.1016/j.heliyon.2023.e16522. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Silver)**

Blood flow analysis through arterial walls depicts unsteady non-Newtonian fluid flow behavior. Arterial walls are impacted by various chemical reactions and magnetohydrodynamic effects during treatment of malign and tumors, cancers, drug targeting and endoscopy. In this regard, current manuscript focuses on modeling and analysis of unsteady non-Newtonian Carreau-Yasuda fluid with chemical reaction, Brownian motion and thermophoresis under variable magnetic field. The main objective is to simulate the effect of different fluid parameters, especially variable magnetic field, chemical reaction and viscous dissipation on the blood flow to help medical practitioners in predicting the changes in blood to make diagnosis and treatment more efficient. Suitable similarity transformations are used for the conversion of partial differential equations into a coupled system of ordinary differential equations. Homotopy analysis method is used to solve the system and convergent results are drawn. Effect of different dimensionless parameters on the velocity, temperature and concentration profiles of blood flow are analyzed in shear thinning and thickening cases graphically. Analysis reveals that chemical reaction increases blood concentration which enhance the drug transportation. It is also observed that magnetic field elevates the blood flow in shear thinning and thickening scenarios. Furthermore, Brownian motion and thermophoresis increases temperature profile.

https://www.sciencedirect.com/science/article/pii/S2405844023037295

130. **Saleem, N., Iqbal, B., Hasan, F., & Shatanawi, W. (2023). Existence Results for Wardoski-Type Convex Contractions and the Theory of Iterated Function Systems.** *Symmetry, 15*(6), 1162. **https://doi.org/10.3390/sym15061162. Naeem Saleem, Bilal Iqbal (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**

The purpose of this paper is to define the notion of extended convex $\mathcal{F}$ contraction by imposing less conditions on the function $\mathcal{F}$ satisfying certain contractive conditions. We prove the existence of fixed points for these types of mappings in the setting of b-metric spaces. In addition, some illustrative examples are provided to show the usability of the obtained results. Lastly, we use the obtained fixed-point results to find the fractals with respect to the iterated function systems in the framework of b-metric spaces. Furthermore, the variables involved in the b-metric space are symmetric, and symmetry plays an important role in solving the nonlinear problems defined in operator theory.

https://www.mdpi.com/2073-8994/15/6/1162

131. **Saleem, N.**, Shafqat, R., George, R., Hussain, A., & Yaseen, M. (2023). A Theoretical Analysis on the Fractional Fuzzy Controlled Evolution Equation. *Fractals.* https://doi.org/10.1142/S0218348X2340090X. **Naeem Saleem (Mathematics/SSC) Date of Publication: October 2023 HJRS: W (Bronze)**

This paper designates two important properties of the existence-uniqueness of the mild solution for a fractional controlled fuzzy evolution equation involving the Caputo-derivative by using nonlocal conditions, where $\beta \in (1,2)$, and it is formulated as $c0D\beta\omega u(\omega)=Au(\omega)+\chi(\omega,u(h(\omega)))+Q(\omega)H(\omega),u(0)=u0+(-1)g(u),u'(0)=u1$, where A is a strongly continuous fuzzy semigroup's generator. Furthermore, many numerical solutions have been presented to ensure that key results are accurate and reliable. Finally, an example about fuzzy fractional evolution equations is presented.

https://www.worldscientific.com/doi/10.1142/S0218348X2340090X

132. **Ahmad, M., Zahid, Z., Javaid, M.**, & Ashebo, M. A. (2023). A Study on Minimal Doubly Resolving Sets of Certain Families of Networks. *IEEE Access, 11*, 56344-56352. doi: 10.1109/ACCESS.2023.3282701. **Muhammad Ahmad, Zohaib Zahid, Muhammad Javaid (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Silver)**

The suppression of harmful information and even its diffusion can be predicted and delayed by precisely finding sources with limited resources. The doubly resolving sets (DRSs) play a crucial role in determining where diffusion occurs in a network. Source detection problems are among the most challenging and exciting problems in complex networks. This problem has great significance in controlling any diffusion outbreak. The detection of a virus source in a network is basically locating a node that spreads the observed diffusion. This problem can be solved by using its connection to the well-known and well-studied minimal doubly resolving set (MDRS) problem, which reduces the number of observers needed to get an accurate answer. In this article, we investigate the MDRSs for the families of kayak paddle networks $KP_{(r,s,t)}$ and lollipop networks $L_{(r,s)}$. It is concluded that the cardinality of MDRSs for $KP_{(r,s,t)}$ is bounded, and it is unbounded for $L_{(r,s)}$.

https://ieeexplore.ieee.org/abstract/document/10143649

133. **Javed, M., & Kashif, A.** (2023). The SSC of the Generalised Jahangir's Graph Jm, k and its Algebraic Characterizations. *Punjab University Journal of Mathematics, 55*(3), 99-115. https://doi.org/10.52280/pujm.2023.550302. **Mehwish Javed, Agha Kashif (Mathematics/SSC) Date of Publication: March 2023 HJRS: Y (Null)**

In this article, we present important combinatorial and algebraic properties of spanning simplicial complex (SSC) of the generalised Jahangir's graph Jm, k. We describe the relation to find f− vectors associated toΔ s (Jm, k) and determine the Hilbert series for the SR-ring K [Δ s (Jm, k)]. In the end, we present the associated primes of the facet ideal IF (Δ s (Jm, k)) and the Cohen-Macaulay characterization of the SR-ring ofΔ s (Jm, k).

http://pu.edu.pk/images/journal/maths/PDF/Paper_2_55_3_2023.pdf

134. **Abbas, M., Aslam, S., Abdullah, F. A., Riaz, M. B., & Gepreel, K. A. (2023). An efficient spline technique for solving time-fractional integro-differential equations. *Heliyon,* 9(9). doi: 10.1016/j.heliyon.2023.e19307. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Gold)**

Spline curves are very prominent in the mathematics due to their simple construction, accuracy of assessment and ability to approximate complicated structures into interactive curved designs. A spline is a smooth piece-wise polynomial function. The primary goal of this study is to use extended cubic B-spline (ExCuBS) functions with a new second order derivative approximation to obtain the numerical solution of the weakly singular kernel (SK) non-linear fractional partial integro-differential equation (FPIDE). The spatial and temporal fractional derivatives are discretized by ExCuBS and the Caputo finite difference scheme, respectively. The present study found that it is stable and convergent. The validity of the current approach is examined on a few test problems, and the obtained outcomes are compared with those that have previously been reported in the literature.

https://www.cell.com/heliyon/pdf/S2405-8440(23)06515-5.pdf

135. **Abdal, S., Siddique, I., Afzal, S., Chu, Y. M., Ahmadian, A., & Salahshour, S. (2023). On development of heat transportation through bioconvection of Maxwell nanofluid flow due to an extendable sheet with radiative heat flux and prescribed surface temperature and prescribed heat flux conditions. *Mathematical Methods in the Applied Sciences*, 46(10), 11355-11372. doi: 10.1002/mma.7722. Imran Siddique, Saima Afzal (Mathematics/SSC) Date of Publication: July 2023 HJRS: W (Bronze)**

This paper evaluates thermal output for the flow of Maxwell nanofluid over an extending sheet with bioconvection of micron size self-motivated organisms. Radiative heat flux and two temperature boundary conditions, namely, prescribed surface temperature (PST) and prescribed heat flux (PHF), are considered. The flow is influenced by a magnetic field and porosity effects of a medium. The motivation pertains to attain an enhancement in thermal transportation via nanoparticle inclusion. The possible settling of the nanoparticles

may be avoided by bioconvection of microorganisms. The basic theoretical conservation of mass, concentration, momentum, and energy provides a nonlinear set of partial differential equations which are then transmuted into ordinary differential form. The implementation of Runge–Kutta method with shooting technique in Matlab coding resulted the numerical solution. A deep insight into the problem is inspected by varying the inputs of influential parameters of the dependent functions. It is perceived that the flow speed is hindered by the growing inputs of parameters of buoyancy ratio, magnetic field, Raleigh number, and porosity. The temperature of the fluid attains higher outputs directly with thermophoresis and Brownian movement of nanoparticles. Motile microorganisms $\chi(\eta)$ profile goes down when bioconvection Schmidt number intensified. The current numeric results are validated when compared within existing studies.
https://onlinelibrary.wiley.com/doi/full/10.1002/mma.7722

136. Afshan, N., Mushtaq, Z., Alamri, F. S., Qureshi, M. F., Khan, N. A., & Siddique, I. (2023). Efficient thyroid disorder identification with weighted voting ensemble of super learners by using adaptive synthetic sampling technique. *AIMS Mathematics,* 8(10), 24274-24309. doi: 10.3934/math.20231238. Imran Siddique (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Honorable Mention)

There are millions of people suffering from thyroid disease all over the world. For thyroid cancer to be effectively treated and managed, a correct diagnosis is necessary. In this article, we suggest an innovative approach for diagnosing thyroid disease that combines an adaptive synthetic sampling method with weighted average voting (WAV) ensemble of two distinct super learners (SLs). Resampling techniques are used in the suggested methodology to correct the class imbalance in the datasets and a group of two SLs made up of various base estimators and meta-estimators is used to increase the accuracy of thyroid cancer identification. To assess the effectiveness of our suggested methodology, we used two publicly accessible datasets: the KEEL thyroid illness (Dataset1) and the hypothyroid dataset (Dataset2) from the UCI repository. The findings of using the adaptive synthetic (ADASYN) sampling technique in both datasets revealed considerable gains in accuracy, precision, recall and F1-score. The WAV ensemble of the two distinct SLs that were deployed exhibited improved performance when compared to prior existing studies on identical datasets and produced higher prediction accuracy than any individual model alone. The suggested methodology has the potential to increase the accuracy of thyroid cancer categorization and could assist with patient diagnosis and treatment. The WAV ensemble strategy computational complexity and the ideal choice of base estimators in SLs continue to be constraints of this study that call for further investigation.
https://www.aimspress.com/aimspress-data/math/2023/10/PDF/math-08-10-1238.pdf

137. Babar, Q., Saeed, A., Tabish, T. A., Sarwar, M., & Thorat, N. D. (2023). Targeting the tumor microenvironment: Potential strategy for cancer therapeutics. *Biochimica et Biophysica Acta - Molecular Basis of Disease,* 1869(6). doi: 10.1016/j.bbadis.2023.166746. Mohsin Sarwar (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Gold)

Cellular and stromal components including tumor cells, immune cells, mesenchymal cells, cancer-linked fibroblasts, and extracellular matrix, constituent tumor microenvironment (TME). TME plays a crucial role in reprogramming tumor initiation, uncontrolled proliferation, invasion and metastasis as well as response to therapeutic modalities. In recent years targeting the TME has developed as a potential strategy for treatment of cancer because of its life-threatening functions in restricting tumor development and modulating responses to standard-of-care medicines. Cold atmospheric plasma, oncolytic viral therapy, bacterial therapy, nano-vaccine, and repurposed pharmaceuticals with combination therapy, antiangiogenic drugs, and immunotherapies are among the most effective therapies directed by TME that have either been clinically authorized or are currently being studied. This article discusses above-mentioned therapies in light of targeting TME. We also cover problems related to the TME-targeted therapies, as well as future insights and practical uses in this rapidly growing field.
https://www.sciencedirect.com/science/article/pii/S0925443923001126

138. Bashir, M. A., Rashid, T., & Bashir, M. S. (2023). Generalized Ordered Intuitionistic Fuzzy C-Means Clustering Algorithm Based on PROMETHEE and Intuitionistic Fuzzy C-Means. *International Journal of Intelligent Systems,* 2023. doi: 10.1155/2023/6686446. Muhammad Adnan Bashir (Mathematics/SSC) Date of Publication: September 2023 HJRS: W (Gold)

The problem of ordered clustering in the context of decision-making with multiple criteria has garnered significant interest from researchers in the field of management science and operational research. In real-world scenarios, the datasets often exhibit imprecision or uncertainty, which can lead to suboptimal ordered-clustering outcomes. However, the intuitionistic fuzzy c-means (IFCM) clustering algorithm enhances the accuracy and effectiveness of decision-making processes by effectively handling uncertain dataset information for clustering. Therefore, we propose a new clustering algorithm, called the generalized ordered intuitionistic fuzzy c-means (G-OIFCM), based on PROMETHEE and the IFCM clustering algorithm. Different from the classical IFCM clustering algorithm, we use positive flow ($\varphi+si\in 0$, 1) and negative flow ($\varphi-si\in 0$, 1) of PROMETHEE to generate ordered clusters within the intuitionistic environment. We define a new objective

function based on the positive and negative flow of the PROMETHEE and IFCM clustering algorithm, whose properties are mathematically justified in terms of convergence and optimization. The performance of the proposed algorithm is evaluated using two different real-world datasets to assess both the ordered clustering and the quality of partitioning. To demonstrate the effectiveness of G-OIFCM, a comparison is conducted with three other algorithms: fuzzy c-means (FCM), ordered fuzzy c-means (OFCM), and an adaptive generalized intuitionistic fuzzy c-means (G-IFCM). The results demonstrate the effectiveness of G-OIFCM in enhancing optimal ordered clustering and utility when dealing with uncertainty in datasets.
https://www.hindawi.com/journals/ijis/2023/6686446/

139. **Batool, A.,** Talib, I., Bourguiba, R., Suwan, I., Abdeljawad, T., & **Riaz, M. B.** (2023). **A new generalized approach to study the existence of solutions of nonlinear fractional boundary value problems.** *International Journal of Nonlinear Sciences and Numerical Simulation,* **24(6), 2145-2154. doi: 10.1515/ijnsns-2021-0338.** **Asmat Batool, Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: October 2023 HJRS: X (Clay)**
In this paper, we construct a new generalized result to study the existence of solutions of nonlinear fractional boundary value problems (FBVPs). The proposed results unify the existence criteria of certain FBVPs including periodic and antiperiodic as special cases that have been previously studied separately in the literature. The method we employ is topological in its nature and manifests themselves in the forms of differential inequalities (lower and upper solutions, and coupled lower and upper solutions (CLUSs)). Two examples are given to demonstrate the applicability of the developed theoretical results.
https://www.degruyter.com/document/doi/10.1515/ijnsns-2021-0338/html

140. Beenish, Kurkcu, H., **Riaz, M. B.,** Imran, M., & Jhangeer, A. (2023). **Lie analysis and nonlinear propagating waves of the (3 + 1)-dimensional generalized Boiti–Leon–Manna–Pempinelli equation.** *Alexandria Engineering Journal*, **80, 475-486. doi: 10.1016/j.aej.2023.08.067.** **Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: October 2023 HJRS: W (Gold)**
The (3 + 1)-dimensional generalized Boiti-Leon-Manna-Pempinelli equation, which describes the evolution of Riemann wave propagation in an in-compressible fluid along three mutually perpendicular axes, is investigated in this research article. The study encompasses the analysis of Lie symmetries, corresponding symmetry reductions, and conservation laws associated with the equation. The Lie symmetry method is employed to determine the infinitesimal generators of the considered equation. Furthermore, commutator table is generated, and symmetry groups corresponding to each infinitesimal generator are derived. By utilizing the similarity reduction technique, the original nonlinear partial differential equation is transformed into nonlinear ordinary differential equations. Then, generalized $exp(-\phi(\zeta))$ expansion technique is utilized to solve the reduced equations and estimate specific traveling wave solutions for the equation. Moreover, graphical representations are employed to illustrate the traveling wave solutions, employing suitable parameter values. Additionally, the multiplier approach is utilizedto calculate conserved vectors for the equation under consideration.
https://www.sciencedirect.com/science/article/pii/S111001682300755X

141. Caliskan, A., Zulqarnain, R. M., Güdekli, E., **Siddique, I.,** Ahmad, H., & Askar, S. (2023). **Structural properties of a new class of stellar structures in modified teleparallel gravity.** *Frontiers in Astronomy and Space Sciences,* **10. doi: 10.3389/fspas.2023.1203777. Imran Siddique (Mathematics/SSC) Date of Publication: September 2023 HJRS: W (Honorable Mention)**
This paper explores new neutron star models based on spherically symmetric space–time. We take into account the gravitational effects of (Formula presented.) gravity, in which T is the torsion and (Formula presented.) is the trace of the energy–momentum tensor. Field equations are evaluated by incorporating the off-diagonal tetrad. In this paper, we discuss the detailed properties of compact star candidates 4U1538−52, J0437−4,715, J0030 + 0451, and 4U1820−30, like energy density, pressure profiles, gradients, anisotropy, energy conditions, equation of state, speeds of sound, TOV equation, and compactification parameters. We discuss all these characteristics using the quadratic cosmological model of (Formula presented.) gravity. We use the well-famed junction equations to evaluate the unknown parameters. Our detailed and comprehensive graphical analysis ensures that the model containing the anisotropic nature of stellar structures is physically acceptable, regular, and stable. Copyright © 2023 Caliskan, Zulqarnain, Güdekli, Siddique, Ahmad and Askar.
https://www.frontiersin.org/articles/10.3389/fspas.2023.1203777/full

142. **Dayan, F.,** Ahmed, N., Rafiq, M., Raza, A., Khan, I., & eldin, E. M. T. (2023). **A reliable numerical investigation of an SEIR model of measles disease dynamics with fuzzy criteria.** *Scientific Reports,* **13(1). doi: 10.1038/s41598-023-42953-x. Fazal Dayan (Mathematics/SSC) Date of Publication: December 2023 HJRS: W (Platinum)**
The terms susceptibility, exposure, infectiousness, and recovered all have some inherent ambiguity because different population members have different susceptibility levels, exposure levels, infectiousness levels, and recovery patterns. This uncertainty becomes more pronounced when examining population subgroups

characterized by distinct behaviors, cultural norms, and varying degrees of resilience across different age brackets, thereby introducing the possibility of fluctuations. There is a need for more accurate models that take into account the various levels of susceptibility, exposure, infectiousness, and recovery of the individuals. A fuzzy SEIR model of the dynamics of the measles disease is discussed in this article. The rates of disease transmission and recovery are treated as fuzzy sets. Three distinct numerical approaches, the forward Euler, fourth-order Runge-Kutta, and nonstandard finite difference (NSFD) are employed for the resolution of this fuzzy SEIR model. Next, the outcomes of the three methods are examined. The results of the simulation demonstrate that the NSFD method adeptly portrays convergent solutions across various time step sizes. Conversely, the conventional Euler and RK-4 methods only exhibit positivity and convergence solutions when handling smaller step sizes. Even when considering larger step sizes, the NSFD method maintains its consistency, showcasing its efficacy. This demonstrates the NSFD technique's superior reliability when compared to the other two methods, while maintaining all essential aspects of a continuous dynamical system. Additionally, the results from numerical and simulation studies offer solid proof that the suggested NSFD technique is a reliable and effective tool for controlling these kinds of dynamical systems. The convergence and consistency analysis of the NSFD method are also studied.
https://www.nature.com/articles/s41598-023-42953-x#Abs1

143. Faiz, Z., Javeed, S., Ahmed, I., Baleanu, D., Bilal Riaz, M., & Sabir, Z. (2023). Numerical solutions of the Wolbachia invasive model using Levenberg-Marquardt backpropagation neural network technique. *Results in Physics,* **50. doi: 10.1016/j.rinp.2023.106602. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: July 2023 HJRS: W (Silver)**

The current study presents the numerical solutions of the Wolbachia invasive model (WIM) using the neural network Levenberg-Marquardt (NN-LM) backpropagation technique. The dynamics of the Wolbachia model is categorized into four classes, namely Wolbachia-uninfected aquatic mosquitoes (An∗), Wolbachia-uninfected adult female mosquitoes (Fn∗), Wolbachia-infected aquatic mosquitoes (Aw∗), and Wolbachia-infected adult female mosquitoes (Fw∗). A reference dataset for the proposed NN-LM technique is created by solving the Wolbachia model using the Runge-Kutta (RK) numerical method. The reference dataset is used for validation, training, and testing of the proposed NN-LM technique for three different cases. The obtained numerical results from the proposed neural network technique are compared with the results obtained from the RK method for accuracy, correctness, and efficiency of the designed methodology. The validation of the proposed solution methodology is checked through the mean square error (MSE), error histograms, error plots, regression plots, and fitness plots.
https://www.sciencedirect.com/science/article/pii/S2211379723003959

144. Faridi, W. A., Bakar, M. A., Myrzakulova, Z., Myrzakulov, R., Akgül, A., & El Din, S. M. (2023). The formation of solitary wave solutions and their propagation for Kuralay equation. *Results in Physics,* **52. doi: 10.1016/j.rinp.2023.106774. Waqas Ali Faridi (Mathematics/SSC) Date of Publication: September 2023 HJRS: W (Silver)**

In this paper, the main motive is to mathematical explore the Kuralay equation, which find applications in various fields such as ferromagnetic materials, nonlinear optics, and optical fibers. The objective of this study is to investigate different types of soliton solutions and analyze the integrable motion of induced space curves. This article appropriates the traveling wave transformation allowing the partial differential equation to be changed into an ordinary differential equation. To establish these soliton solutions, the study employs the new auxiliary equation method. As an outcome, a numerous types of soliton solutions like, Periodic pattern with anti-peaked crests and anti-troughs, singular solution, mixed complex solitary shock solution, mixed singular solution, mixed shock singular solution, mixed trigonometric solution, mixed periodic, periodic solution and mixed hyperbolic solution obtain via Mathematica. In order to visualize the graphical propagation of the obtained soliton solutions, 3D, 2D, and contour graphics are generated by choosing appropriate parametric values. The impact of parameter w is also graphically displayed on the propagation of solitons.
https://www.sciencedirect.com/science/article/pii/S2211379723005673

145. Faridi, W. A., Yusuf, A., Akgül, A., Tawfiq, F. M. O., Tchier, F., Al-deiakeh, R., . . . Ma, W. X. (2023). The computation of Lie point symmetry generators, modulational instability, classification of conserved quantities, and explicit power series solutions of the coupled system. *Results in Physics,* **54. doi: 10.1016/j.rinp.2023.107126. Waqas Ali Faridi (Mathematics/SSC) Date of Publication: November 2023 HJRS: W (Silver)**

The well-known Chaffee–Infante reaction hierarchy is examined in this article along with its reaction–diffusion coupling. It has numerous variety of applications in modern sciences, such as electromagnetic wave fields, fluid dynamics, high-energy physics, ion-acoustic waves in plasma physics, coastal engineering, and optical fibres. The physical processes of mass transfer and particle diffusion might be expressed in this way. The Lie invariance criteria is taken into consideration while we determine the symmetry generators. The suggested approach produces the six-dimensional Lie algebra, where translation symmetries in space and time are associated to

mass conservation and conservation of energy respectively, the other symmetries are scaling or dilation. Additionally, similarity reductions are performed, and the optimal system of the sub-algebra should be quantified. There are an enormous number of exact solutions can construct for the traveling waves when the governing system is transformed into ordinary differential equations using the similarity transformation technique. The power series approach is also utilized for ordinary differential equations to obtain closed-form analytical solutions for the proposed diffusive coupled system. The stability of the model under the limitations is ensured by the modulation instability analysis. The reaction diffusion hierarchy's conserved vectors are calculated using multiplier methods using Lie Backlund symmetries. The acquired results are presented graphically in 2-D and 3-D to demonstrate the wave propagation behavior. https://www.sciencedirect.com/science/article/pii/S2211379723009191

146. **Furqan, S., Saleem, N., & Sessa, S.** (2023). Fuzzy n−Controlled Metric Space. *International Journal of Analysis and Applications,* **21.** doi: 10.28924/2291-8639-21-2023-101. **Salman Furqan, Naeem Saleem (Mathematics/SSC) Date of Publication: September 2023 HJRS: Y (Null)**
This manuscript consists of the idea of n−controlled metric space in fuzzy set theory to generalize a number of fuzzy metric spaces in the literature, for example, pentagonal, hexagonal, triple, and double controlled metric spaces and many other spaces in fuzzy environment. Various examples are given to explain definitions and results. We define open ball, convergence of a sequence and a Cauchy sequence in the context of fuzzy n−controlled metric space. We also prove, by means of an example, that a fuzzy n−controlled metric space is not Hausdorff. At the end of the article, an application is given to prove the uniqueness of the solution to fractional differential equations.
https://etamaths.com/index.php/ijaa/article/view/2931

147. **Harl, M. I., Saeed, M., Saeed, M. H.,** Alballa, T., & Khalifa, H. A. E. W. (2023). Human Intuitionistic Data-Based Employee Performance Evaluation with Similarity Measure Using Lattice Ordered Picture Fuzzy Hypersoft Sets. *IEEE Access*, 11, 105642-105654. doi: 10.1109/ACCESS.2023.3318599.**Muhammad Imran Harl, Muhammad Saeed (Mathematics/SSC) Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: September 2023 HJRS: W (Silver)**
Performance evaluation is a critical process in organizations as it provides valuable insights into employee productivity, identifies areas of improvement, facilitates fair reward systems, and ultimately contributes to the overall growth and success of the company. Most evaluations are based on human intuitionistic data, and performance attributes are divided into sub-attributes for a fair and detailed evaluation. For handling attributes at a sub-attributic level, we introduce a novel lattice-ordered picture fuzzy hypersoft set (LOPFHSS), which provides a more valuable structure for certain decision-making problems where uncertainty associated with picture fuzzy sets and the ordering among parameters is crucial. The utilization of LOPFHSS can enhance decision-making processes by introducing a systematic and ordered representation of parameters. For a detailed illustration of the designed structure, basic operations are defined, which are then used to develop an employee performance evaluation system that incorporates information in the form of membership degree (MD), non-membership degree (NMD), and abstinence degree (AD) while also addressing the issue of parametric ordering. The structure offers great flexibility and versatility in addressing decision-making problems commonly arising in human resource management, as most data is based on human intuition.
https://ieeexplore.ieee.org/abstract/document/10261991

148. **Harl, M. I., Saeed, M., Saeed, M. H.,** Alharbi, T., & Alballa, T. (2023). Bipolar picture fuzzy hypersoft set-based performance analysis of abrasive textiles for enhanced quality control. *Heliyon,* 9(9). doi: 10.1016/j.heliyon.2023.e19821.**Muhammad Imran Harl, Muhammad Saeed (Mathematics/SSC) Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: September 2023 HJRS: W (Gold)**
Abrasive textiles have widespread industrial applications in the fields of polishing, finishing, deburring, and cleaning of various surfaces. Effective decision making and performance analysis are crucial in the development and manufacturing of abrasive textiles, as it enables manufacturers to evaluate and optimize the performance of these materials for specific applications and to make informed decisions about their production processes. For that purpose, this work aims to introduce an innovative bipolar picture fuzzy hypersoft set (BPFHSS) which is composed of two picture fuzzy hyper soft sets; one of them gives us the positive information, and the other gives us the negative information, for each membership degree, neutral membership, and non-membership degree. The properties of the designed structure and discussed alongside a thorough discussion on the De-Morgan's laws. Also, the bipolar picture fuzzy hypersoft weighted geometric (BPFHSWG) operator is defined for the BPFHSS framework to aggregate bipolar picture fuzzy hypersoft numbers (BPFHSN) information. This research highlights the importance of considering inconsistent, bipolar, and multiple sub-attribute information in decision-making processes by using the defined operators to develop an algorithm for a multi-attribute analysis for quality control of manufacture of abrasive textiles.
https://www.cell.com/heliyon/pdf/S2405-8440(23)07029-9.pdf

149. **Hussain, M. T.** (2023). On Generalized-Subnormal Subgroups of Finite Groups. A*dvances in Group Theory and Applications,* 16, 81-89. doi: 10.32037/agta-2023-009. **Muhammad Tanveer Hussain (Mathematics/SSC) Date of Publication: August 2023** HJRS: X (Null)

Let = {i | i ∈ I} be some partition of the set of all primes P, G a finite group and (G) = {i | i ∩ π(G) 6= ∅}. A subgroup A of G is said to be generalized-sub-normal in G if A = [removed], where L is a modular subgroup and T is a-subnormal subgroup of G. We study the structure of G being based on the assumptions that if all members of H and every maximal subgroup of any non-cyclic Hi ∈ H are generalized-subnormal in G, where H is a complete Hall-set of G.

https://www.advgrouptheory.com/journal/Volumes/16/Hussain.pdf

150. **Hussain, M. T.**, Zafar, Z. U. A., & Ullah, S. (2023). A note on weakly σ -n-embedded subgroups of σ -full groups. *Ricerche di Matematica.* doi: 10.1007/s11587-023-00795-9. **Muhammad Tanveer Hussain (Mathematics/SSC) Date of Publication: July 2023** HJRS: X (Clay)

Let σ= { σi: i∈ I} be a partition of the set P of all prime numbers. A subgroup H of a finite group G is called σ -subnormal in G if there is a chain of subgroups H= H⊆ H1⊆ ⋯ ⊆ Hn= G where, for every i= 1 , … , n , Hi-1 normal in Hi or Hi/(Hi-1)Hi is a σi -group for some i∈ I . A subgroup H of G is said to be weakly σ -n-embedded in G, if there is a σ -subnormal subgroup T of G such that HG= HT and H∩ T≤ HσG , where the subgroup HσG is generated by all σ -subnormal subgroups of G contained in H. In this paper, we study the properties of weakly σ -n-embedded subgroups and use them to determine the structure of finite groups. Some known results are gerneralized. © 2023, Università degli Studi di Napoli "Federico II".

https://link.springer.com/article/10.1007/s11587-023-00795-9#Abs1

151. **Ihsan, M., Saeed, M., Rahman, A. U.,** Mohammed, M. A., Abdulkaree, K. H., Alghawli, A. S., & Al-Qaness, M. A. A. (2023). An innovative decision-making framework for supplier selection based on a hybrid interval-valued neutrosophic soft expert set. *AIMS Mathematics,* 8(9), 22127-22161. doi: 10.3934/math.20231128. **Muhammad Ihsan, Muhammad Saeed, Atiqe Ur Rahman (Mathematics/SSC) Date of Publication: July 2023** HJRS: X (Honorable Mention)

The best way to achieve sustainable construction is to choose materials with a smaller environmental impact. In this regard, specialists and architects are advised to take these factors into account from the very beginning of the design process. This study offers a framework for selecting the optimal sustainable building material. The core goal of this article is to depict a novel structure of a neutrosophic soft expert set hybrid called an interval-valued neutrosophic soft expert set for utilization in construction supply chain management to select a suitable supplier for a construction project. This study applies two different techniques. One is an algorithmic technique, and the other is set-theoretic. The first one is applied for the structural characterization of an interval-valued neutrosophic expert set with its necessary operators like union and OR operations. The second one is applied for the construction of a decision-making system with the help of pre-described operators. The main purpose of the algorithm is to be used in supply chain management to select a suitable supplier for construction. This paper proposes a new model based on interval-valued, soft expert and neutrosophic settings. In addition to considering these settings jointly, this model is more flexible and reliable than existing ones because it overcomes the obstacles of existing studies on neutrosophic soft set-like models by considering interval-valued conditions, soft expert settings and neutrosophic settings. In addition, an example is presented to demonstrate how the decision support system would be implemented in practice. In the end, analysis, along with benefits, comparisons among existing studies and flexibility, show the efficacy of the proposed structure.

https://www.aimspress.com/aimspress-data/math/2023/9/PDF/math-08-09-1128.pdf

152. **Iqbal, B.,** Saleem, N., Iqbal, I., & George, R. (2023). Common and Coincidence Fixed-Point Theorems for ℑ-Contractions with Existence Results for Nonlinear Fractional Differential Equations. *Fractal and Fractional,* 7(10). doi: 10.3390/fractalfract7100747. **Bilal Iqbal (Mathematics/SSC) Date of Publication: October 2023** HJRS: X (Clay)

In this paper, we derive the coincidence fixed-point and common fixed-point results for ℑ-type mappings satisfying certain contractive conditions and containing fewer conditions imposed on function ℑ with regard to generalized metric spaces (in terms of Jleli Samet). Finally, a fractional boundary value problem is reduced to an equivalent Volterra integral equation, and the existence results of common solutions are obtained with the use of proved fixed-point results.

https://www.mdpi.com/2504-3110/7/10/747

153. **Javed, F., Fatima, G.,** Sadiq, S., & Mustafa, G. (2023). Thermodynamics of Charged Black Hole in Symmetric Teleparallel Gravity. *Fortschritte der Physik,* 71(6-7). doi: 10.1002/prop.202200214. **Ghulam Fatima (Mathematics/SSC) Date of Publication: July 2023** HJRS: W (Silver)

In the current study, we examine the thermodynamics of a novel symmetric teleparallel gravity charged black hole solution. Our main focus is on the approximated solution for a nonlinear model like (Figure presented.). For this purpose, we calculate the Hawking temperature and discuss the stable configuration of considered

black hole using heat capacity. Then, we explore the effects of thermal corrections on thermodynamical quantities as well as energies of the system. We study the phase transitions of the system in the background of thermal fluctuations. It is concluded that the presence of coupling constant enhances the thermodynamical stable configuration of uncharged and charged BH geometries. To complete this study, we also explore the interesting aspects of the emission energy and quantum fluctuations. We highlight that our results are in good agreement with the thermodynamics of the previous black hole solutions and assumptions presented in the literature.

https://onlinelibrary.wiley.com/doi/full/10.1002/prop.202200214

154. **Jawaz, M., Rehman, M. A. U.,** Ahmed, N., Baleanu, D., Iqbal, M. S., Rafiq, M., & Raza, A. (2023). Analysis and numerical effects of time-delayed rabies epidemic model with diffusion. *International Journal of Nonlinear Sciences and Numerical Simulation,* 24(6), 2179-2194. doi: 10.1515/ijnsns-2021-0233. **Muhammad Jawaz, Muhammad Aziz-ur Rehman** (Mathematics/SSC) Date of Publication: October 2023 HJRS: X (Clay)

The current work is devoted to investigating the disease dynamics and numerical modeling for the delay diffusion infectious rabies model. To this end, a non-linear diffusive rabies model with delay count is considered. Parameters involved in the model are also described. Equilibrium points of the model are determined and their role in studying the disease dynamics is identified. The basic reproduction number is also studied. Before going towards the numerical technique, the definite existence of the solution is ensured with the help of the Schauder fixed point theorem. A standard result for the uniqueness of the solution is also established. Mapping properties and relative compactness of the operator are studied. The proposed finite difference method is introduced by applying the rules defined by R.E. Mickens. Stability analysis of the proposed method is done by implementing the Von–Neumann method. Taylor's expansion approach is enforced to examine the consistency of the said method. All the important facts of the proposed numerical device are investigated by presenting the appropriate numerical test example and computer simulations. The effect of τ on infected individuals is also examined, graphically. Moreover, a fruitful conclusion of the study is submitted.

https://www.degruyter.com/document/doi/10.1515/ijnsns-2021-0233/html

155. **Khalid, N. A., Saeed, M.,** & Smarandache, F. (2023). Interpretation of Neutrosophic Soft cubic T-ideal in the Environment of PS-Algebra. *Neutrosophic Sets and Systems,* 58, 443-463. doi: 10.5281/zenodo.8404510. **Neha Andaleeb Khalid, Muhammad Saeed** (Mathematics/SSC) Date of Publication: 2023 HJRS: Y (Null)

This study provides an innovative approach to neutrosophic algebraic structures by introducing a new structure called Neutrosophic Soft Cubic T-ideal (NSCTID), which combines T-ideal (TID) and Neutro-sophic Soft Cubic Sets (NSCSs) within the framework of PS-Algebra. Within the already-existing neutrosophic cubic structures, the addition of soft sets with the characteristics of TID makes this structure more desirable. The theoretical development of the proposed structure includes the application of fundamental ideas as union, intersection, the Cartesian product, and homomorphism. We also introduce the notions of NSCTID-translation and NSCTID-multiplication to further enhance the structure of NSCTID. By applying the idea of translation and multiplication, we offer improved algorithm for neutrosophic cubic sets to deal with different parameters that are satisying the TID's distinctive characteristics. Through this thorough research, we offer an elementary understanding of NSCTID and its capabilities, providing the way to new algebraic structures.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4649400

156. **Khan, A. A., Ali, B.,** & George, R. (2023). On semi best proximity points for multivalued mappings in quasi metric spaces. *AIMS Mathematics,* 8(10), 23835-23849. doi: 10.3934/math.20231215. **Arshad Ali Khan, Basit Ali** (Mathematics/SSC) Date of Publication: August 2023 HJRS: X (Honorable Mention)

Due to the lack of symmetry property for the quasi metrics, we have considered left and right versions of best proximity points of multivalued mappings of quasi metric spaces. Further we consider the problem of existence of semi (left and right) best proximity points of generalized multivalued contractions of quasi metric spaces via various versions of so called p–property. Some examples are given to explain the results

https://www.aimspress.com/aimspress-data/math/2023/10/PDF/math-08-10-1215.pdf

157. **Khan, A. A.,** Ullah, S., Altanji, M., Amin, R., Haider, N., Alshehri, A., & **Riaz, M. B.** (2023). A numerical study of spatio-temporal COVID-19 vaccine model via finite-difference operator-splitting and meshless techniques. *Scientific Reports,* 13(1). doi: 10.1038/s41598-023-38925-w. **Muhammad Bilal Riaz** (Mathematics/SSC) Date of Publication: July 2023 HJRS: W (Platinum)

In this paper, a new spatio-temporal model is formulated to study the spread of coronavirus infection (COVID-19) in a spatially heterogeneous environment with the impact of vaccination. Initially, a detailed qualitative analysis of the spatio-temporal model is presented. The existence, uniqueness, positivity, and boundedness of the model solution are investigated. Local asymptotical stability of the diffusive COVID-19 model at steady state is carried out using well-known criteria. Moreover, a suitable nonlinear Lyapunov functional is constructed for the global asymptotical stability of the spatio-temporal model. Further, the model is solved numerically based on uniform and non-uniform initial conditions. Two different numerical schemes named: finite difference

operator-splitting and mesh-free operator-splitting based on multi-quadratic radial basis functions are implemented in the numerical study. The impact of diffusion as well as some pharmaceutical and non-pharmaceutical control measures, i.e., reducing an effective contact causing infection transmission, vaccination rate and vaccine waning rate on the disease dynamics is presented in a spatially heterogeneous environment. Furthermore, the impact of the aforementioned interventions is investigated with and without diffusion on the incidence of disease. The simulation results conclude that the random motion of individuals has a significant impact on the disease dynamics and helps in setting a better control strategy for disease eradication.
https://www.nature.com/articles/s41598-023-38925-w

158. **Khan, K. A., Javed, M. F., Ullah, M. A., & Riaz, M. B. (2023). Heat and Mass transport analysis for Williamson MHD nanofluid flow over a stretched sheet. *Results in Physics,* 53. doi: 10.1016/j.rinp.2023.106873. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: October 2023 HJRS: W (Silver)**

This study focuses on analyzing the behavior of a time-varying magnetohydrodynamic (MHD) Williamson nanofluid (WNF) flowing over a stretched plate. The main objective is to understand the heat and mass transport properties of the nanofluid in this scenario. The mathematical model involves a system of partial differential equations (PDEs) that are transformed into a set of ordinary differential equations (ODEs) using a similarity transformation. These ODEs are then solved using the well-established MATLAB BVP4C technique; a part of the finite difference method. To ensure the reliability and accuracy of the approach, the obtained results are compared with previously published literature, serving as a validation step. The numerical findings are presented graphically and in tabular form. The study focuses on examining the impact of various external factors on the friction factor, Nusselt number, and Sherwood number, providing a comprehensive evaluation of heat transfer and mass transport characteristics. Specifically, the study investigates the flow and heat transfer properties near a stretched plate with a permeable layer. Also, takes into account the transverse dispersion, and heat generation effects in MHD WNF moreover with magnetic field and slip boundary conditions. The results of the study indicate that increasing the Brownian motion parameter (Nb) and Thermophoresis parameter (Nt) leads to higher local Nusselt numbers, reflecting the increased rates of transferring the heat. Similarly, an increase in the Nt is associated with higher local Sherwood numbers, indicating enhanced mass transport. Conversely, higher values of the Brownian motion parameter (Nb) result in lower local Sherwood numbers. By analyzing the influence of various external factors, such as nanofluid properties and magnetic fields, a better understanding of heat transfer and mass transport characteristics can be obtained.
https://www.sciencedirect.com/science/article/pii/S2211379723006666

159. **Khan, N., Ayaz, S., Siddique, I., Ahmad, H., Askar, S., & Zulqarnain, R. M. (2023). Sustainable practices to reduce environmental impact of industry using interaction aggregation operators under interval-valued Pythagorean fuzzy hypersoft set. *AIMS Mathematics,* 8(6), 14644-14683. doi: 10.3934/math.2023750. Imran Siddique (Mathematics/SSC) Date of Publication: April 2023 HJRS: W (Honorable Mention)**

Optimization techniques can be used to find the optimal combination of inputs and parameters and help identify the most efficient solution. Aggregation operators (AOs) play a prominent role in discernment between two circulations of prospect and pull out anxieties from that insight. The most fundamental objective of this research is to extend the interaction AOs to the interval-valued Pythagorean fuzzy hypersoft set (IVPFHSS), the comprehensive system of the interval-valued Pythagorean fuzzy soft set (IVPFSS). The IVPFHSS adroitly contracts with defective and ambagious facts compared to the prevalent Pythagorean fuzzy soft set and interval-valued intuitionistic fuzzy hypersoft set (IVIFHSS). It is the dominant technique for enlarging imprecise information in decision-making (DM). The most important intention of this exploration is to intend interactional operational laws for IVPFHSNs. We extend the AOs to interaction AOs under IVPFHSS setting such as interval-valued Pythagorean fuzzy hypersoft interactive weighted average (IVPFHSIWA) and interval-valued Pythagorean fuzzy hypersoft interactive weighted geometric (IVPFHSIWG) operators. Also, we study the significant properties of the proposed operators, such as Idempotency, Boundedness, and Homogeneity. Still, the prevalent multi-criteria group decision-making (MCGDM) approaches consistently carry irreconcilable consequences. Meanwhile, our proposed MCGDM model is deliberate to accommodate these shortcomings. By utilizing a developed mathematical model and optimization technique, Industry 5.0 can achieve digital green innovation, enabling the development of sustainable processes that significantly decrease environmental impact. The impacts show that the intentional model is more operative and consistent in conducting inaccurate data based on IVPFHSS.
https://www.aimspress.com/aimspress-data/math/2023/6/PDF/math-08-06-750.pdf

160. **Khan, N., Javaid, M., Aslam, M. K., & Ashebo, M. A. (2023). On Minimum Generalized Degree Distance Index of Cyclic Graphs. *International Journal of Mathematics and Mathematical Sciences,* 2023. doi: 10.1155/2023/9934992. M. Javaid, M. K. Aslam (Mathematics/SSC) Date of Publication: June 2023 HJRS: Y (Null)**

Topological index (TI) is a mapping that associates a real number to the under study (molecular) graph which predicts its various physical and chemical properties. The generalized degree distance index is the latest

developed TI having compatible significance among the list of distance-based TIs. In this paper, the minimum generalized degree distance of unicyclic, bicyclic, and four cyclic graphs is determined. Mainly, the associated extremal (minimal) graphs are also identified among all the aforesaid classes of graphs.
https://www.hindawi.com/journals/ijmms/2023/9934992/

161. **Ahmed, R., Rafaqat, M., Siddique, I., & Arefin, M. A. (2023). Complex Dynamics and Chaos Control of a Discrete-Time Predator-Prey Model.** *Discrete Dynamics in Nature and Society,* **2023. doi: 10.1155/2023/8873611. Imran Siddique (Mathematics/SSC) Date of Publication: 2023 HJRS: X (Null)**
The objective of this study is to investigate the complexity of a discrete predator-prey system. The discretization is achieved using the piecewise constant argument method. The existence and stability of equilibrium points, as well as transcritical and Neimark–Sacker bifurcations, are all explored. Feedback and hybrid control methods are used to control the discrete system's bifurcating and fluctuating behavior. To validate the theoretical conclusions, numerical simulations are performed. The findings of the study suggested that the discretization technique employed in this investigation preserves bifurcation and displays more effective dynamic consistency in comparison to the Euler method.
https://www.hindawi.com/journals/ddns/2023/8873611/

162. **Ahsan, M., Sarwar, M. A., Lone, S. A., Almutlak, S. A., & Anwer, S. (2023). Optimizing New Technology Implementation Through Fuzzy Hypersoft Set: A Framework Incorporating Entropy, Similarity Measure, and TOPSIS Techniques.** *IEEE Access,* **11, 80680-80691. doi: 10.1109/ACCESS.2023.3299861. Muhammad Ahsan (Mathematics/SSC) Date of Publication: July 2023 HJRS: W (Gold)**
As each day passes by the world's NT requirements increase due to increasing population and technological advancements. Currently, traditional technologies are inadequate to support the requirement. It is vital to investigate cost-effective and suitable green environmental technologies as a response. Future connectivity(5G, 6G), programming, artificial intelligence and new technologies might be a resolution to this resource crisis in this setting. Now, choosing amongst the most suitable option present itself as a Multi-Criteria Decision Making (MCDM) challenge in which a judgment must be made in terms of a wide variety of characteristics. In this paper, the extended MCDM strategies are proposed to optimizing new technologies implementation. The novelty of the Fuzzy Hypersoft (FHS) set is discussed, which can deal with uncertainties, vagueness, and unclear data. This framework is more flexible than the structures found in literature as it can deal with the information where the attributes can be further sub-partitioned into attribute values for a better understanding. It may not always be possible to analyze these criteria using precise figures; instead, an assessment must be made using human and expert judgments for a more adaptable and sensitive review. The adaptive MCDM design with fuzzy edges incorporates Entropy (EN), Similarity Measure (SIM), and TOPSIS techniques rely on FHS. The conveyed frameworks are better for probing NT issues because they analyze a more expansive range of attributes, which can handle a component with multiple different sub-attribute values. Expert ratings are used to demonstrate a practical application to highlight the relevance of the proposed approach. In addition, a sensitivity analysis is done to investigate the impact of primary criterion weights in sorting.
https://ieeexplore.ieee.org/abstract/document/10196382/authors

163. **Alburaikan, A., Khalifa, H. A. E. W., & Saeed, M. (2023). Toward Multi-Objective Optimization Approach for Solving Cooperative Continuous Static Games under Fuzzy Environment.** *International Journal of Fuzzy Logic and Intelligent Systems,* **23(3), 365-374. doi: 10.5391/IJFIS.2023.23.3.365. Muhammad Saeed (Mathematics/SSC) Date of Publication: September 2023 HJRS: Y (Null)**
This study focuses on the analysis of cooperative continuous static games involving multiple players (n-players) with fuzzy parameters present in both the cost functions and the right-hand side of constraints. The fuzzy parameters used in this study are described by piecewise quadratic fuzzy numbers that are known for their accurate representation. Specifically, we introduce close interval approximations as a reliable method for handling piecewise quadratic fuzzy numbers. The study defines and investigates the stability set of the second kind in a fuzzy environment, where differentiability is not assumed. The determination of this stability set is an essential aspect of the study. To illustrate the concepts presented, a numerical example is provided, offering a practical demonstration of the proposed framework.
https://www.ijfis.org/journal/view.html?doi=10.5391/IJFIS.2023.23.3.365

164. **Ali, B., Ali, H., Nazir, T., & Ali, Z. (2023). Existence of Fixed Points of Suzuki-Type Contractions of Quasi-Metric Spaces.** *Mathematics,* **11(21). doi: 10.3390/math11214445. Basit Ali, Hammad Ali (Mathematics/SSC) Date of Publication: November 2023 HJRS: W (Bronze)**
In order to generalize classical Banach contraction principle in the setup of quasi-metric spaces, we introduce Suzuki-type contractions of quasi-metric spaces and prove some fixed point results. Further, we suggest a correction in the definition of another class of quasi-metrics known as Δ-symmetric quasi-metrics satisfying a weighted symmetry property. We discuss equivalence of various types of completeness of Δ-symmetric quasi-

metric spaces. At the end, we consider the existence of fixed points of generalized Suzuki-type contractions of Δ-symmetric quasi-metric spaces. Some examples have been furnished to make sure that generalizations we obtain are the proper ones.
https://www.mdpi.com/2227-7390/11/21/4445

165. **Ali Faridi, W., Abu Bakar, M.,** Akgül, A., Abd El-Rahman, M., & El Din, S. M. (2023). **Exact fractional soliton solutions of thin-film ferroelectric material equation by analytical approaches.** *Alexandria Engineering Journal,* 78, 483-497. doi: 10.1016/j.aej.2023.07.049. **Waqas Ali Faridi, Muhammad Abu Bakar (Mathematics/SSC) Date of Publication: September 2023** HJRS: W (Gold)
In this paper, the main motive is to mathematical explore the thin-film ferroelectric material partial differential equation which addresses the Ferroelectrics, that are being examined as key materials for applications in piezoelectric, pyroelectric electrostrictive, linear, and nonlinear optical systems. Thin ferroelectric films are used in a variety of modern electrical devices because they are both nonlinear ferroelectric and dielectric materials. This article appropriates the fractional travelling wave transformation allowing the partial differential equation to be changed into an ordinary differential equation. The considered fractional model is explored through employing the combo of $G'/G2$ −expansion method and new extended direct algebraic methodology. As an outcome, numerous types of soliton solutions like, Periodic pattern with anti-peaked crests and antitroughs, singular solution, mixed complex solitary shock solution, mixed singular solution, mixed shock singularsolution, mixed trigonometric solution, mixed periodic, periodic solution and mixed hyperbolic solution obtain via Mathematica. In addition, the $G'/G2$ −expansion technique produces singular, trigonometric, and hyperbolic solutions with different soliton families. The revealed solution will improve the mathematical analysis of this model and the associated physical phenomenon's. In order to visualize the graphical propagation of the obtained fractional soliton solutions, 3D, 2D, and contour graphics are generated by choosing appropriate parametric values. The impact of fractional parameter β is also graphically displayed on the propagation of solitons.
https://www.sciencedirect.com/science/article/pii/S1110016823006312#ab0010

166. **Ali, J., Bashir, Z., Rashid, T.,** & Mashwani, W. K. (2023). **A q-rung orthopair hesitant fuzzy stochastic method based on regret theory with unknown weight information.** *Journal of Ambient Intelligence and Humanized Computing,* 14(9), 11935-11952. doi: 10.1007/s12652-022-03746-8. **Tabasam Rashid (Mathematics/SSC) Date of Publication: September 2023** HJRS: X (Clay)
The present study introduces a q-rung orthopair hesitant fuzzy stochastic method based on regret theory to capture the psychological behavior of decision makers (DMs) in decision making. For this, first, according to the score and variance function of q-rung orthopair hesitant fuzzy number (q-ROHFN), a novel group satisfaction degree is defined, which can precisely mirror the overall level and group divergence. And then, on this basis, an optimization model of criteria weights is constructed, and the Lagrange function is formulated to cope with the situation where the information about criteria weights is entirely unknown. Next, the regret value and the rejoice value are obtained by the provided regret-rejoice function, and the alternatives are ranked according to the total psychological perception values of DMs under multi-state situations. Lastly, a case study concerning stock investment is addressed to demonstrate the implantation of the provided method. Besides this, detailed sensitivity analysis and comparison with relevant literature are performed to discuss the stability and superiority of the presented method.
https://link.springer.com/article/10.1007/s12652-022-03746-8#Abs1

167. **Alqurashi, N. T., Manzoor, M., Majid, S. Z., Asjad, M. I.,** & Osman, M. S. (2023). **Solitary waves pattern appear in tropical tropospheres and mid-latitudes of nonlinear Landau–Ginzburg–Higgs equation with chaotic analysis.** *Results in Physics,* 54. doi: 10.1016/j.rinp.2023.107116. **Maria Manzoor, Sheikh Zain Majid, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: November 2023** HJRS: W (Silver)
The objective of this research is to investigate the nonlinear Landau–Ginzburg–Higgs equation, which characterizes nonlinear solitary waves exhibiting distant and feeble scattering interactions among tropical tropospheres and mid-latitudes. Additionally, the study will examine the interchange of mid-latitude Rossby waves and equatorial waves within this context. In this research article, we focus on obtaining exact traveling wave solutions for the Landau–Ginzburg–Higgs equation using a new extended direct algebraic technique. The obtained soliton solutions include various types such as combined and multiple bright-dark, periodic, bright, and multiple bright-periodic. We present these soliton solutions graphically by varying the involved parameters using the advanced software program Wolfram Mathematica. The graphical representations allow us to visualize the behavior of the wave velocity and wave number as the parameters change. Additionally, we conduct a chaotic analysis to examine the wave profiles of the newly designed dynamical framework. The results of this analysis demonstrate the reliability and efficiency of the proposed method, which can be applied to find closed-form traveling wave solitary solutions for a wide range of nonlinear evolution equations.
https://www.sciencedirect.com/science/article/pii/S2211379723009099

168. Alsaadi, A., **Dayan, F.,** Ahmed, N., Baleanu, D., Rafiq, M., & Raza, A. (2023a). Evolutionary computational method for tuberculosis model with fuzziness. *AIP Advances,* 13(8). doi: 10.1063/5.0165348. **Fazal Dayan (Mathematics/SSC) Date of Publication: August 2023 HJRS: X (Clay)**

This work investigates the computational study of a six-compartmental mathematical model of tuberculosis disease dynamics with the impact of vaccination. Traditional mathematical models presume that all variables are precise and can be measured or calculated precisely. However, in many real-world scenarios, variables may need to be more accurate or easier to quantify, resulting in model uncertainty. Considering this, fuzziness is introduced into the model by taking the contact, recovery, and death rates due to disease as fuzzy membership functions. Two numerical computational schemes, forward Euler and nonstandard finite difference (NSFD), are designed to solve the model. The positivity and convergence for the developed method are investigated, which are significant characteristics of these dynamical models, and it is revealed that these features are preserved in the extended scheme. Numerical computations are performed to support the analytical results. The numerical and computational results indicate that the proposed NSFD method adequately represents the dynamics of the disease despite the uncertainty and heterogeneity. Moreover, the obtained method generates plausible predictions that regulators can use to design and develop control strategies to support decision-making.

https://pubs.aip.org/aip/adv/article/13/8/085125/2907606

169. Alsaadi, A., **Dayan, F.,** Ahmed, N., Baleanu, D., Rafiq, M., & Raza, A. (2023b). A novel method for the dynamics of worms in wireless sensor networks with fuzzy partition. *AIP Advances,* 13(10). doi: 10.1063/5.0165342. **Fazal Dayan (Mathematics/SSC) Date of Publication: October 2023 HJRS: X (Clay)**

Wireless sensor networks (WSNs) have gained much interest due to their enormous potential in civil and military applications. The power and radio communication capabilities of the sensor nodes are limited. Because sensor nodes have limited resources, they have weak defense capabilities and are attractive targets for software attacks. Worm-based cyberattacks are among the most significant threats to computers and WSNs' security and integrity. In this article, a five-compartmental WSN epidemic model is considered. We conducted an investigation into equilibrium analysis and the reproductive number, followed by the development of a nonstandard finite difference numerical scheme for our model. The outcomes of our numerical simulations are then presented. This method yields reliable predictions, which can be valuable for regulators when making decisions related to designing and implementing control strategies. Furthermore, some interesting properties of the developed scheme are investigated, such as positivity, convergence, and consistency. The developed scheme preserves the essential characteristics of disease epidemic models like positivity, convergence, and consistency.

https://pubs.aip.org/aip/adv/article/13/10/105111/2915201

170. Amir, M., Haider, J. A., Ahmad, S., Gul, S., & **Ashraf, A.** (2023). Approximate Solution of Painlevé Equation I by Natural Decomposition Method and Laplace Decomposition Method. *Acta Mechanica et Automatica,* 17(3), 417-422. doi: 10.2478/ama-2023-0048. **Asifa Ashraf (Mathematics/SSC) Date of Publication: September 2023 HJRS: Y (Null)**

The Painlevé equations and their solutions occur in some areas of theoretical physics, pure and applied mathematics. This paper applies natural decomposition method (NDM) and Laplace decomposition method (LDM) to solve the second-order Painlevé equation. These methods are based on the Adomain polynomial to find the non-linear term in the differential equation. The approximate solution of Painlevé equations is determined in the series form, and recursive relation is used to calculate the remaining components. The results are compared with the existing numerical solutions in the literature to demonstrate the efficiency and validity of the proposed methods. Using these methods, we can properly handle a class of non-linear partial differential equations (NLPDEs) simply. Novelty: One of the key novelties of the Painlevé equations is their remarkable property of having only movable singularities, which means that their solutions do not have any singularities that are fixed in position. This property makes the Painlevé equations particularly useful in the study of non-linear systems, as it allows for the construction of exact solutions in certain cases. Another important feature of the Painlevé equations is their appearance in diverse fields such as statistical mechanics, random matrix theory and soliton theory. This has led to a wide range of applications, including the study of random processes, the dynamics of fluids and the behaviour of non-linear waves.
https://intapi.sciendo.com/pdf/10.2478/ama-2023-0048

171. Amir, M., Haider, J. A., Ul Rahman, J., & **Ashraf, A.** (2023). Solutions of the Nonlinear Evolution Problems and their Applications. *Acta Mechanica et Automatica,* 17(3), 357-363. doi: 10.2478/ama-2023-0040. **Asifa Ashraf (Mathematics/SSC) Date of Publication: September 2023 HJRS: Y (Null)**

In this article, a well-known technique, the variational iterative method with the Laplace transform, is used to solve nonlinear evolution problems of a simple pendulum and mass spring oscillator, which represents the duffing equation. In the variational iteration method (VIM), finding the Lagrange multiplier is an important step, and the variational theory is often used for this purpose. This paper shows how the Laplace transform

can be used to find the multiplier in a simpler way. This method gives an easy approach for scientists and engineers who deal with a wide range of nonlinear problems. Duffing equation is solved by different analytic methods, but we tackle this for the first time to solve the duffing equation and the nonlinear oscillator by using the Laplace-based VIM. In the majority of cases, Laplace variational iteration method (LVIM) just needs one iteration to attain high accuracy of the answer for linearization anddiscretization, or intensive computational work is needed. The convergence criteria of this method are efficient as compared with the VIM. Comparing the analytical VIM by Laplace transform with MATLAB's built-in command Simulink that confirms the method's suitability for solving nonlinear evolution problems will be helpful. In future, we will be able to find the solution of highly nonlinear oscillators. © 2023 Muhammad Amir et al., published by Sciendo.
https://intapi.sciendo.com/pdf/10.2478/ama-2023-0040

172. **Amman, M., Rashid, T., & Ali, A. (2023). Fermatean fuzzy multi-criteria decision-making based on Spearman rank correlation coefficient.** *Granular Computing,* **8(6), 2005-2019. doi: 10.1007/s41066-023-00421-x.** Muhammad Amman, Tabasam Rashid, Asif Ali (Mathematics/SSC) Date of Publication: November 2023 HJRS: W (Bronze)

Real-world decision-making challenges tend to evolve into more intricate scenarios over time. In this context, the Fermatean fuzzy set emerges as an efficient and convenient framework, adept at illustrating the uncertainties inherent in multi-criteria decision-making (MCDM) problems. To address decision-making challenges intertwined with uncertainties, the fundamental objective of this study is to develop a Fermatean fuzzy MCDM tool. This tool aims to expand users' scope to articulate their opinions and viewpoints. As a preliminary step, the study begins by elucidating the computation of the degree of proximity between the optimal alternative and its counterparts. This article presents the concept, representation, and pertinent characteristics of the Spearman rank correlation coefficient (CC) within the context of Fermatean fuzzy sets. Subsequent to this, a multi-criteria decision-making technique, fortified by incorporating Fermatean fuzzy operators (FFOs), is formulated based on the proposed Spearman rank CC. Ultimately, we demonstrate the significance and efficacy of the introduced approach by showcasing its application in a real-world context, specifically within the domain of supplier selection decision-making. The results revealed that the primary advantage of the provided decision rule lies in its potential to effectively reduce production costs and streamline complexity within the context of supplier selection problems, both in theory and practical application. We demonstrate the superiority of the proposed method in delivering reliable outcomes through a comprehensive analysis of FFOs and a comparative assessment against established techniques. A concrete case study is employed to firmly establish the stability and credibility of FFOs when combined with the Spearman rank CC. Additionally, this study carefully conducts a comprehensive comparative evaluation, comparing the previously developed methods with the newly proposed approach. This reinforces the robustness and authenticity of the FFO-based methodology and highlights its unique and practical nature.
https://link.springer.com/article/10.1007/s41066-023-00421-x#Abs1

173. **Aqib, M., Ali Malik, M.,** Afzal, U. H., **& Fatima, T. (2023). Structural characterization of nanomaterials C4C8.** *Molecular Physics.* **doi: 10.1080/00268976.2023.2260905.** Hafiz Usman Afzal (Mathematics/SSC) Date of Publication: 2023 HJRS: X (Null)

Topological indices are the numerical parameters of molecular graphs that characterise their behaviour and are mathematical invariant that preserves chemical and material properties. In a QSAR/QSPR study, physico-chemical properties and topological indices are studied. In this research, we shall calculate forgotten topological, inverse sum, the general sum connectivity and the first multiplicative atom–bond connectivity indices of carbon nanotube (Formula presented.) and (Formula presented.) nanotorus. The main motivation here is the molecular graphs of the nano-chemical compound (Formula presented.) nanotubes and (Formula presented.) nanotorus. While the central and latest point of convergence of our discussion is to provide a ' (Formula presented.) graphical trend and relative comparison' of these derived topological descriptors of these materials that will make them more useful and comparative for chemists, nano and material scientists and would open a new (Formula presented.) graphical horizon towards material sciences and chemical engineering.
https://www.tandfonline.com/doi/full/10.1080/00268976.2023.2260905

174. **Aqib, M., Ali Malik, M.,** Afzal, U. H., **Fatima, T., & Ali, Y. (2023). On topological indices of some chemical graphs.** *Molecular Physics.* **doi: 10.1080/00268976.2023.2276386.** Hafiz Usman Afzal (Mathematics/SSC) Date of Publication: 2023 HJRS: X (Null)

This research delves into the application of topological indices in predicting the physico-chemical properties of chemical materials. These indices have been employed in various QSAR and QSPR studies, providing a mathematical formulation to predict properties such as viscosity and radius of gyrations Rucker and Rucker [J. Chem. Inf. Comput. Sci. 39, 788–802, (1999)]. We explore several indices, including the forgotten topological index, inverse sum index, general sum connectivity index and first multiplicative atom bond connectivity index, and investigate their usefulness in predicting bio-activity and anti-inflammatory activities of certain chemical

compounds. Specifically, we focus on the (Formula presented.) allotrope structure, (Formula presented.) nanotubes and dominating oxide and silicate chemical networks. We present a (Formula presented.) graphical trend of these indices and perform a comparison to facilitate the observation of physical-chemical properties of these materials for researchers.
https://www.tandfonline.com/doi/full/10.1080/00268976.2023.2276386

175. **Asjad, M. I., Manzoor, M., Faridi, W. A., & Majid, S. Z. (2023). Precise invariant travelling wave soliton solutions of the Nizhnik–Novikov–Veselov equation with dynamic assessment.** *Optik,* **294. doi: 10.1016/j.ijleo.2023.171438.** Muhammad Imran Asjad, Maria Manzoor, Waqas Ali Faridi, Sheikh Zain Majid (Mathematics/SSC) Date of Publication: December 2023 HJRS: W (Honorable Mention)

The (2 + 1)-dimensional Nizhnik–Novikov–Veselov equation is a significant model that describes the behaviour of conserved scalar nucleons and their connection to neutral scalar masons. This system exhibits self-formation and depends on various free parameters. It is commonly used to study the dynamics of scalar nucleons and neutral scalar masons. This research article used an extended direct algebraic technique to obtain exact travelling wave solutions for the Nizhnik–Novikov–Veselov system. The obtained soliton solutions include various types, such as multi-periodic, periodic, plane, singular, bright, dark, and flat kink-type wave solitons. We present these soliton solutions graphically by varying the involved parameters using the advanced software program Wolfram Mathematica. The graphical representations in 3D, contour, and 2D surfaces allow us to visualise the behaviour of the solutions as the parameters change and the physical interpretation for these solutions is obtained. Additionally, we conduct a sensitivity analysis to examine the wave profiles of the newly designed dynamical framework. The results of this analysis demonstrate the reliability and efficiency of the proposed method, which can be applied to find closed-form travelling wave solitary solutions for a wide range of nonlinear evolution equations.
https://www.sciencedirect.com/science/article/abs/pii/S0030402623009361

176. **Azam, M. K., Farooq, S. E., Ahmad, F., Iqbal, M., Shabbir, K., & Rehman, M. A. (2023). Applications of extended Hadamard K-fractional integral.** *Italian Journal of Pure and Applied Mathematics* **(49), 20-44.** Muhammad Khurshid Azam, Muhammad Aziz ur Rehman (Mathematics/SSC) Date of Publication: May 2023 HJRS: Y (Null)

In this paper, some types of edge irregular interval-valued neutrosophic graphs such as neighbourly edge irregular interval-valued neutrosophic graphs and neighbourly edge totally irregular interval-valued neutrosophic graphs are introduced. A comparative study between neighbourly edge irregular interval-valued neutrosophic graphs and neighbourly edge totally irregular interval-valued neutrosophic graphs is done. Likewise some properties of them are studied.
https://ijpam.uniud.it/online_issue/IJPAM_no-49-2023.pdf#page=48

177. **Azhar, K., Zafar, S., Kashif, A., & Zahid, Z. (2023). Fault-Tolerant Partition Resolvability in Chemical Graphs.** *Polycyclic Aromatic Compounds,* **43(10), 8830-8840. doi: 10.1080/10406638.2022.2156559.** Kamran Azhar, Sohail Zafar, Agha Kashif, Zohaib Zahid (Mathematics/SSC) Date of Publication: 2023 HJRS: X (Clay)

Apart from many branches in mathematical sciences, the main share of applications of graph theory nowadays is in chemistry. The graph-theoretical ideas have been used by many chemists for more than two centuries but over the last 30 years, the great significance of graph theory in chemistry has been extensively acknowledged. In a chemical graph, the vertices can symbolize atoms, orbitals, bonds, collection of atoms, molecules, or group of molecules and the edges symbolize the connection between chemical substances and are used to describe reactions, chemical bonds, kinetic models, reaction mechanisms, or other interactions and alterations of the chemical substances. Benzene is the archetypal aromatic molecule, showing exceptional chemical stability as compared with other unsaturated hydrocarbons. Fullerenes are a unique family of carbon-based cage molecules having remarkable properties. Fullerene has potential applications in medicinal chemistry due to its size, hydrophobicity, three-dimensionality, and electronic configurations. In this paper, we will calculate the fault-tolerant partition dimension of classes of fullerene graphs, n-linear benzene graph and partition dimension of polyphenyl chains.
https://www.tandfonline.com/doi/full/10.1080/10406638.2022.2156559

178. **Li, S., Bukhsh, I., Khan, I. U., Asjad, M. I., Eldin, S. M., El-Rahman, M. A., & Baleanu, D. (2023). The impact of standard and nonstandard finite difference schemes on HIV nonlinear dynamical model.** *Chaos, Solitons and Fractals,* **173. doi: 10.1016/j.chaos.2023.113755.** Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Platinum)

Mathematical models are enormously valuable in recognition the characteristics of infectious afflictions. The present study describes and analyses a nonlinear Susceptible-Infected (S·I) type mathematical model for HIV/AIDS. To better comprehend the dynamics of disease diffusion, it is assumed that by giving AIDS patients timely Anti Retroviral Therapy (ART), their transition into HIV infected class is attainable. The ART treatment can reduce or manage the spread of disease among individuals that can extend their life for some more years.

For the model, the basic reproduction number is formed which provides a base to study the stability of disease free and endemic equilibria. To understand the entire dynamical behavior of the model, standard finite difference (SFD) schemes such as Runge-Kutta of order four (RK-4) and forward Euler schemes and nonstandard finite difference (NSFD) scheme are implemented. The goal of constructing the NSFD scheme for differential equations is to ensure that it is dynamically reliable, while maintaining important dynamical properties like the positivity of the solutions and its convergence to equilibria of continuous model for all finite step sizes. However, the essential characteristics of the continuous model cannot be properly maintained by the Euler and RK-4 schemes, leading to the possibility of numerical solutions that are not entirely similar to those of the original model. For the NSFD scheme, the Routh-Hurwitz criterion is used to assess the local stability of disease-free and endemic equilibria. To explain the global stability of both the equilibria, Lyapunov functions are offered. To verify the theoretical findings and validate the dynamical aspects of the abovementioned schemes, numerical simulations are also provided. The outcomes offered in this study may be engaged as an effective tool for forecasting the progression of HIV/AIDS epidemic diseases.
https://www.sciencedirect.com/science/article/abs/pii/S0960077923006562

179. M, N. P., Reddy, G. V. R., Akgül, A., & **Riaz, M. B.** (2023). **Unsteady mhd flow of tangent hyperbolic liquid past a vertical porous plate plate.** *Heliyon,* **9(8). doi: 10.1016/j.heliyon.2023.e18478. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Gold)**
The analysis in this communication addresses the unsteady MHD flow of tangent hyperbolic liquid through a vertical plate. The model on mass and heat transport is set up with Joule heating, heat generation, viscous dissipation, thermal radiation, chemical reaction and Soret-Dufour in the form of partial differential equations (PDEs). The PDEs are simplified into a dimensionless PDEs by utilizing a suitable quantities. The simplified equations are solved by utilizing the spectral relaxation method (SRM). The outcomes shows that increase in the Weissenberg and the magnetic field degenerates the velocity profile. The thermal radiation is found to elevate the velocity and temperature profiles as its values increases. The impact of Soret and Dufour on the flow is found to alternate each other. The computational outcomes for concentration, temperature and velocity are illustrated graphically for all encountered flow parameters. The present outcomes are compared with previous outcomes and are found to correlate.
https://www.cell.com/heliyon/pdf/S2405-8440(23)05686-4.pdf

180. Mahmood, A., Abbas, M., & **Murtaza, G.** (2023). **Observation of experts, attitudes through multi-criteria decision-making.** *Sigma Journal of Engineering and Natural Sciences,* **41(5), 926-937. doi: 10.14744/sigma.2023.00112. Ghulam Murtaza (Mathematics/SSC) Date of Publication: October 2023 HJRS: Y (Null)**
The aim of this paper is to obtain optimum fuzzy soft constants through multi-criteria decision-making approaches. TOPSIS and VIKOR are utilized for this purpose and results are compared with those obtained through Bonferroni mean. The hesitant fuzzy soft set is taken as initial data in decision-making methods. Hesitant fuzzy Bonferroni means and distance measures for TOPSIS and VIKOR are calculated in the structure of hesitant fuzzy set and hesitant fuzzy soft set. OFSCs are chosen from the constants which rank the alternatives in the decision-making process. By using the system of linear differential equations based on OFSCs, the future approach of people with respect to their decisions is analyzed and is observed through phase portrait and a line graph of that system of differential equations. To explain the proposed idea, explanative examples for two techniques are also given. These examples illustrate that if two persons select the two different alternatives, they do not favor each other after that decision.
https://sigma.yildiz.edu.tr/storage/upload/pdfs/1698151363-en.pdf

181. Mahmood, R., Majeed, A. H., Mehmood, A., & **Siddique, I.** (2023). **Numerical study of hydrodynamic forces of nonlinear fluid flow in a channel-driven cavity: Finite element-based simulation.** *International Journal of Modern Physics B.* **doi: 10.1142/S0217979224501844. Imran Siddique (Mathematics/SSC) Date of Publication: October 2023 HJRS: X (Null)**
This communication is aimed at presenting the flow behavior of viscoplastic materials in a channel driven-cavity by utilizing the Bingham constitutive equation in conjunction with the modification proposed by Papanastasiou. The whole system has been represented by a model consisting of coupled nonlinear partial differential equations. In addition, the governing equations were nondimensionalized by making use of the appropriate set of variables and the computations were carried out using the finite element method. A finite element space including quadratic polynomial P2 is chosen for the approximation of velocity profiles whilst a space containing linear polynomials is used for the estimation of pressure P1. The hydrodynamics forces like drag and lift values on cylindrical obstacle whose center is located at (1.5, 1.5) are computed against various values of Bingham number. Moreover, pressure drop values between the back and front of the square obstacle have also been tabulated.
https://www.worldscientific.com/doi/abs/10.1142/S0217979224501844

182. **Manzoor, R.**, Awais Sadiq, M., & Hussain, I. (2023). The impact of f (G , T) gravity on the evolution of cavity in the cluster of stars. *Classical and Quantum Gravity,* 40(6). doi: 10.1088/1361-6382/acbadb. **Rubab Manzoor (Mathematics/SSC) Date of Publication: March 2023** HJRS: W (Gold)
This paper investigates the evolution of cavities for the cluster of stars in the context of extended Gauss–Bonnet gravity. We assume a spherically symmetric geometry along with locally anisotropic fluid distribution. It is assumed that the proper radial distance among neighboring stellar components stays unchanged during purely areal evolution stage. We provide some analytical solutions by using general formulism in $f(\mathbb{G}, T)$ gravitation theory. The thick-shells cavities at one or both boundary surfaces are found to satisfy the Darmois conditions. Moreover, we also investigate the physical behavior of cavity models by considering the stellar $4U\ 1820\text{-}30$, $\textrm{PSR} \ J0740\text{+}6620$ and $\textrm{PSR} \ J0348\,+\,0432$. We conclude that the dark matter has a strong impact on the evolution of cavities in the cluster of stars.
https://iopscience.iop.org/article/10.1088/1361-6382/acbadb/meta

183. **Manzoor, R.**, Sadiq, M. A., Mumtaz, S., & Kausar, H. R. (2023). Cluster of stars in f(T) gravity. *Physica Scripta,* 98(2). doi: 10.1088/1402-4896/acb297. **Rubab Manzoor (Mathematics/SSC) Date of Publication: February 2023** HJRS: W (Honorable Mention)
This paper is devoted to analyze the dynamical impacts of $f({ \mathcal G },T)$ gravity model on the cluster of stars. For this motive, we consider the spherically symmetric interior geometry with anisotropic fluid as analogous to cluster of stars distributions. We express the modified field equations by taking a particular model of $f({ \mathcal G },T)$, i.e. $f({ \mathcal G },T)=f(T)+f({ \mathcal G })$. In order to explore the evolutionary behavior of cluster of stars, the observational data of a compact star 4U1820 − 30 is used. We construct the modified scalar functions by orthogonal splitting of Riemann tensor in $f({ \mathcal G },T)$ theory of gravity and find the factors causing density irregularities in the framework. We calculate the evolution parameters by using these scalar functions. Moreover, we also investigate the structure scalars for dust ball. The dynamical effects on cluster of stars are examined via structure scalars in the presence of Gauss-Bonnet gravity. It is found that Gauss-Bonnet parameter representing exotic material in the cluster plays a vital role in governing the dynamics of cluster of stars.
https://iopscience.iop.org/article/10.1088/1402-4896/acb297/meta

184. **Mardan, S. A.**, Moeed, U. E. F., Noureen, I., & Malik, A. (2023). Spherically symmetric generating solutions in f(R) theory. *European Physical Journal Plus,* 138(9). doi: 10.1140/epjp/s13360-023-04413-3. **Syed Ali Mardan (Mathematics/SSC) Date of Publication: September 2023** HJRS: W (Bronze)
The main objective of this work, is to develop a novel general framework for generating solutions of stellar models in f(R) theory of gravity with class one metric. Such framework is not available in the vicinity of f(R) gravity. The relations of anisotropy factor, which is based on radial and tangential pressure serves as a main source of generating solutions. The linear equation of state and conformally flat condition for class one metric is used to develop a consistent system of differential equations. We conclude that it is possible to develop generating solutions for the systems in f(R) gravity.
https://link.springer.com/article/10.1140/epjp/s13360-023-04413-3#Abs1

185. Miao, B., Arsalan, M., BaQais, A., Murugadoss, V., Saddique, I., Amin, M. A., **Siddique, I.,**. . . Wei, F. (2023). **Highly efficient tetrametallic PtNiCuCo alloy nanoparticles for sensitive detection of hydrogen peroxide.** *Advanced Composites and Hybrid Materials,* 6(3). doi: 10.1007/s42114-023-00676-7. **Imran Siddique (Mathematics/SSC) Date of Publication: May 2023** HJRS: W (Bronze)
The tetrametallic PtNiCuCo alloy nanoparticles were prepared by a simple and cost-effective solution-based approach and spray deposited on fluorine-doped tin oxide (FTO) substrates to use as a highly sensitive catalyst for hydrogen peroxide (H_2O_2) sensing. The morphological studies revealed that the PtNiCuCo nanoparticles had an average particle size of 5 ± 1 nm. Electrochemical studies showed that PtNiCuCo nanoparticles possess excellent electro-oxidation activity for hydrogen peroxide at 20 mVs−1 scanning rate (vs Ag/AgCl). The wide linear range for hydrogen peroxide (H_2O_2) was obtained from 10μM to 16 mM. The detection limits for H_2O_2 were 0.16 μM (SNR = 3). The sensitivity of H_2O_2 was 4367.25 μAmM−1 cm−2. These results revealed that the prepared nanoparticles could be a potential candidate for H_2O_2 sensing.
https://link.springer.com/article/10.1007/s42114-023-00676-7#Abs1

186. **Nadeem, A.**, Kashif, A., Zafar, S., & Zahid, Z. (2023a). 2 − Partition Resolvability of Induced Subgraphs of Certain Hydrocarbon Nanotubes. *Polycyclic Aromatic Compounds,* 43(5), 4322-4332. doi: 10.1080/10406638.2022.2088577. **Asim Nadeem, Agha Kashif, Sohail Zafar & Zohaib Zahid (Mathematics/SSC) Date of Publication: May 2023** HJRS: X (Null)
arbon nanotubes have been actively studied for their applications in filtering of polycyclic aromatic hydrocarbons, sensors, electronics, stretchable devices, and energy storage. The large structures of nanotubes are studied using their induced subgraphs. The partition dimension focusses on the unique distance-based representation of nodes with respect to partition sets such that each node is exclusively identified. The

partition and 2–partition dimension of induced subgraphs of certain nanotubes have been computed in this article.
https://www.tandfonline.com/doi/full/10.1080/10406638.2022.2088577

187. **Nadeem, A., Kashif, A., Zafar, S., & Zahid, Z.** (2023b). **On 2-partition dimension of rotationally-symmetric graphs.** *Discrete Mathematics, Algorithms and Applications,* **15(7). doi: 10.1142/S1793830922501531. Asim Nadeem, Agha Kashif, Sohail Zafar & Zohaib Zahid (Mathematics/SSC) Date of Publication: May 2023 HJRS: Y (Null)**

The k-partition dimension of graphs was introduced as generalization of partition dimension of graphs by Estrado–Moreno in 2020. Its applications can be seen in several areas including robot navigation, network designing, image processing and chemistry. Rotationally symmetric graphs are important in computer network topologies due to uniform rate of data transformation to all nodes. In this paper, we compute the lower bound of the 2-partition dimension of r-regular graphs for r≥3and also calculate the 2-partition dimension of the families of rotationally symmetric graphs, namely, prism graph and n-sunlet graph.
https://www.tandfonline.com/doi/full/10.1080/10406638.2022.2088577

188. **Nadeem, M., Siddique, I., Bilal, M., & Anjum, K.** (2023). **Numerical study of MHD Prandtl Eyring fuzzy hybrid nanofluid flow over a wedge.** *Numerical Heat Transfer; Part A: Applications.* **doi: 10.1080/10407782.2023.2257379. Imran Siddique (Mathematics/SSC) Date of Publication: Spetember 2023 HJRS: X (Clay)**

The prime aim of this effort is to investigate the steady, incompressible flow of magnetohydrodynamics (MHD) Prandtl Eyring fuzzy hybrid (Al2O3+Cu/SA) nanofluid through a wedge surface when viscous dissipation, nonlinear thermal radiation, and fuzzy volume fraction are presented. The flow phenomena of a hybrid nanofluid are investigated for the two-dimensional fluid flow with the inclusion of copper (Cu)and alumina (Al2O3) particles added into sodium alginate (SA). By employing a dimensionless similarity transformation, the presented model's nonlinear governing partial differential equations (PDEs) are redefined into a set of dimensionless nonlinear ordinary differential equations (ODEs), which are then solved utilizing numerical methods named built-in MATAB BVP4C (Finite Difference Method). Also, nanoparticle volume fractions are said to be triangular fuzzy numbers (TFN). σ-cut has control over the TFNs and triangular membership function. The importance of physical factors is emphasized through tables and graphs. The findings of the present investigation indicate that compared to Prandtl Eyring fluid, hybrid nanofluid transmits heat at a faster rate. Thermal distribution is improved by the solid volume fraction percentage. As thermal radiation and second fluid parameter levels rise, heat transfer rate also accelerated. The triangular fuzzy membership analysis specifies that fuzzy temperature rises more quickly for hybrid nanofluids when compared with simple nanofluids.
https://www.tandfonline.com/doi/full/10.1080/10407782.2023.2257379

189. **Nadeem, M., Siddique, I., Riaz, Z., Makhdoum, B. M., Zulqarnain, R. M., & Sallah, M.** (2023). **Numerical study of unsteady tangent hyperbolic fuzzy hybrid nanofluid over an exponentially stretching surface.** *Scientific Reports,* **13(1). doi: 10.1038/s41598-023-32374-1. Muhammad Nadeem & Imran Siddique (Mathematics/SSC) Date of Publication: Spetember 2023 HJRS: W (Platinum)**

The signifcance of fuzzy volume percentage on the unsteady fow of MHD tangent hyperbolic fuzzy hybrid nanofuid towards an exponentially stretched surface is scrutinized. The heat transport mechanism is classifed by Joule heating, nonlinear thermal radiation, boundary slippage, and convective circumstances. Ethylene glycol (EG) as a host fuid along with the nanomaterial's Cu and Al2O3 are used for heat transfer analysis is also considered in this investigation. The nonlinear governing PDEs are meant to be converted into ODEs employing appropriate renovations. Then, a built-in MATLAB program bvp4c is employed to acquire the outcome of the given problem. The variation of fow rate, thermal heat, drag force and Nusselt number and their infuence on fuid fow with heat transfer have been scrutinized through graphs. An increase in thermal radiation, power law index and nanoparticle volume friction heightens the heat transmission rate. Skin friction is diminished by swelling the power-law index, Weissenberg number, and ratio parameters, whereas it is increased by enhancing the magnetic parameter. The heat transfer rate upsurges with an increase in Weissenberg number and nanoparticle volume fraction. Also, the nanoparticle volume percentage is expressed as a triangular fuzzy number (TFN). The triangular membership function (MF) and TFN are regulated by the χ – cut parameter, which has a range of 0 to 1. In comparison to nanofuids, hybrid nanofuids have a higher heat transmission rate, according to the fuzzy analysis. This investigation has applications in the areas of paper manufacturing, metal sheet cooling and crystal growth.
https://www.nature.com/articles/s41598-023-32374-1

190. **Qayyum, M., Afzal, S., Ahmad, E., & Riaz, M. B.** (2023). **Fractional modeling and analysis of unsteady squeezing flow of Casson nanofluid via extended He-Laplace algorithm in Liouville-Caputo sense.** *Alexandria*

Engineering Journal, **73, 579-591. doi: 10.1016/j.aej.2023.05.010. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: July 2023 HJRS: W (Gold)**

The objective of this manuscript is to model the fully fractional unsteady Casson nanofluid flow between two parallel plates influenced by magneto hydrodynamic forces and Darcian effects in both slip and no-slip case. Casson nanofluid model is fractionally transformed through mixed similarity transformations into a non-dimensional fully fractional model. In modeled fluid problem the continuity equation is identically satisfied and fractional order highly non-linear momentum equation is obtained. The obtained fractional model is further validated by putting and obtaining the integer order Casson fluid model already existing in literature. In order to solve the flow problem, a hybrid of homotopy perturbation method and Laplace transform, namely He-Laplace method (HLM) is utilized. The obtained results are validated with existing results in literature and through residual errors and average error plots with increasing order of approximation. It is observed that results obtained through HLM are better in terms of accuracy than existing results. Moreover, the errors reduce substantially as order of approximation in HLM increases, depicting the convergence of proposed scheme. Graphical analysis is also performed to analyze the behavior of normal and radial velocity. Furthermore, contour plots are presented for flow rate and skin friction of Casson nanofluid. It is observed that fluid parameters present different behavior in case of fractional environment when compared with existing integer order results. Also, the behavior of velocity profile in no-slip case is in contrast to the behavior noted in slip case of Casson nanofluid. These finding confirm the importance of fractional modeling in terms of capturing more generalized physical phenomena.

https://www.nature.com/articles/s41598-023-32374-1

191. Qayyum, M., Afzal, S., Saeed, S. T., Akgül, A., & **Riaz, M. B.** (2023). **Unsteady hybrid nanofluid (Cu–UO2/blood) with chemical reaction and non-linear thermal radiation through convective boundaries: An application to bio-medicine.** *Heliyon,* **9(6). doi: 10.1016/j.heliyon.2023.e16578. Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Silver)**

This study is focused on modeling and simulations of hybrid nanofluid flow. Uranium dioxide $UO2$ nanoparticles are hybrid with copper Cu, copper oxide CuO and aluminum oxide $Al2O3$ while considerin blood, as a base fluid. The blood flow is initially modeled considering magnetic effect, non-linear thermal radiation and chemical reactions along with convective boundaries. Then for finding solution of the obtained highly nonlinear coupled system we propose a methodology in which q-homotopy analysis method is hybrid with Galerkin and least square Optimizers. Residual errors are also computed in this study to confirm the validity of results. Analysis reveals that rate of heat transfer in arteries increases up to 13.52 Percent with an increase in volume fraction of Cu while keeping volume fraction of $UO2$ fixed to 1% in a base fluid (blood). This observation is in excellent agreement with experimental result. Furthermore, comparative graphical study of Cu, CuO and $Al2O3$ for increasing volume fraction is also performed keeping $UO2$ volume fraction fixed. Investigation indicates that Cu has the highest rate of heat transfer in blood when compared with CuO and $Al2O3$. It is also observed that thermal radiation increases the heat transfer rate in the current study. Furthermore, chemical reaction decreases rate of mass transfer in hybrid blood nanoflow. This study will help medical practitioners to minimize the adverse effects of $UO2$ by introducing hybrid nano particles in blood based fluids.

https://ui.adsabs.harvard.edu/abs/2023Heliy...916578Q/abstract

192. Rahman, A. U., Alballa, T., Alqahtani, H., & Khalifa, H. A. E. W. (2023). **A Fuzzy Parameterized Multiattribute Decision-Making Framework for Supplier Chain Management Based on Picture Fuzzy Soft Information.** *Symmetry,* **15(10). doi: 10.3390/sym15101872. Atiqe Ur Rahman (Mathematics/SSC) Date of Publication: October 2023 HJRS: W (Bronze)**

Supplier selection as a multiattribute decision-making (MADM) problem has various inherent uncertainties due to a number of symmetrical variables. In order to handle such information-based uncertainties, rational models like intuitionistic fuzzy sets have already been introduced in the literature. However, a picture fuzzy set (PiFS) with four dimensions of positive, neutral, negative, and rejection is better at capturing and interpreting such kinds of ambiguous information. Additionally, fuzzy parameterization (FPara) is helpful for evaluating the degree of uncertainty in the parameters. This study aims to develop a fuzzy parameterized picture fuzzy soft set (FpPiFSS) by integrating the ideas of PiFS and FPara. This integration is more adaptable and practical since it helps decision makers manage approximation depending on their objectivity and parameterization uncertainty. With the assistance of instructive examples, some of the set-theoretic operations are examined. A decision support framework is constructed using matrix manipulation, preferential weighting, fuzzy parameterized grades based on Pythagorean means, and the approximations of decision makers. This framework proposes a reliable algorithm to evaluate four timber suppliers (initially scrutinized by perusal process) based on eight categorical parameters for real estate projects. In order to accomplish suppliers evaluation, crucial validation outcomes are taken into account, including delivery level, purchase cost, capacity, product quality, lead time, green degree, location, and flexibility. To assess the advantages, dependability, and flexibility of the recommended strategy, comparisons in terms of computation and

structure are provided. Consequently, the results are found to be reliable, analog, and consistent despite the use of fuzzy parameterization and picture fuzzy setting.
https://www.mdpi.com/2073-8994/15/10/1872

193. **Rana, S.,** Saeed, M., Qayyum, M., & Smarandache, F. (2023). Generalized plithogenic whole hypersoft set, PFHSS-Matrix, operators and applications as COVID-19 data structures. *Journal of Intelligent and Fuzzy Systems,* 44(5), 7797-7820. doi: 10.3233/JIFS-202792. **Shazia Rana** (Mathematics/SSC) Date of Publication: May 2023 HJRS: X (Clay)

This article is a preliminary draft for initiating and commencing a new pioneer dimension of expression. To deal with higher-dimensional data or information flowing in this modern era of information technology and artificial intelligence, some innovative super algebraic structures are essential to be formulated. In this paper, we have introduced such matrices that have multiple layers and clusters of layers to portray multi-dimensional data or massively dispersed information of the plithogenic universe made up of numerous subjects their attributes, and sub-attributes. For grasping that field of parallel information, events, and realities flowing from the micro to the macro level of universes, we have constructed hypersoft and hyper-super-soft matrices in a Plithogenic Fuzzy environment. These Matrices classify the non-physical attributes by accumulating the physical subjects and further sort the physical subjects by accumulating their non-physical attributes. We presented them as Plithogenic Attributive Subjectively Whole Hyper-Super-Soft-Matrix (PASWHSS-Matrix) and Plithogenic Subjective Attributively Whole-Hyper-Super-Soft-Matrix (PSAWHSS-Matrix). Several types of views and level-layers of these matrices are described. In addition, some local aggregation operators for Plithogenic Fuzzy Hypersoft Set (PPFHS-Set) are developed. Finally, few applications of these matrices and operators are used as numerical examples of COVID-19 data structures.
https://content.iospress.com/articles/journal-of-intelligent-and-fuzzy-systems/ifs202792

194. Raza, Q., Wang, X., Ali, B., Eldin, S. M., Yang, H., & **Siddique, I.** (2023). Role of nanolayer on the dynamics of tri-hybrid nanofluid subject to gyrotactic microorganisms and nanoparticles morphology vis two porous disks. *Case Studies in Thermal Engineering,* 51. doi: 10.1016/j.csite.2023.103534. **Imran Siddique** (Mathematics/SSC) Date of Publication: November 2023 HJRS: W (Gold)

This paper investigates the simultaneous heat and mass transfer phenomena in nanolayers induced by morphology, motile microorganisms, and magnetohydrodynamics (MHD). The study also discusses the crucial role of viscous dissipation resulting from joule heating effects in the flow of ternary hybrid nanofluids, considering both model thermal conductivity and nanolayer thermal conductivity. The influence of various types of nanoparticles on thermal conductivity (TC) and nanolayer thermal conductivity (NTC) is examined, with a focus on the significance of chemical reactions and concentration equations. To solve the nonlinear system of ordinary differential equations, a stable and accurate numerical method is employed. The study provides valuable engineering insights, summarizing key parameters such as skin friction coefficient, Nusselt number, Sherwood number, and motile number. Several nondimensional parameter effects like Re, Pr, β, Pe, α, h,r, γ, and Sc are shown in graphical and tabulation form for both porous disks. The addition of nanolayer thermal conductivity of ternary nanoparticles at a level of 5% enhances the heat transfer rate. When the values of the radius of nanoparticles and nanolayer thickness increase, the flow of tri-hybrid nanofluid's nanolayer thermal conductivity behaves oppositely.
https://www.sciencedirect.com/science/article/pii/S2214157X23008407

195. Raza, Q., Wang, X., Hassan, A. M., **Siddique, I.,** Ali, B., & Ali, I. (2023). Coaxially swirled porous disks flow simultaneously induced by mixed convection with morphological effect of metallic/metallic oxide nanoparticles. *Frontiers in Materials,* 10. doi: 10.3389/fmats.2023.1152030. **Imran Siddique** (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Honorable Mention)

This study focuses on the numerical modeling of coaxially swirling porous disk flow subject to the combined effects of mixed convection and chemical reactions. We conducted numerical investigations to analyze the morphologies of aluminum oxide (Al_2O_3) and copper (Cu) nanoparticles under the influence of magnetohydrodynamics. For the flow of hybrid nanofluids, we developed a model that considers the aggregate nanoparticle volume fraction based on single-phase simulation, along with the energy and mass transfer equations. The high-order, nonlinear, ordinary differential equations are obtained from the governing system of nonlinear partial differential equations via similarity transformation. The resulting system of ordinary differential equations is solved numerically by the Runge–Kutta technique and the shooting method. This is one of the most widely used numerical algorithms for solving differential equations in various fields, including physics, engineering, and computer science. This study investigated the impact of various nanoparticle shape factors (spherical, platelet and laminar) subject to relevant physical quantities and their corresponding distributions. Our findings indicate that aluminum oxide and copper (Al_2O_3-Cu/H_2O) hybrid nanofluids exhibit significant improvements in heat transfer compared to other shape factors, particularly in laminar flow. Additionally, the injection/suction factor influences the contraction/expansion phenomenon, leading to noteworthy results concerning skin friction and the Nusselt number in the field of engineering. Moreover, the

chemical reaction parameter demonstrates a remarkable influence on Sherwood's number. The insights gained from this work hold potential benefits for the field of lubricant technology, as they contribute valuable knowledge regarding the behavior of hybrid nanofluids and their associated characteristics.
https://www.frontiersin.org/articles/10.3389/fmats.2023.1152030/full

196. **Rehman, A. U.,** Hua, S., **Riaz, M. B.,** Awrejcewicz, J., & Xiange, S. (2023). A fractional study with Newtonian heating effect on heat absorbing MHD radiative flow of rate type fluid with application of novel hybrid fractional derivative operator. *Arab Journal of Basic and Applied Sciences,* 30(1), 482-495. doi: 10.1080/25765299.2023.2250063. Aziz Ur Rehman, Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: December 2023 HJRS: Y (Null)

The present work examines the analytical solutions of the mathematical fractional Maxwell fluid model near an infinitely vertical plate. The phenomenon has been expressed in terms of partial differential equations, then transformed the governing equations in non-dimensional form. For the sake of better rheology of rate type fluid, developed a fractional model by applying the new definition of Constant Proportional Caputo (CPC) fractional derivative operator that describe the generalized memory effects. For seeking exact solutions in terms of Mittag-Leffler functions for velocity and temperature, Laplace integral transformation technique is applied. For physical significance of various system parameters on fluid velocity and temperature distributions are demonstrated through various graphs by using graphical software. Furthermore, for being validated the acquired solutions, some limiting models such as ordinary Newtonian model had been recovered from fractional model. It is also analyzed that for Newtonian heating and non-uniform velocity conditions, the CPC fractional operator is the finest fractional model to describe the memory effect of velocity and energy distribution. Moreover, the graphical representations of the analytical solutions illustrated the main results of the present work. Also, in the literature, it is observed that to derived analytical results from fractional fluid models developed by the various fractional operators, is difficult and this article contributing to answer the open problem of obtaining analytical solutions the fractionalized fluid models.
https://www.tandfonline.com/doi/full/10.1080/25765299.2023.2250063

197. **Rehman, H. U.,** Asjad, M. I., Ullah, N., & Akgül, A. (2023). Exact solutions of (2 + 1)-dimensional Schrödinger's hyperbolic equation using different techniques. *Numerical Methods for Partial Differential Equations,* 39(6), 4575-4594. doi: 10.1002/num.22644. Muhammad Imran Asjad, Naeem Ullah, (Mathematics/SSC) Date of Publication: November 2023 HJRS: W (Silver)

In this paper, we derive new optical soliton solutions to (2 + 1)-dimensional Schrödinger's hyperbolic equation using extended direct algebraic method and new extended hyperbolic function method. New acquired solutions have the form of bright, dark, combined dark-bright, singular, and combined bright-singular solitons solutions. These solutions reveal that our techniques are straightforward and dynamic. The solutions are also demonstrated through 3-d and 2-d plots to make clear the physical structures for such kind of model. The obtained results illustrate the power of the present method to determine soliton solution of nonlinear evolution equations.
https://onlinelibrary.wiley.com/doi/full/10.1002/num.22644

198. **Rehman, H. U.,** Ullah, N., Asjad, M. I., & Akgül, A. (2023). Exact solutions of convective–diffusive Cahn–Hilliard equation using extended direct algebraic method. *Numerical Methods for Partial Differential Equations,* 39(6), 4517-4532. doi: 10.1002/num.22622. Naeem Ullah, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: November 2023 HJRS: W (Silver)

In this paper, we apply the extended direct algebraic method to examine the soliton solutions as well as hyperbolic and trigonometric functions solutions of convective–diffusive Cahn–Hilliard equation describing the dynamic of separation phase for ternary iron alloys of (Fe - Cr - Mo) and (Fe - X - Cu). The outcomes reveal that our technique is very dynamic and straightforward. It is observed that the obtained exact solutions of this model are new in the literature. Moreover, various 2D and 3D graphs of the obtained solutions are presented to examine the physical understanding of the obtained results.
https://onlinelibrary.wiley.com/doi/full/10.1002/num.22622

199. **Riaz, A.,** Asjad, M. I., Almusawa, M. Y., Eldin, S. M., Said, N. M., & Khan, M. I. (2023). New solutions of fractional Maxwell fluid with ternary-hybrid nanoparticles. *Case Studies in Thermal Engineering,* 47. doi: 10.1016/j.csite.2023.103091. Ayesha Riaz, Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: July 2023 HJRS: W (Gold)

This paper is about Maxwell fluid over a vertical heated wall having an infinite length. A mathematical model which includes heat, velocity, and concentration profile is obtained and is converted into dimensionless equations by mean of various different parameters. Fractional model based on generalized Fourier and Fick's law are considered in order to address the accurate memory concept of the flow problem. For analytical solutions, Prabhakar fractional operator is utilized to get results for energy, velocity, and concentration field. The effect of various parameters involved is shown with the help of graph by assigning different values to

parameters. The fractional method can lay out modern vision for analytical results which causes the understanding of the consequences less complex. For the accuracy and validation recently published work retrieved as a limiting case. Addition of concentration of ternary hybrid nanofluid is a source of improving base fluid properties. The usage of Prabhakar operators displays the probability of a suitable choice of fractional parameters so that it is more appropriate in between experimental and theoretical facts.
https://www.sciencedirect.com/science/article/pii/S2214157X23003970

200. Rizwan, M., Shahab, S., Bhatti, A. A., Javaid, M., & Anjum, M. (2023). On the Hyper Zagreb Index of Trees with a Specified Degree of Vertices. *Symmetry,* 15(7). doi: 10.3390/sym15071295. **Muhammad Javaid (Mathematics/SSC) Date of Publication: June 2023** HJRS: W (Bronze)

Topological indices are the numerical descriptors that correspond to some certain physicochemical properties of a chemical compound such as the boiling point, acentric factor, enthalpy of vaporisation, heat of fusion, etc. Among these topological indices, the Hyper Zagreb index, is the most effectively used topological index to predict the acentric factor of some octane isomers. In the current work, we investigate the extremal values of the Hyper Zagreb index for some classes of trees.
https://www.mdpi.com/2073-8994/15/7/1295

201. Sadiq, K., Siddique, I., Khan, I., Khan, M. I., & Singh, A. (2023). Heat and mass transfer in a second grade nanofluids with wall slippage, heat generation and chemical reaction: Exact solutions. *International Communications in Heat and Mass Transfer,* 148. doi: 10.1016/j.icheatmasstransfer.2023.107024. **Kashif Sadiq, Imran Siddique (Mathematics/SSC) Date of Publication: November 2023** HJRS: W (Gold)

In this work, an engine oil-based second-grade nanofluid is considered in a channel with wall slippage. Two additional effects of chemical reaction and heat absorption are also considered. The problem is formulated in the PDEs and then solved using the integral transform. Analytical solutions for concentration and temperature are calculated. Tzou's and Stehfest's algorithms are utilized to find the inverse Laplace of the velocity field numerically. Two different engine oil-based nanofluids are depicted graphically, each containing nanoparticles of copper (Cu) and silver (Ag). The results showed that increasing the value of volume fraction and time enhanced the thermal conductivity and lubricity of EO. The temperature decreases with increasing values of heat absorption. The outcomes are discussed at up to 5% volume fraction (φ). The results for skin friction, Nusselt number, and Sherwood number are computed in tabular form. It is found that at $\varphi = 0.01$, the skin friction is 0.394 for Cu and 0.395 for Ag. The rate of heat transfer (Nu) is 2.79×10^{-6} for Cu and 3.008×10^{-6} for Ag. The rate of mass transfer (Sh) is 0.424 for Cu and 0.431 for Ag. A comparison with published work shows an excellent agreement.
https://www.sciencedirect.com/science/article/abs/pii/S073519332300413X

202. Saeed, M., Ishtiaq, U., Kattan, D. A., Ahmad, K., & Sessa, S. (2023). New Fixed Point Results in Neutrosophic b-Metric Spaces With Application. International Journal of Analysis and Applications, 21. doi: 10.28924/2291-8639-21-2023-73. **Muhammad Saeed, Khaleel Ahmad (Mathematics/SSC) Umar Ishtiaq (ORIC) Date of Publication: July 2023** HJRS: Y (Null)

In this manuscript, we establish the notion of neutrosophic b-metric spaces as a generalization of fuzzy b-metric spaces, intuitionistic fuzzy b-metric spaces and neutrosophic metric spaces in which three symmetric properties plays an important role for membership, non-membership and neutral functions as well we derive some common fixed point and coincident point results for contraction mappings. Also, we provide several non-trivial examples with graphical views of neutrosophic b-metric spaces and contraction mappings by using computational techniques. Our results are more generalized with respect to the existing ones in the literature. At the end of the paper, we provide an application to test the validity of the main result
https://www.etamaths.com/index.php/ijaa/article/view/2856

203. Saeed, M., Nisa, M. U., Saeed, M. H., Alballa, T., & Khalifa, H. A. E. W. (2023). Detecting Patterns of Infection-Induced Fertility Using Fermatean Neutrosophic Set With Similarity Analysis. *IEEE Access,* 11, 112320-112333. doi: 10.1109/ACCESS.2023.3323024. **Muhammad Saeed, Mehar Un Nisa & Muhammad Haris Saeed (Mathematics/SSC) Date of Publication: October 2023** HJRS: W (Gold)

Urinary tract infections (UTIs) pose a significant challenge globally, as they increase the risk of miscarriage and promote the growth of gram-negative bacteria. Accurately assessing susceptibility is crucial for effective diagnosis and treatment in resource-limited settings. In the field of diagnosing and treating infected patients, numerous models have been suggested in various studies. An innovative mathematical model is presented for analysing UTIs. To address this disease, a decision-making model is developed utilizing the Fermatean Neutrosophic set (FNS) distance and similarity measures (SM), which is the affixed structure of the Pythagorean neutrosophic set (PNS) and the intuitionistic neutrosophic set (INS). The FNS susceptibility model incorporates expert opinions to identify appropriate types of UTIs based on relevant symptoms or parameters. It calculates the distance and similarity between an ideal UTIs patient and the FNS for the disease. This approach aims to provide a robust multi-attribute selection support mechanism, minimizing biases and errors

associated with subjective evaluations. However, it's important to note that this method does not replace traditional diagnostic techniques. It should be used alongside other ways for the most accurate diagnosis. Implementing this model can improve the management of UTIs, ultimately enhancing overall population health. A table is constructed for UTIs patients using a fuzzy interval of [0, 1]. The calculation involves distance and similarity measures within the Fermatean neutrosophic FN environment, enabling accurate UTIs diagnosis. FNS provide a robust framework for modelling uncertainty in UTIs diagnosis. It can represent indeterminacy, inconsistency, and incomplete information, which are common in medical data.
https://ieeexplore.ieee.org/abstract/document/10278132

204. **Saeed, M., Saeed, M. H., Khalid, M.,** & Mekawy, I. (2023). Development of hamming and hausdorff distance metrics for cubic intuitionistic fuzzy hypersoft set in cement storage quality control: Development and evaluation. *PLoS ONE,* 18(9 September). doi: 10.1371/journal.pone.0291817. Muhammad Saeed, Muhammad Haris Saeed, Misbah Khalid (Mathematics/SSC) Date of Publication: September 2023 HJRS: W (Platinum)

Quality control is paramount in product manufacturing as it ensures consistent production to meet customer expectations, regulatory requirements and maintain a company's reputation and profitability. Distance measures within fuzzy sets serve as powerful tools for quality control, allowing for data comparison and identification of potential defects or outliers within a system. This study aims to develop a hybrid concept by combining a Cubic Intuitionistic Fuzzy Set (CIFS) with Soft Set (SS) and extending it to Cubic Intuitionistic Fuzzy Hypersoft Set (CIFHSS). CIFHSS enables handling multiple distinct attributes at the sub-attribute level within a cubic set environment. The concept includes operations like internal, partial internal, external, complement, direct sum, and product. Additionally, six distance metrics are defined within CIFHSS and applied to establish a quality control management system for industrial applications. The versatility of CIFHSS in quality control management stems from its ability to capture and model uncertainty, vagueness, and imprecision in data. This makes it an effective tool for decision-making, risk analysis, and process optimization across a wide range of industrial applications.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0291817

205. **Saeed, M., Wahab, A.,** Ali, J., & Bonyah, E. (2023). A robust algorithmic framework for the evaluation of international cricket batters in ODI format based on q-rung linguistic neutrosophic quantification. *Heliyon,* 9(11). doi: 10.1016/j.heliyon.2023.e21429. Muhammad Saeed, Abdul Wahab (Mathematics/SSC) Date of Publication: November 2023 HJRS: W (Gold)

This article presents a novel approach for decision-making problems in which the criteria and alternatives are evaluated under a q-rung linguistic neutrosophic set (QRLNS) environment. QRLN sets are an extension of the traditional linguistic variables, which allow more flexibility and accuracy in modeling complex decision-making situations. We introduce several QRLN weighted aggregation operators, including QRLN weighted averaging operator, QRLN weighted geometric operator, and QRLN weighted hybrid operator, which can be used to aggregate the QRLN information provided by decision-makers. The properties and characteristics of these operators are analyzed, and their performance is compared with other existing aggregation operators. Finally, this system is able to handle the uncertainty and imprecision in the data and provide a more reliable assessment of the performance of cricket players. Our study demonstrates the potential of QRLN-based approaches for ranking assessment in other fields and provides insights for future research in this area.
https://ui.adsabs.harvard.edu/abs/2023Heliy...921429S/abstract

206. **Saeed, M., Wahab, A., Ali, M.,** Ali, J., & Bonyah, E. (2023). An innovative approach to passport quality assessment based on the possibility q-rung ortho-pair fuzzy hypersoft set. *Heliyon,* 9(9). doi: 10.1016/j.heliyon.2023.e19379. Muhammad Saeed, Abdul Wahab, Mubashir Ali (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Gold)

This research article aims to evaluate the quality of passports issued by different countries. Passport quality assessment is critical in ensuring secure and efficient international travel. By leveraging this novel structure we address the limitations of existing methods and provide a comprehensive and accurate evaluation of passport quality. Our proposed PQROFHS (possibility q-rung orthopair fuzzy hypersoft set) based structure integrates various attributes related to passport quality, considering the inherent uncertainties and imprecisions associated with each attribute. Through extensive experimentation, we demonstrate the superior performance of our approach, achieving higher accuracy, reliability, and consistency than traditional methods. The flexibility of the PQROFHS framework allows for a nuanced representation of uncertainty, enabling informed decision-making in real-world scenarios. Implementing the presented approach can enhance global travel security, streamline immigration processes, and facilitate seamless international travel experiences. A explanatory example of a real-world problem is shown to demonstrate the suggested method.
https://pubmed.ncbi.nlm.nih.gov/37681123/

207. **Saleem, N., Raazzia, M. T.,** Hussain, N., & Asiri, A. (2023). Geraghty–Pata–Suzuki-Type Proximal Contractions and Related Coincidence Best Proximity Point Results. *Symmetry,* 15(8). doi: 10.3390/sym15081572. **Naeem Saleem, Maneesha Tur Raazzia** (Mathematics/SSC) Date of Publication: September 2023 HJRS: W (Bronze)
The objective of this research paper is to establish the existence and uniqueness of the best proximity and coincidence with best proximity point results, specifically focusing on Geraghty–Pata–Suzuki-type proximal mappings. To achieve this, we introduce three types of mappings, all within the context of a complete metric space: an $\alpha-\theta$–Geraghty–Pata–Suzuki-type proximal contraction; an $\alpha-\theta$–generalized Geraghty–Pata–Suzuki-type proximal contraction; and an $\alpha-\theta$–modified Geraghty–Pata–Suzuki-type proximal contraction. These new results generalize, extend, and unify various results from the existing literature. Symmetry plays a crucial role in solving nonlinear problems in operator theory, and the variables involved in the metric space are symmetric. Several illustrative examples are provided to showcase the superiority of our results over existing approaches.
https://www.mdpi.com/2073-8994/15/8/1572

208. **Saleem, S., Hussain, F., Irfan, M.,** Siddique, I., Nazeer, M., & Eldin, S. M. (2023). Theoretical investigation of heat transfer analysis in Ellis nanofluid flow through the divergent channel. *Case Studies in Thermal Engineering,* 48. doi: 10.1016/j.csite.2023.103140. **Muhammad Irfan** (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Gold)
Nanofluid flow with heat transfer is investigated in this article. Ellis fluid model of nonNewtonian fluid features is treated as physiological fluid in a complex divergent wavy channel. Thermophysical properties of blood and gold are used to form the nanofluid. The single-phase model is taken into account for the mathematical formulation of the nano-suspension. Long wavelength approximation and assumption of low Reynolds number are applied to obtain the governing differential equations of heat mass transfer. A closed-form solution is achieved by following some cumbersome mathematical manipulations. The Poisson–Boltzmann differential equation is incorporated to derive anelectrochemical potential of ions for the electro-osmotic flow (EOF). Numerical data has also been computed against the most prominent contributors and found to be in complete adherence with the existing literature for the limiting case. It is inferred from the visual graphics that the convection of nanofluid rises initially due to the flexibility of the channel for additional introduction of nano species up to 20%. However, the case is vice versa for the region 1 < x < 1.5. The variation of Brinkman number greater than one (Br > 1) outpaced the conduction of heat produced by viscous dissipation for the domain. Heat transfer rate diminishes which results in cooling-effects on the system. Enlarge boluses resulting from electro-osmotic parameters (UHS = 3) indicate strong resistive forces.
https://www.sciencedirect.com/science/article/pii/S2214157X2300446X

209. **Shaheen, A., Muhammad Hussain, S., Ghazwani, H. A., Huma, Z., & Siddique, I.** (2023). Analytical solution of non-Newtonian Williamson fluid under the effect of magnetohydrodynamics. *Modern Physics Letters B.* doi: 10.1142/S0217984924501033. **Imran Siddique** (Mathematics/SSC) Date of Publication: November 2023 HJRS: X (Clay)
In this paper, inscribed non-Newtonian Williamson fluid relaxation and contraction phenomena due to the effect of magnetohydrodynamics (MHD) is taken into account. This issue is modeled, and precise solutions are handled using a low Reynolds number and long wavelength approximation. Graphical depiction of the consequences of various parameters on temperature and velocity are provided. It becomes clear that the temperature reactions to increases in Biot numbers are decreased. Considering a cylindrical coordinate system, the impact of various physical parameters on the temperature distribution, velocity, the pressure gradient, and frictional force are secured from the flow for non-Newtonian Williamson fluid exposed from MATLAB. Additionally, it has been discovered that the velocity profile at the tube's center increases for shear-thinning a fluid and decreases for thickening a fluid. Furthermore, the peristaltic walls show the opposite behavior.
https://www.worldscientific.com/doi/full/10.1142/S0217984924501033

210. **Sharif, H., Ali, B., Siddique, I., Saman, I.,** Jaradat, M. M. M., & Sallah, M. (2023a). Author Correction: Numerical investigation of dusty tri-hybrid Ellis rotating nanofluid flow and thermal transportation over a stretchable Riga plate (Scientific Reports, (2023), 13, 1, (14272), 10.1038/s41598-023-41141-1). *Scientific Reports,* 13(1). doi: 10.1038/s41598-023-43647-0. **Imran Siddique, Iqra Saman** (Mathematics/SSC) Date of Publication: September 2023 HJRS: W (Platinum)
Due to high-ultra thermic significances, the nanosize materials are used in various chemical and mechanical engineering, modern technology and thermic engineering eras. For industrial growth of a country, one of the biggest challenges for engineers and scientists is improvement in thermal production and resources. In this study we analyzed the momentum and thermic aspects of MHD Ellis ternary nano material embedded with dust particles via stretchable Riga plate including volume concentration of dust material. The flow generating PDE's for two phase models are minimized into dimensionless nonlinear ODE's by using the right modification. To acquire the graphical results the BVP4c method was adopted in MATLAB software. Fundamental aspects affecting velocity and temperature have investigated through graphs. Additionally Nusselt number and skin

friction have also been evaluated. Compared it with previous literature to check the validity of results. Finding reveals that as compared to dusty phase the performance of trihybrid nano phase thermal transport is improved. Moreover, the temperature profile increases for rotational and volume fraction dust particles parameter. Dusty fluids are used in numerous manufacturing and engineering sectors, like petroleum transport, car smoke emissions, caustic granules in mining and power plant pipes.
https://www.nature.com/articles/s41598-023-41141-1

211. **Siddiqa, A., Manzoor, R., & Kamal, A. (2023). Polar gravitational waves in f(R, Tφ) framework.** *Physica Scripta,* **98(7), 075008. doi: 10.1088/1402-4896/acd888. Rubab Manzoor, Arsal Kamal (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Honorable Mention)**

This work analyzes the propagation of polar gravitational waves for flat FRW cosmic background and in view of f(R, Tφ) theory. In what follows, we opt for the Regge-Wheeler polar perturbation scheme in flat geometry of background spacetime and corresponding scalar, field source is also perturbed. The two sets of field equations for flat and perturbed geometry are constructed and furthermore used to evaluate perturbation parameters. The obtained expressions suggest that polar fluctuations affect both geometry and scalar field. The radial and temporal parts of perturbation parameters χ and σ are plotted explicitly while the behavior of ψ is observed via a numerical solution plotted as a 3D graph. The change in these fluctuations for different values of model parameter λ is noticed through these plots.
https://iopscience.iop.org/article/10.1088/1402-4896/acd888/meta

212. **Siddique, I., Adrees, R., Ahmad, H., & Askar, S. (2023). MHD Free convection flows of Jeffrey fluid with Prabhakar-like fractional model subject to generalized thermal transport.** *Scientific Reports,* **13(1). doi: 10.1038/s41598-023-36436-2. Imran Siddique, Rubina Adrees (Mathematics/SSC) Date of Publication: June 2023 HJRS: W (Platinum)**

This article examines the effects of magnetohydrodynamics and heat absorption on an incompressible Jeffrey fluid' time-dependent free convection flow over an infinite, vertically heated plate with homogeneous heat flux. The constitutive equation for heat flow utilizes the Prabhakar-like fractional derivative. The Laplace transform technique obtains the precise solution for the momentum and thermal profiles. The typical case and well-known outcomes from the literature are retrieved as restraining cases. The graphical analysis of the impact of the flow and fractionalized parameters on the thermal and momentum profiles is presented. Additionally, a comparison is made between the ordinary model and the Prabhakar-like fractional model, which shows that the latter better captures the retention of the physical features of the problem. It is concluded that the Prabhakar-like fractional model is better suited for describing the memory effect of the thermal and momentum fields.
https://www.nature.com/articles/s41598-023-36436-2

213. **Siddique, I., Iqbal, S., Akram, A., & Zahid, M. (2023). Coating of pseudo-plastic material in reverse roll-coating: Mathematical analysis.** *International Journal of Modern Physics B.* **doi: 10.1142/S021797922450108X. Imran Siddique, Aimen Akram (Mathematics/SSC) Shaukat Iqbal (Informatics & Systems/SST) Date of Publication: April 2023 HJRS: X (Null)**

This paper describes a theoretical framework and computational methods of a thin layer coating of a non-Newtonian polymeric material while it moves through a tiny space among two inverted rollers. Order of magnitude is accustomed to clarify the nondimensional forms of the governing equations. Semi-analytical solutions of pressure gradient, velocity profile and rate of the flow are acquired via optimal homotopy asymptotic method (OHAM). The graphical representation depicts the physical quantities of the effects of velocity profile ratio k and Weissenberg number We. It is observed that by increasing the values of k and We, velocity profile decreases while pressure distribution increases.
https://www.worldscientific.com/doi/epdf/10.1142/S021797922450108X

214. **Sultana, F., Gulistan, M., Ali, M., Yaqoob, N., Khan, M., Rashid, T., & Ahmad, T. (2023). Correction to: A study of plithogenic graphs: applications in spreading coronavirus disease (COVID-19) globally (Journal of Ambient Intelligence and Humanized Computing, (2023), 14, 10, (13139-13159), 10.1007/s12652-022-03772-6).** *Journal of Ambient Intelligence and Humanized Computing,* **14(10), 13161. doi: 10.1007/s12652-022-04483-8. Tabasam Rashid (Mathematics/SSC) Date of Publication: October 2023 HJRS: X (CLay)**

During the last two decades, the world has experienced three major outbreaks of Coronaviruses, namely severe acute respiratory syndrome (SARS- CoV), middle east respiratory syndrome (MERS-CoV), and the current ongoing pandemic of severe acute respiratory syndrome 2 (SARS-CoV-2). The SARS-CoV-2 caused the disease known as Coronavirus Disease 2019 (COVID-19). Since its discovery for the first time in Wuhan, China, in December 2019, the disease has spread very fast, and cases have been reported in more than 200 countries/territories. In this study, the idea of Smarandache's pathogenic set is used to discuss the novel COVID-19 spread. We first introduced plithogenic graphs and their subclass, like plithogenic fuzzy graphs. We also established certain binary operations like union, join, Cartesian product, and composition of pathogenic

fuzzy graphs, which are helpful when we discuss combining two different graphs. In the end, we investigate the spreading trend of COVID-19 by applying the pathogenic fuzzy graphs. We observe that COVID-19 is much dangerous than (MERS-CoV) and (SARS-CoV). Moreover, as the SARS-CoV and MERS-CoV outbreaks were controlled, there are greater chances to overcome the current pandemic of COVID-19 too. Our model suggests that all the countries should stop all types of traveling/movement across the borders and internally too to control the spread of COVID-19. The proposed model also predicts that in case precautionary measures have not been taken then there is a chance of severe outbreak in future.

https://link.springer.com/article/10.1007/s12652-022-03772-6#Abs1

215. Tabraiz, A., Mufti, Z. S., Aslam, M. N., Saleem, N., & Hosseinzadeh, H. (2023). Fuzzy Computational Analysis of Flower Graph via Fuzzy Topological Indices. *Journal of Mathematics,* 2023. doi: 10.1155/2023/8077729. Naeem Saleem (Mathematics/SSC) Date of Publication: August 2023 HJRS: X (Null)

Fuzzy graphs have many applications not only in mathematics but also in any feld of science where the concept of fuzziness is involved. Te notion of fuzziness is suitable in any environment, which favor to predicts the problem and solve this problem in a decent way. As compared to crisp theory, fuzzy graphs are a more benefcial and powerful tool to get better accuracy and precision due to their fuzziness property. A topological index is a numerical value which characterizes the properties of the graph. Topological indices were basically developed for chemical structures, but these are also used for general graphs as well. In chemical graph theory, topological indices are used to extract the chemical properties of the graphs. Tese indices are also well studied in fuzzy environment. Applications of fuzzy graphs are found in medicines, telecommunications, trafc light control, and many more. Our aim is to fnd these fuzzy topological indices for fower graphs to strengthen the concepts of fuzziness in general graphs. In this paper, some novel results for fm×r fower graphs are achieved.

https://www.hindawi.com/journals/jmath/2023/8077729/

216. Ullah, K., Saleem, N., Bilal, H., Ahmad, J., Ibrar, M., & Jarad, F. (2023). On the convergence, stability and data dependence results of the JK iteration process in Banach spaces. *Open Mathematics,* 21(1). doi: 10.1515/math-2023-0101. Naeem Saleem (Mathematics/SSC) Date of Publication: August 2023 HJRS: Y (Null)

This article analyzes the JK iteration process with the class of mappings that are essentially endowed with a condition called condition (E). The convergence of the iteration toward a fixed point of a specific mapping satisfying the condition (E) is obtained under some possible mild assumptions. It is worth mentioning that the iteration process JK converges better toward a fixed point compared to some prominent iteration processes in the literature. This fact is confirmed by a numerical example. Furthermore, it has been shown that the iterative scheme JK is stable in the setting of generalized contraction. The data dependence result is also established. Our results are new in the iteration theory and extend some recently announced results of the literature.

https://www.degruyter.com/document/doi/10.1515/math-2023-0101/html

217. Ur Rahman, R., Faridi, W. A., El-Rahman, M. A., Taishiyeva, A., Myrzakulov, R., & Az-Zo'bi, E. A. (2023). The Sensitive Visualization and Generalized Fractional Solitons' Construction for Regularized Long-Wave Governing Model. *Fractal and Fractional,* 7(2). doi: 10.3390/fractalfract7020136. Riaz Ur Rahman, Waqas Ali Faridi (Mathematics/SSC) Date of Publication: February 2023 HJRS: X (Clay)

The solution of partial differential equations has generally been one of the most-vital mathematical tools for describing physical phenomena in the different scientific disciplines. The previous studies performed with the classical derivative on this model cannot express the propagating behavior at heavy infinite tails. In order to address this problem, this study addressed the fractional regularized long-wave Burgers problem by using two different fractional operators, Beta and M-truncated, which are capable of predicting the behavior where the classical derivative is unable to show dynamical characteristics. This fractional equation is first transformed into an ordinary differential equation using the fractional traveling wave transformation. A new auxiliary equation approach was employed in order to discover new soliton solutions. As a result, bright, periodic, singular, mixed periodic, rational, combined dark–bright, and dark soliton solutions were found based on the constraint relation imposed on the auxiliary equation parameters. The graphical visualization of the obtained results is displayed by taking the suitable parametric values and predicting that the fractional order parameter is responsible for controlling the behavior of propagating solitary waves and also providing the comparison between fractional operators and the classical derivative. We are confident about the vital applications of this study in many scientific fields.

https://www.mdpi.com/2504-3110/7/2/136

218. Ur Rehman, F., Rashid, T., & Hussain, M. T. (2023). Applications of maximum matching by using bipolar fuzzy incidence graphs. *PLoS ONE,* 18(8 August). doi: 10.1371/journal.pone.0285603. Fahad Ur Rehman, Tabasam Rashid & Muhammad Tanveer Hussain (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Platinum)

The extension of bipolar fuzzy graph is bipolar fuzzy incidence graph (BFIG) which gives the information regarding the effect of vertices on the edges. In this paper, the concept of matching in bipartite BFIG and also for BFIG is introduced. Some results and theorems of fuzzy graphs are also extended in BFIGs. The number of operations in BFIGs such as augmenting paths, matching principal numbers, relation between these principal numbers and maximum matching principal numbers are being investigated which are helpful in the selection of maximum most allied applicants for the job and also to get the maximum outcome with minimum loss (due to any controversial issues among the employees of a company). Some characteristics of maximum matching principal numbers in BFIG are explained which are helpful for solving the vertex and incidence pair fuzzy maximization problems. Lastly, obtained maximum matching principal numbers by using the matching concept to prove its applicability and effectiveness for the applications in bipartite BFIG and also for the BFIG.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0285603

219. Vimala, J., Mahalakshmi, P., **Rahman, A. U., & Saeed, M.** (2023). A customized TOPSIS method to rank the best airlines to fly during COVID-19 pandemic with q-rung orthopair multi-fuzzy soft information. *Soft Computing, 2*7(20), 14571-14584. doi: 10.1007/s00500-023-08976-2. **Atiqe Ur Rahman & Muhammad Saeed (Mathematics/SSC) Date of Publication: August 2023** HJRS: W (Silver)

Multi-attribute decision making is aimed at identifying the problem of ranking the finite alternatives or selecting the best alternatives within feasible alternatives. In this study, we investigate two new notions, namely q-rung orthopair multi-fuzzy set and q-rung orthopair multi-fuzzy soft set, which combine the benefits of both q-rung orthopair fuzzy set and multi-fuzzy soft set. The eminent characteristic of these two new notions is their ability to overcome the insufficiency of the q-rung orthopair fuzzy set and multi-fuzzy soft set. It is observed that the nature of the q-rung orthopair multi-fuzzy set and the q-rung orthopair multi-fuzzy soft set is more beneficial for expressing unclear and vague information. Some of their fundamental operations, namely complement, equality, subset, union and intersection operations, are defined. Next, the TOPSIS mechanism using the correlation coefficient has been presented to rank the best airlines to fly during the COVID-19 pandemic in a q-rung orthopair multi-fuzzy soft environment. Finally, a comparative analysis of the developed approach is given to ensure the supremacy of the proposed method in the existing literature.
https://link.springer.com/article/10.1007/s00500-023-08976-2

220. Vivas-Cortez, M., **Murtaza, G., Baig, G. M.,** & Awan, M. U. (2023). Raina's Function-Based Formulations of Right-Sided Simpson's and Newton's Inequalities for Generalized Coordinated Convex Functions. *Symmetry,* 15(7). doi: 10.3390/sym15071441. **Ghulam Murtaza, Ghulam Murtaza Baig (Mathematics/SSC) Date of Publication: July 2023** HJRS: W (Bronze)

The main focus of this article is to derive some new counterparts to Simpson's and Newton's type inequalities involve a class of generalized coordinated convex mappings. This class contains several new and known classes of convexity as special cases. For further demonstration, we deploy the concept of right quantum derivatives to develop two new identities involving Raina's function. Moreover, by implementing these auxiliary results together with generalized convexity, we acquire a Holder-type inequality. We also acquire some applications of our main findings by making use of suitable substitutions in Raina's function.
https://www.mdpi.com/2073-8994/15/7/1441

221. Wali, M., Arshad, S., Eldin, S. M., & **Siddique, I.** (2023). **Numerical approximation of Atangana-Baleanu Caputo derivative for space-time fractional diffusion equations.** *AIMS Mathematics,* 8(7), 15129-15147. doi: 10.3934/math.2023772. **Imran Siddique (Mathematics/SSC) Date of Publication: April 2023** HJRS: W (Honorable Mention)

In this study, we attempt to obtain the approximate solution for the time-space fractional linear and nonlinear diffusion equations. A finite difference approach is given for the solution of both linear and nonlinear fractional order diffusion problems. The Riesz fractional derivative in space is specifically approximated using the centered difference scheme. A system of Atangana-Baleanu Caputo equations that have been converted through spatial discretization is solved using a newly developed modified Simpson's 1/3 formula. A study of the proposed scheme is done to ascertain its stability and convergence. It has been shown that for mesh size h and time steps δt the recommended method converges at a rate of $O(\delta t^2 + h^2)$. Based on graphic results and numerical examples, the application of the model is also examined.
https://www.aimspress.com/aimspress-data/math/2023/7/PDF/math-08-07-772.pdf

222. Yahya, A. U., Eldin, S. M., Alfalqui, S. H., Ali, R., Salamat, N., **Siddique, I.,** & Abdal, S. (2023). **Computations for efficient thermal performance of Go + AA7072 with engine oil based hybrid nanofluid transportation across a Riga wedge.** *Heliyon,* 9(7). doi: 10.1016/j.heliyon.2023.e17920. **Imran Siddique (Mathematics/SSC) Date of Publication: July 2023** HJRS: W (Gold)

The demand for efficient heat transportation for the reliable functioning of mechanical processes is rising. The hybrid nanofluid emulsion is a related new concept in this research field. This communication pertains to mass and thermal transportation of Graphene oxide (Go) + AA7072 to be dissolved homogeneously in the bulk

engine oil. In order to demonstrate the effectiveness of this hybrid nanofluid, a simple nanofluid Go/engine oil is also discussed. The flow of fluids occurs due to stretch in the wedge adjusted with Riga surface. The design of a hybrid nanofluid manifests the novelty of the work. The system of partial differential equations that are based on conservation principles of energy, momentum, and mass are transmuted to ordinary differential form. Numerical simulation is carried out on the Matlab platform by employing the Runge-Kutta approach along with a shooting tool. The influential parameters are varied to disclose the nature of physical quantities. The flow is accelerated with higher attributes of the modified Hartmann number, but it decelerates against the Weinberg number. The fluid's temperature rises with increment, in the concentration of nano-entities. The velocity for hybrid nanofluids is slower than that of mono nanofluids and the temperature distribution for hybrid nanofluids is greater than that of mono nanofluids. The fluid temperature increases with the concentration $\phi 2$ of $AA7072$.

https://www.cell.com/heliyon/pdf/S2405-8440(23)05128-9.pdf

223. Yahya, A. U., **Siddique, I.**, Salamat, N., Ahmad, H., Rafiq, M., Askar, S., & Abdal, S. (2023). **Numerical study of hybridized Williamson nanofluid flow with TC4 and Nichrome over an extending surface.** *Open Physics,* **21(1). doi: 10.1515/phys-2022-0246.** Imran Siddique (Mathematics/SSC) Date of Publication: June 2023 HJRS: X (Null)

Enhancement in thermal distribution of Williamson hybrid nanofluid flow is articulated in this research. Nichrome and TC4 nanoparticles are homogenously diffused in the water, which is the base fluid. An elongating surface holds the flow and thermal transition phenomenon in the existence of uniform sources of magnetic field and heat radiation. The boundary of wall obeys a suction and slip condition. The formulation for physical conservation laws is made as a system of partial differential equations. For the solution purpose, their boundary-value problem is transmuted into the ordinary differential form. Then, Matlab code involving Runge–Kutta procedure is run to compute the variation in velocity as well as temperature profiles under impacts of the controlling factors. The comparative computations are made for two cases: nanofluids (TC4+water)(TC4+water) and hybrid nanofluids (TC4,Nichrome+water)(TC4,Nichrome+water) . The heat for that hybrid nanofluid case is larger than that for the nanofluids. The velocity curve is decreased against increasing magnetic field strength and Williamson parameter. Enhancement in thermal distribution is observed with increasing concentration φ2�2 of Nichrome.

https://www.degruyter.com/document/doi/10.1515/phys-2022-0246/html

224. Yao, S. W., **Ullah, N.,** Rehman, H. U., Hashemi, M. S., Mirzazadeh, M., & Inc, M. (2023). **Dynamics on novel wave structures of non-linear Schrödinger equation via extended hyperbolic function method.** *Results in Physics,* **48. doi: 10.1016/j.rinp.2023.106448.** Naeem Ullah (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)

In this study, our focus is on the construction of novel soliton solutions of non-linear Schrödinger equation with parabolic law and non-local law non-linearities via new extended hyperbolic function method. The acquired solutions are original and could be helpful in the field of nonlinear optics, fluid dynamics, and plasma physics. From these outcomes, it is believed that this method is a promising technique to handle a wide variety of such type of equations. For physical understanding and better realization of our constructed solutions, some of the obtained solutions under appropriate parameters are demonstrated by 2D and 3D plots. Analysis discloses that the proposed scheme is consistent and can be applied to more advanced models in engineering and physics.

https://www.sciencedirect.com/science/article/pii/S2211379723002413

225. **Zahra, A., & Mardan, S. A.** (2023). **Five dimensional analysis of electromagnetism with heat flow in the post-quasi-static approximation.** *European Physical Journal C,* **83(3). doi: 10.1140/epjc/s10052-023-11383-4.** Anam Zahra, Syed Ali, Mardan (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Platinum)

The development of dissipative and electrically charged distributions in five dimensions is presented by using the post-quasistatic approximation. It is an iterative technique for the evolution of self-gravitating spheres of matter. We construct non-adiabatic distributions by means of an equation of state that accounts for the anisotropy based on electric charge. Streaming out and diffusion approximations are used to describe dissipation. In non-comoving coordinates, we match the higher dimensional interior solution with the corresponding Vaidya–Reissner–Nordström exterior solution. Hence, a system of higher dimensional surface equations results from generalized form of the post-quasistatic approximation. Surface equations are essential for understanding physical phenomena such as luminosity, Doppler shift, and red-shift at the boundary surface of gravitating sources.

https://link.springer.com/article/10.1140/epjc/s10052-023-11383-4

226. Zhang, H., Zhang, Y., **Rahman, A. U., & Saeed, M.** (2023). **An intelligent sv-neutrosophic parameterized MCDM approach to risk evaluation based on complex fuzzy hypersoft set for real estate investments.**

Management Decision, 61(2), 486-505. doi: 10.1108/MD-05-2022-0605. **Atiqe Ur Rahman, Muhammad Saeed (Mathematics/SSC) Date of Publication: March 2023 HJRS: W (Gold)**

Purpose – In this article, the elementary notions and aggregation operations of single-valued neutrosophic parameterized complex fuzzy hypersoft set (sv-NPCFHSS) are characterized initially. Then by using matrix version of sv-NPCFHSS, a decision-support system is constructed for the evaluation of real estate residential projects by observing various risk factors. Design/methodology/approach – Two approaches are utilized in this research: set-theoretic approach and algorithmic approach. The first approach is used to investigate the notions of sv-NPCFHSS and its some aggregations whereas the second approach is used to propose an algorithm for designing its decision-support system by using the aggregation operations like reduced fuzzy matrix, decision matrix, etc. of sv-NPCFHSS. The adopted algorithm is validated in real estate scenario for the selection of residential project by observing various risk factors to avoid any expected investment loss. Findings – The proposed approach is more flexible and reliable as it copes with the shortcomings of literature on sv-neutrosophic set, sv-neutrosophic soft set and other fuzzy soft set-like structures by considering hypersoft setting, complex setting and neutrosophic setting collectively. Research limitations/implications – It has limitations for complex intuitionistic fuzzy hypersoft set, complex neutrosophic hypersoft set and other complex neutrosophic hypersoft set-like models. Practical implications – The scope of this research may cover a wide range of applications in several fields of mathematical sciences like artificial intelligence, optimization, MCDM, theoretical computer science, soft computing, mathematical statistics etc. Originality/value – The proposed model bears the characteristics of most of the relevant existing fuzzy soft set-like models collectively and fulfills their limitations.

https://www.emerald.com/insight/content/doi/10.1108/MD-05-2022-0605/full/html

227. Zulqarnain, R. M., Ma, W. X., **Mehdi, K. B., Siddique, I.,** Hassan, A. M., & Askar, S. (2023). **Physically significant solitary wave solutions to the space-time fractional Landau–Ginsburg–Higgs equation via three consistent methods.** *Frontiers in Physics,* 11. doi: 10.3389/fphy.2023.1205060. **Khush Bukht Mehdi, Imran Siddique (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**

The Landau–Ginzburg–Higgs equation (LGHE) is a mathematical model used to describe nonlinear waves that exhibit weak scattering and long-range connections in the tropical and mid-latitude troposphere as interactions between equatorial and mid-latitude Rossby waves. This study assessed the fractional Landau–Ginzburg–Higgs model, previously introduced in truncated M-fractional derivatives utilizing the (G′/G,1/G)
, modified (G′/G2), and new auxiliary equation methods. Using these techniques, different solutions, including unknown parameters, were obtained in trigonometric, hyperbolic, and exponential functions. This study investigated how varying values of the fractional parameter affected the deeds of the solutions obtained for the given conditions. The predicted solutions, obtained under restricted conditions, were visualized through 2D, 3D, and contour plots using appropriate parameter values. The attained results were confirmed for the aforementioned equations using symbolic soft computations. Moreover, the outcomes confirmed that the methods used in this study were effective mathematical tools for discovering exact solitary wave solutions to nonlinear models encountered in various areas of science and engineering.

https://www.frontiersin.org/articles/10.3389/fphy.2023.1205060/full

228. Zulqarnain, R. M., Ma, W. X., **Siddique, I.,** Alburaikan, A., Abd El-Wahed Khalifa, H., & Alanzi, A. M. (2023). **Prioritization of Thermal Energy Storage Techniques Using TOPSIS Method Based on Correlation Coefficient for Interval-Valued Intuitionistic Fuzzy Hypersoft Set.** *Symmetry*, 15(3). doi: 10.3390/sym15030615. **Imran Siddique (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Bronze)**

The correlation between two disparate variables conquers a significant habitation in statistics. The concept of correlation coefficient (CC) is one of the well-known indicators, but it is not used in interval-valued intuitionistic fuzzy hypersoft set (IVIFHSS) information. It is a generalization of interval-valued intuitionistic fuzzy soft sets and a refined extension of intuitionistic fuzzy hypersoft sets. However, using the CC and weighted correlation coefficient (WCC) has not yet been explored for IVIFHSS information. The core objective of this research is to present the correlation coefficient (CC) and weighted correlation coefficient (WCC) for interval-valued intuitionistic fuzzy hypersoft sets (IVIFHSS) and their mandatory properties. A prioritization technique for order preference by similarity to the ideal solution (TOPSIS) is developed based on proposed correlation measures. To ensure the symmetry of the developed scheme, we consider mathematical clarifications of correlation contractions. Based on assessments, it conceded vibrant multi-attribute decision-making (MADM) methodology with the most substantial significance. In addition, a statistical illustration is designated to regulate the operative usage of a decision-making configuration in thermal energy storage techniques. The productivity of the advocated algorithm is more reliable than existing replicas to control the favorable configurations of the premeditated study.

https://www.mdpi.com/2073-8994/15/3/615

229. Zulqarnain, R. M., **Nadeem, M., Siddique, I.,** Ahmad, H., Askar, S., & Samar, M. (2023). **Heat transfer analysis of Maxwell tri-hybridized nanofluid through Riga wedge with fuzzy volume fraction.** *Scientific Reports,* 13(1).

doi: 10.1038/s41598-023-45286-x. **Muhammad Nadeem, Imran Siddique (Mathematics/SSC) Date of Publication: October 2023 HJRS: W (Platinum)**

This contribution aims to optimize nonlinear thermal fow for Darcy-Forchheimer Maxwell fuzzy (Al2O3 + Cu + TiO2/EO) tri-hybrid nanofuid fow across a Riga wedge in the context of boundary slip. Three types of nanomaterials, Al2O3, Cu and TiO2 have been mixed into the basic fuid known as engine oil. Thermal properties with the efects of porous surface and nonlinear convection have been established for the particular combination (Al2O3 + Cu + TiO2/EO). Applying a set of appropriate variables, the set of equations that evaluated the energy and fow equations was transferred to the dimensionless form. For numerical computing, the MATLAB software's bvp4c function is used. The graphical display is used to demonstrate the infuence of several infuential parameters. It has been observed that fow rate decay with expansion in porosity parameter and nanoparticles volumetric fractions. In contrast, it rises with wedge angle, Grashof numbers, Darcy-Forchheimer, nonlinear Grashof numbers, and Maxwell fuid parameter. Thermal profles increase with progress in the heat source, nanoparticles volumetric fractions, viscous dissipation, and nonlinear thermal radiation. The percentage increases in drag force for ternary hybrid nanofuid are 13.2 and 8.44 when the Modifed Hartmann number takes input in the range $0.1 \leq Mh \leq 0.3$ and wedge angle parameters $0.1 \leq m \leq 0.3$. For fuzzy analysis, dimensionless ODEs transformed into fuzzy diferential equations and employed symmetrical triangular fuzzy numbers (TFNs). The TFN makes a triangular membership function (M.F.) that describes the fuzziness and comparison. This study compared nanofuids, hybrid nanofuids, and ternary nanofuids through triangular M.F. The boundary layer fow caused by a wedge surface plays a crucial role in heat exchanger systems and geothermal.

https://www.nature.com/articles/s41598-023-45286-x

230. Zulqarnain, R. M., **Siddique, I.,** Asif, M., Ahmad, H., Askar, S., & Gurmani, S. H. (2023). Extension of correlation coefficient based TOPSIS technique for interval-valued Pythagorean fuzzy soft set: A case study in extract, transform, and load techniques. *PLoS ONE,* 18(10 October). doi: 10.1371/journal.pone.0287032.**Imran Siddique (Mathematics/SSC) Date of Publication: October 2023 HJRS: W (Platinum)**

Correlation is an essential statistical concept for analyzing two dissimilar variables' relationships. Although the correlation coefficient is a well-known indicator, it has not been applied to interval-valued Pythagorean fuzzy soft sets (IVPFSS) data. IVPFSS is a generalized form of interval-valued intuitionistic fuzzy soft sets and a refined extension of Pythagorean fuzzy soft sets. In this study, we propose the correlation coefficient (CC) and weighted correlation coefficient (WCC) for IVPFSS and examine their necessary properties. Based on the proposed correlation measures, we develop a prioritization technique for order preference by similarity to the ideal solution (TOPSIS). We use the Extract, Transform, and Load (ETL) software selection as an example to demonstrate the application of these measures and construct a prioritization technique for order preference by similarity to the ideal solution (TOPSIS) model. The method investigates the challenge of optimizing ETL software selection for business intelligence (BI). This study offers to illuminate the significance of using correlation measures to make decisions in uncertain and complex settings. The multi-attribute decision-making (MADM) approach is a powerful instrument with many applications. This expansion is predicted to conclude in a more reliable decision-making structure. Using a sensitivity analysis, we contributed empirical studies to determine the most significant decision processes. The proposed algorithm's productivity is more consistent than prevalent models in controlling the adequate conformations of the anticipated study. Therefore, this research is expected to contribute significantly to statistics and decision-making.

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0287032

231. Zulqarnain, R. M., **Siddique, I.,** Mahboob, A., Ahmad, H., Askar, S., & Gurmani, S. H. (2023). Optimizing construction company selection using einstein weighted aggregation operators for q-rung orthopair fuzzy hypersoft set. *Scientific Reports,* 13(1). doi: 10.1038/s41598-023-32818-8.**Imran Siddique (Mathematics/SSC) Date of Publication: April 2023 HJRS: W (Platinum)**

Infrastructure development and the economy heavily rely on the construction industry. However, decision-making in construction projects can be intricate and difficult due to conflicting standards and requirements. To address this challenge, the q-rung orthopair fuzzy soft set (q-ROFSS) has emerged as a useful tool incorporating fuzzy and uncertain contractions. In many cases, further characterization of attributes is necessary as their values are not mutually exclusive. The prevalent q-ROFSS structures cannot resolve this state. The q-rung orthopair fuzzy hypersoft sets (q-ROFHSS) is a leeway of q-ROFSS that use multi-parameter approximation functions to scare the scarcities of predominant fuzzy sets structures. The fundamental objective of this research is to introduce the Einstein weighted aggregation operators (AOs) for q-rung orthopair fuzzy hypersoft sets (q-ROFHSS), such as q-rung orthopair fuzzy hypersoft Einstein weighted average and geometric operators, and discuss their fundamental properties. Mathematical explanations of decision-making (DM) contractions is present to approve the rationality of the developed approach. Einstein AOs, based on predictions, carried an animated multi-criteria group decision (MCGDM) method with the most substantial significance with the prominent MCGDM structures. Moreover, we utilize our proposed MCGDM model to

select the most suitable construction company for a given construction project. The proposed method is evaluated through a statistical analysis, which helps ensure the DM process's efficiency. This analysis demonstrates that the proposed method is more realistic and reliable than other DM approaches. Overall, the research provides valuable insights for decision-makers in the construction industry who seek to optimize their DM processes and improve the outcomes of their projects.

https://www.nature.com/articles/s41598-023-32818-8

Book Chapter

1. **Rashid, T., Mahboob, A., & Beg, I. (2023). Bilevel Approach for E-Bidding Auction with Regret Theory. In L. Sahoo, T. Senapati & R. R. Yager (Eds.),** *Real Life Applications of Multiple Criteria Decision Making Techniques in Fuzzy Domain* **(pp. 319-332). Singapore: Springer Nature Singapore. Tabasam Rashid, Aamir Mahboob (Mathematics/SSC) Date of Publication: 2023**

In e-price bid auctions, we construct an auction model using regret decision theory to explain how a bidder decides his bidding price. The fundamental distinction between regret theory and other decision theories under uncertainty is clarified in this article. The suggested regret decision theory is scenario-based rather than the other theories. The process of the suggested theory is split into two stages. The first stage is to consider every possible lowest bidding offered by the auctioneers and select the one action point from the bidding price. After selecting the action point in the second stage, a decision-maker evaluates the best bidding price that produces the best results for him. Our model captures the various preferences for risk in such auction issues, which are considerably different from the typical auction model based on probability distribution in which maximizing expected utility is the aim. The study results indicate that the suggested decision models should give valuable framework for understanding the different behaviors of decision makers and assist the decision maker in finding the optimal solution according to his attitude regarding partly known information.

https://link.springer.com/chapter/10.1007/978-981-19-4929-6_15

Conference Proceeding

1. **Osalusi, O. J., Zafar, A. A., Asgir, M., Baleanu, D., & Riaz, M. B. (2023). Case Study of Non-singular Kernel Model for MHD Boundary Layer Flow of a Rate Type Fluid over an Oscillating Plate. Vol. 415.** *4th International Conference on Mathematical Modelling, Applied Analysis and Computation, ICMMAAC 2021* **(pp. 91-106). Muhammad Bilal Riaz (Mathematics/SSC) Date of Publication: 2023**

The magnetohydrodynamics boundary layer flow of rate type fluid over an oscillating inclined infinite plate along with Newtonian heating and slip at the boundary is investigated. The model is developed by using the Atangana-Baleanu time-fractional derivative operator. Temperature and velocity fields for the non-integer order derivative model are computed. From our general results, several results from the literature could be recovered, for example; the cases corresponding to the constant motion of the plate, as well as the analogous results for ordinary Maxwell fluid, the fractional viscous and ordinary viscous fluid could be recovered. Moreover, the physical significance of the parameters like relaxation time, fractional order parameter, Grashof number, and inclination of the plate is discussed and their control on the velocity of the fluid is analysed through graphical illustrations and useful conclusions are recorded.

https://link.springer.com/chapter/10.1007/978-981-19-0179-9_4

Department of Chemistry

1. **Arif, M. (2023). Extraction of iron (III) ions by core-shell microgel for in situ formation of iron nanoparticles to reduce harmful pollutants from water.** *Journal of Environmental Chemical Engineering,* **11(1), 109270. doi: https://doi.org/10.1016/j.jece.2023.109270. Muhammad Arif (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Gold)**

Since the most transition metal ions and organic dyes are hazardous, it is crucial to remove them from water. For this purpose, various systems are reported for removal of only transition metal ions or organic dyes. I have introduced a new system which is suitable for removal of both metal ions and organic dyes. The free radical precipitation polymerization method was used to create the spherical system of silica surrounded by poly(N-vinylcaprolactam-acrylic acid) S@P(NVCP-AA) core shell microgels and then characterized by using FTIR, DLS, XRD, and STEM. The S@P(NVCP-AA) microgel system was applied as adsorbent to extract iron (III) ions from water under various concentrations of S@P(NVCP-AA), iron (III) ions content, pH, and agitation time. The adsorption process of iron (III) ions on S@P(NVCP-AA) microgels was investigated by different adsorption isotherms. The kinetics of adsorption of iron (III) ions on S@P(NVCP-AA) microgel system was also examined by intra-particle diffusion model (InPDM), pseudo-1st order (P1O), pseudo-2nd order (P2O) and Elovich model (EM). Iron nanoparticles were formed by in-situ reduction of iron (III) ions that had been adsorbed in the P(NVCP-AA) shell region of the S@P(NVCP-AA) microgel. The organic pollutants and toxic transition metal ions

like 4-nitrophenol (4NiP), methyl red (MeR), methylene blue (MeB) and chromium (VI) ions (CMI) were reduced from an aqueous medium by using the iron nanoparticles loaded in S@P(NVCP-AA) microgels. The pseudo 1st order rate constant values for the catalytic reduction of 4NiP, MeR, MeB and CMI were found to be 0.778 min-1, 0.928 min-1, 0.943 min-1 and 0.142 min-1 respectively. The resulting S@Fe–P(NVCP-AA) system can act as an efficient catalyst for a wide range of additional organic transformations.
https://www.sciencedirect.com/science/article/pii/S221334372300009X

2. **Ehsan, M., Razzaq, H., Razzaque, S., Kanwal, M., & Hussain, I. (2023). Engineering nanocomposite membranes of sodium alginate-graphene oxide for efficient separation of oil-water and antifouling performance.** *Journal of Environmental Chemical Engineering*, *11*(1), 109185.doi: 10.1016/j.jece.2022.109185. **Shumaila Razzaque (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Gold)**

The consistent oil spill incidents and industrial wastewater disposal impart an adverse impact on human health and nature. The utilization of porous membranes to address these problems has been predominantly investigated. Recently, hydrophilic membranes, have revealed the promising potential in oil-water separation. Thus, the present work focuses on the fabrication of hydrophilic nanocomposite membranes by incorporating the graphene oxide (GO) nanosheets to develop cost-effective, environmentally friendly and sustainable membranes of sodium alginate (SA) for separating oil/water mixtures. The pristine sodium alginate (pSA) and composite membranes (SA-GO) were developed by solution casting and crosslinking approach. Permeation experiments confirmed that the composite membranes possess porosity, hydrophilicity and high pure water flux (PWF) in comparison to pSA membranes. The structural and morphological features of fabricated membranes were confirmed by X-ray diffractometry (XRD), Fourier transform infrared spectroscopy (FTIR), and Scanning electron microscopy (SEM). Moreover, the thermogravimetric analysis (TGA) and tensile testing results confirmed that the composite membranes have high mechanical endurance and thermal stability over pSA membranes. In addition, the wettability and surface hydrophilicity were further assured by measuring the water contact angle. The nanocomposite membranes significantly outperformed than the pristine SA membranes in the antifouling test without the requirement for alkaline or acidic washing. These membranes were then employed for oil-water separation utilizing a pressure-driven filtration method. The separation efficiency (% S), flux recovery ratio (% FRR) and protein rejection (% R) were also evaluated for the engineered membranes. The results depict that introducing 1.5 wt% GO to the SA matrix improved oil removal efficiency by 93.26%, antifouling performance with a protein rejection rate of 90%, and the flux recovery ratio of > 88%, repeated over the three filtration cycles.
https://www.sciencedirect.com/science/article/pii/S2213343722020589

3. **Iqbal, S., Ahmed, K., Ayub, K., Butt, M. H., Saqib, A. N. S., Lakhani, A., ... & Hashmi, M. A. (2023). Transition metals incorporated on phosphorene sheet as cost-effective single atom catalysts for hydrogen evolution reaction: A DFT study.** *Computational and Theoretical Chemistry*, *1220*, 113998. doi: 10.1016/j.comptc.2022.113998. **Sonia Iqbal, Muhammad Hamid Butt (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Clay)**

Hydrogen is an efficient alternative for conventional energy sources with a high gravimetric caloric value and zero-emission rate. Hydrogen evolution reaction (HER) is an efficient technique for hydrogen production via water electrolysis, but the process yields limited production of hydrogen gas due to less intrinsic activity of the electrode. Pt, in this case, is known as a state-of-the-art electrocatalyst for HER reaction, however, its application is limited due to high cost and less availability. In this study, the performance of less expensive transition metals embedded on phosphorene (TM@P) has been theoretically evaluated for HER through single-atom catalysis. TM@P sheet is optimized at various spin states. Gibbs free-energy change (ΔG_H^*) is calculated for the system with the most stable spin states to analyze the hydrogen binding strength on the surface of the catalyst, which is a key parameter to evaluate HER activity. The results showed that low-cost TM@P could be an effective alternative to noble metals with improved catalytic activity for HER, which is also supported by NBO analysis.
https://www.sciencedirect.com/science/article/pii/S2210271X2200411X

4. **Hayat, K., Shkeel, M., Iqbal, M. A., Quah, C. K., Wong, Q. A., Nazari V, M., . . . Hameed, S. (2023). O-Halogen-substituted arene linked selenium-N-heterocyclic carbene compounds induce significant cytotoxicity: Crystal structures and molecular docking studies.** *Journal of Organometallic Chemistry,* 985, 122593. doi: https://doi.org/10.1016/j.jorganchem.2022.122593. **Mehwish Shkeel (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Clay)**

Synthesis of N-arylated benzimidazolium salts 1–2, as stable N-heterocyclic Carbene (NHC) σ- donor ligands, was carried out by simple, facile and high yielding method. Respective Se-NHC compounds 3–4 were synthesized in water at 100 °C in open air environment using elemental selenium as reactant. Various spectroscopic methods (FT-IR, 1H and 13C NMR) were used for characterization of the products. Single crystal of salt 2 was analyzed by x-rays crystallographic analysis. In-vitro anticancer studies of the products 1–4 were carried out against breast cancer cell line (MDA-MB-231), cervical cancer cell line from Henrietta Lacks (HeLa), human normal endothelial

cell line (EA.hy926) and adenocarcinoma cell line (A549) using MTT assay and compared with a standard drug 5-Flourouracil (5FU). The products 1–4 showed IC50 values less than standard drug 5FU against MDA-MB-231. Against HeLa cell line, compound 2 and its complex 4 were more potent with IC50 value of 0.05 μM and 0.082 μM, respectively as compared with 5FU having IC50 value of 4.9 μM. Against A549 cell line the products 1–2 showed good IC50 values while 3 was inactive with very high value of IC50 and 4 also showed good IC50 value of 19.02 μM. Against EA.hy926 cell line, both the salts 1–2 showed more toxicity with lower IC50 values than selenium counterpart 3–4. The docked conformation of VEGFA, EGF, COX1 and HIF with active conformation of selenium compounds 3–4 and 5FU revealed numerous potential interactions. The selenium adducts 3–4 were better with lower binding energies than 5FU, however, both showed almost same values of inhibition constants and binding energies against all proteins. Also, inhibition constants of compounds 3–4 were almost equal but less than 5FU.

https://www.sciencedirect.com/science/article/pii/S0022328X22003412?via%3Dihub

5. **Hassan, S. U., Shafique, S., Palvasha, B. A., Saeed, M. H., Naqvi, S. A. R., Nadeem, S., Toheed. A., & Park, Y. K. (2023). Photocatalytic degradation of industrial dye using hybrid filler impregnated poly-sulfone membrane and optimizing the catalytic performance using Box-Behkendesign.** *Chemosphere*, *313*,137418. **doi:10.1016/j.chemosphere.2022.137418. Sidra Shafique, Muhammad Haris Saeed, Sohail Nadeem, Toheed Akher (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Gold)**

Mixed Matrix Membranes have gained significant attention over the past few years due to their diverse applications, unique hybrid inorganic filler and polymeric properties. In this article, the impregnation of nano-hybrid filler (polyoxometalates (∼POMs) encapsulated into the metal-organic framework (MOF) ∼ PMOF) on the polysulfone membrane (∼PSF) was done, resulting in a mix matrix membrane (∼PMOF@PSF). The developed structure was characterized by Fourier transform infrared (FT-IR), powder X-ray diffraction (PXRD), thermogravimetric analysis (TGA), scanning electron microscopy (SEM), and transmission electron microscopes (TEM). The results confirmed that the nano-hybrid filler was successfully fabricated on the surface of PSF. Different loading ratios of nano-hybrid filler (5%, 10%, 20%, 30%, and 40%) were used for impregnation. The study's objective was to enhance catalytic performance using optimization curves designed using a three-level Box-Behnken Design (BBD) simulation. The photodegradation of Methylene Blue (∼MB) was studied against PMOF@PSF30% and was found to perform optimally when the concentration of catalyst, time of degradation, and temperature were 0.05–0.15 gm, 40–120 min, and 30–70 °C respectively. These experiments were replicated 15 times, and obtained results were further processed using a two-quadratic polynomial model to develop response surface methodology (RSM), which allowed for a functional relationship between the decolorization and experimental parameters. The optimal performance of the reaction mixture was calculated to be 0.15 gm for concentration, 70 °C for temperature, with an 80 min reaction time. Under these optimal conditions, the predicted decolorization of MB was 98.09%. Regression analysis with $R2 > 0.99$ verified the fit of experimental results with predicted values. The PMOF@PSF PSF30% demonstrated excellent reusability as its dye degradation properties were significantly unaffected after ten cycles.

https://www.sciencedirect.com/science/article/pii/S004565352203911X

6. **Maqbool, M., Akhter, T., Faheem, M., Nadeem, S., Park, C. H., & Mahmood, A. (2023). CO₂ free production of ethylene oxide via liquid phase epoxidation of ethylene using niobium oxide incorporated mesoporous silica material as the catalyst.** *RSC Advances*, *13*(3), 1779-1786.**doi: 10.1039/d2ra07240h**. **Muhammad Maqbool, Toheed Akhtar, Muhammad Faheem, Sohail Nadeem (Chemistry/ SSC) Date of publication: February 2023 HJRS: W (Bronze)**

Ethylene Oxide (EO) is an essential raw material used in various consumer products like different glycol derivatives, ethoxylates, and polymers. We hydrothermally synthesize niobium oxide incorporated with mesoporous silica material (Nb/MSM), an efficient catalyst for CO2 free-ethylene oxide (EO) production via partial oxidation of ethylene. The structural properties of Nb/MSM catalysts were characterized using XRD, TEM, and N2 adsorption-desorption. The catalytic activity of synthesized materials in liquid phase epoxidation (LPE) of ethylene was evaluated in the presence of peracetic acid (PAA) as an oxidant to avoid the production of CO2 and also minimize metal leaching. GC chromatography was used to investigate the successful production of EO, and a peak with a retention time (RT) of 9.01 min served as confirmation. Various reaction parameters viz. temperature, catalyst concentration, ethylene to PAA molar ratio, and solvent effect were investigated in order to optimize the reaction conditions for enhancing the ethylene conversion and selectivity for EO production. By this approach, the challenges of greenhouse gas production and metal leaching were addressed which were associated with previously reported catalysts.

https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07240h

7. **Ahmed, H., Kilinc, S. G., Celik, F., Kesik, H. K., Simsek, S., Ahmad, K. S., Afzal, M. S., ... & Cao, J. (2023). An Inventory of Anthelmintic Plants across the Globe.** *Pathogens,* 12(1), 131. doi: 10.3390/pathogens12010131. **Muhammad Sohail Afzal (Chemistry/SSC) Date of publication: January 2023 HJRS: W (Honorable Mention)**

A wide range of novelties and significant developments in the field of veterinary science to treat helminth parasites by using natural plant products have been assessed in recent years. To the best of our knowledge, to date, there has not been such a comprehensive review of 19 years of articles on the anthelmintic potential of plants against various types of helminths in different parts of the world. Therefore, the present study reviews the available information on a large number of medicinal plants and their pharmacological effects, which may facilitate the development of an effective management strategy against helminth parasites. An electronic search in four major databases (PubMed, Scopus, Web of Science, and Google Scholar) was performed for articles published between January 2003 and April 2022. Information about plant species, local name, family, distribution, plant tissue used, and target parasite species was tabulated. All relevant studies meeting the inclusion criteria were assessed, and 118 research articles were included. In total, 259 plant species were reviewed as a potential source of anthelmintic drugs. These plants can be used as a source of natural drugs to treat helminth infections in animals, and their use would potentially reduce economic losses and improve livestock production.

https://www.mdpi.com/2076-0817/12/1/131

8. **Zahid, A., Mukhtar, Z., Qamar, M. A., Shahid, S., Ali, S. K., Shariq, M., ... & Sher, M. (2023). Synthesis of Mn-Doped ZnO Nanoparticles and Their Application in the Transesterification of Castor Oil.** *Catalysts*, **13**(1), 105.doi: 10.3390/catal13010105. Afifa Zahid, Zahid Mukhtar, Muhammad Azam Qamar, Sammia Shahid, Mudassar Sher (Chemistry/SSC) Date of publication: January 2023 HJRS: W (Bronze)

Alarming environmental changes and the threat of natural fuel resource extinction are concerning issues in human development. This has increased scientists' efforts to phase out traditional energy resources and move on to environmentally friendly biofuels. In this study, non-edible castor oil was transesterified with methanol using a manganese-doped zinc oxide (Mn-doped ZnO) nanocatalyst. A heterogeneous nanocatalyst was prepared by means of the the sonochemical method. X-ray diffraction (XRD), energy dispersive X-ray spectroscopy (EDX), and transmission electron microscopy (TEM) were used to characterize these nanocatalysts. The transesterification reaction was studied under different temperature conditions, different ratios of methyl alcohol to castor oil, and different amounts of the catalyst to identify optimum conditions in which the maximum yield of biodiesel was produced. The maximum biodiesel yield (90.3%) was observed at 55 °C with an oil-to-methanol ratio of 1:12, and with 1.2 g of nanocatalyst. The first-order kinetic model was found to be the most suitable. Several thermodynamic parameters were also determined, such as activation energy, enthalpy, and entropy. We found that this transesterification was an endergonic and entropy-driven reaction. The results showed that the Mn-doped ZnO nanocatalyst could be a suitable catalyst for the heterogeneous catalytic transesterification process, which is essential for biodiesel production.

https://www.mdpi.com/2073-4344/13/1/105

9. **Ikhlaq, A., Fiaz, U., Rizvi, O. S., Akram, A., Qazi, U. Y., Masood, Z., ... & Javaid, R. (2023). Catalytic Ozonation Combined with Conventional Treatment Technologies for the Recycling of Automobile Service Station Wastewater.** *Water*, **15**(1), 171.doi: 10.3390/w15010171. Asia Akram (Chemistry/SSC) Date of publication: January 2023 HJRS: W (Silver)

The ample increase in water scarcity and depletion of natural resources due to their overconsumption and the contamination of water sources becomes more challenging day by day. This challenging situation has pushed the scientific community to cope with it by providing alternative solutions. Therefore, it is indeed important to conduct a sustainable study on recycling wastewater for a particular purpose. Taking this into account, an effort was made to develop a novel hybrid treatment system that applied both conventional and advanced oxidation treatment processes. In this sustainable study, an integrated system was designed for the effective treatment followed by the recycling of automobile service station wastewater (ASSWW) which comprised sedimentation (sed), catalytic ozonation, adsorption, and filtration. In the current investigation, two catalysts/adsorbents, the granular activated carbon (GAC) and rice husk (RH) were employed individually and in combination for the first time in the studied hybrid process and their performance was compared and evaluated. The obtained results revealed that the hybrid system combination-I (Sed–O3/GAC) was more efficient than combination-II (Sed–O3/RH); the maximum removal efficiency of COD was 100% and 80%, respectively. In addition, the hybrid system combination-III (Sed–O3/RH + GAC) was more economical and efficient than others by employing 35% of each absorbent in the adsorption column. Moreover, this efficient Sed–O3/RH + GAC system has a maximum removal efficiency 99%, 100%, 99%, 100%, (89%, 99%, 100%) and 100% for turbidity, COD, BOD5, fecal coliform, potentially toxic metals (Cd, Pb, As), oil and grease, respectively, at optimized conditions (O3 = 82.5 mg/L; contact time = 18 min and catalyst dose of GAC and RH = 200 g each). Furthermore, the treated water sample complied with the WWF-recommended Irrigation Water Quality Guidelines (IWQGs) for class D. The increase in biodegradability (BOD5/COD ratio) was observed from 0.41 to 0.83. Therefore, the proposed efficacious hybrid system may be employed for the recycling of ASSWW for irrigation purposes.

https://www.mdpi.com/2073-4441/15/1/171

10. **Qamar, M. A., Javed, M., Shahid, S.,** Shariq, M., Fadhali, M. M., Ali, S. K., & Khan, M. S. (2023). Synthesis and applications of graphitic carbon nitride (g-C3N4) based membranes for wastewater treatment: A critical review. *Heliyon*, e12685.doi: 10.1016/j.heliyon.2022.e12685. **Muhammad Azam Qamar, Mohsin Javed, Sammia Shahid** (Chemistry/SSC) Date of publication: January 2023 **HJRS: W (Silver)**

Semiconducting membrane combined with nanomaterials is an auspicious combination that may successfully eliminate diverse waste products from water while consuming little energy and reducing pollution. Creating an inexpensive, steady, flexible, and diversified business material for membrane production is a critical challenge in membrane technology development. Because of its unusual structure and high catalytic activity, graphitic carbon nitride (g-C3N4) has come out as a viable material for membranes. Furthermore, their great durability, high permanency under challenging environments, and long-term use without decrease in flux are significant advantages. The advanced material techniques used to manage the molecular assembly of g-C3N4 for separation membrane were detailed in this review work. The progress in using g-C3N4-based membranes for water treatment has been detailed in this presentation. The review delivers an updated description of g-C3N4 based membranes and their separation functions and new ideas for future enhancements/adjustments to address their weaknesses in real-world situations. Finally, the ongoing problems and promising future research directions for g-C3N4-based membranes are discussed.

https://www.sciencedirect.com/science/article/pii/S2405844022039731

11. **Khan, H.,** Shah, M. R., Barek, J., & Malik, M. I. (2023). Cancer biomarkers and their biosensors: A comprehensive review. *TrAC - Trends in Analytical Chemistry,* 158. doi: 10.1016/j.trac.2022.116813. **Humaira Khan** (Chemistry/SSC) Date of publication: January 2023 **HJRS: W (Platinum)**

The article starts with a brief history of discovery of cancer biomarkers followed by statistical data on published cancer biomarkers detection strategies in the last decade to demonstrate the latest trends and the necessity to develop sensitive, cost-effective, and portable monitoring systems for these purposes to monitor wide spectrum of biomarkers. The latter part contains a short description of various optical and colorimetric detection methods while focusing more on the utilization of electrochemical detection methods and their signal amplification strategies. This part shows that the current state of knowledge is still limited and there is an ample need for biosensors that can rapidly analyze cellular modifications to identify biomarkers associated with cancer for enhancing the prognosis and therapy options. Finally, different approaches employed to overcome the limitations of existing electrochemical methods for cancer biomarker detection are critically discussed while highlighting the existing challenges and future opportunities.

https://www.sciencedirect.com/science/article/pii/S0165993622002965

12. **Tabasum, A., Razzaq, H., Razzaque, S.,** Bibi, A., Farooq, S., Yaqub, A., ... & Rehman, S. U. (2023). Protonated polyaniline and its derivatives as potential adsorbents for simultaneous reclamation of textile dyes and oil/water separation. *Materials Chemistry and Physics,* 293, 126913.doi: 10.1016/j.matchemphys.2022.126913. **Shumaila Razzaque (Chemistry/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

Potential adsorbents hold vital importance for the removal of conventional and hazardous micropollutants from waste water. The present study reports the synthesis and characterization of polyaniline (PANI) and its two derivatives by selecting pre-substituted monomers at ring (poly 4-amino phenol; PpAP) and nitrogen atom (poly N-methyl aniline; PNMA) prior to polymerization. The synthesized polymers were characterized by FTIR, XRD, TGA, SEM, TEM, BET and UV–Vis techniques. These polymers were exploited simultaneously for the removal of textile dyes and o il/water (O/W) separation. Initially, the adsorption potential of adsorbents towards removal of methylene blue (MB) dye was investigated in batch mode study by diversifying the effective factors like contact time, initial concentration of MB dye, amount of adsorbent and pH. The maximum dye adsorption capacity was found to be 320, 311, 299 mg/g for PNMA, PpAP and PANI respectively. These results were further verified by the computational studies. Thermodynamics of adsorption studies revealed that Langmiur adsorption isotherm is best fitted whereas kinetic studies were best described by pseudo second order model. The polymers were regenerated without any significant reduction in adsorption capacity by washing simply with water and ethanol. On the other hand, FTIR analysis before and after adsorption of MB explains that a variety of interactions are involved in the adsorption of MB. Moreover, the synthesized polymers were also applied for the separation of non-polar solvents from water (oil/water separation). Interestingly, PNMA, PpAP and PANI have shown promising results towards O/W separation studies obtaining separation efficiency values of 98%, 97% and 96% respectively. Good separation efficiency of prepared polymers is attainable due to hydrophilic nature of polyanilines. Overall, this study explores the potentiality of conducting polymer adsorbents for textile waste water treatment as well as for O/W separation.

https://www.sciencedirect.com/science/article/pii/S0254058422012196

13. **Ulfat, W., Mohyuddin, A., Amjad, M.,** Kurniawan, T. A., Mujahid, B., Nadeem, S., . . . Arif, M. (2023). Reuse of Buffing Dust-Laden Tanning Waste Hybridized with Poly- Styrene for Fabrication of Thermal Insulation Materials. *Sustainability,* 15(3), 1958. **Wajad Ulfat, Ayesha Mohyuddin, Muhammad Amjad, Sohail Nadeem,**

Mohsin Javed, Adnan Amjad, Sadaful Hassan, Muhammad Arif (Chemistry/SSC) Beenish Mujahid (Architecture/SAP) Date of Publication: February 2023 HJRS: W (Silver)

Air pollution, resulting from buffing dust waste produced by local leather tanning industry, has become a critical issue for the environment and public health. To promote a circular economy through resource recovery, this work developed a thermal insulation composite using buffing dust-laden tanning waste mixed with polystyrene and a blowing agent. To prepare the samples from leather tanning waste, different proportions of buffing dust (5–20% (w/w)) were blended with polystyrene in the presence of 3% (w/w) blowing agent. The composite material was processed in double-barreled with co-twin extruder to expose it to pressure and then heated at 200 °C. Different physico-chemical properties of composite samples were determined. The prepared composite materials had a good thermal conductivity (0.033–0.029 W/m-K), strong compression (5.21–6.25 ton), density (38–20 kg/m3), and water absorption (5–7.5%), as compared to conventional constructional insulation panels. The thermal conductivity of polystyrene was reduced to 10% after the addition of buffing dust (20% w/w). The presence of a blowing agent in the composite material enhanced its volume without compromising its physico-chemical properties. Thermo-gravimetric analysis showed that the thermal stability of the composite material ranged from 200–412 °C. FTIR analysis indicated that the composite had carbonyl and amino functional groups. The SEM images revealed the formation of voids with a decreasing homogeneity of the composite after the addition of the buffing dust waste. The EDX analysis revealed that the composite also had 62% of C and a tiny amount of Cr. This implies that the composite panels can be used for installation in buildings as thermal insulators in the construction sector. Overall, this work not only resolved the energy consumption problems during manufacturing, but it also brought positive impacts on the environment by recycling hazardous buffing dust and then reusing it as a thermal insulation material. Not only does this reduce the air pollution that results from the buffing dust waste, but this also promotes resource recovery in the framework of a circular economy.
https://www.mdpi.com/2071-1050/15/3/1958

14. **Amjad, M., Mohyuddin, A., Javed, M., Alhujaily, A., Iqbal, S., Almufarij, R. S., . . . Hassan, A. U. (2023). Biosynthesis of Silver Nanoparticles Using Kitchen Vegetable Waste Extract for Application against Poultry Pathogens, Antimicrobial Activity, and Photocatalytic Dye Degradation. *Journal of Chemistry, 2023*. doi: 10.1155/2023/6699622. Muhammad Amjad, Ayesha Mohyuddin, Mohsin Javed, Wajad Ulfat, Sohail Nadeem (Chemistry/SSC) Date of Publication: April 2023 HJRS: X (Honorable Mention)**

Bacteria develop resistance against antimicrobial drugs, and new remediations are constantly being introduced in the market. Silver and its compounds have strong resistance against different bacteria. The vegetable waste extract-synthesized silver nanoparticles (VWE-AgNPs) have distinct properties and potential applications because of their unique size and morphology. The fundamental purpose of this study was to develop an environment-friendly method for the synthesis of VWE-AgNPs to avoid the use of hazardous chemicals that cause danger to the environment as well as recycling vegetable waste material. The VWE-AgNPs were synthesized by mixing 1 mM AgNO3 solution and VWE at room temperature. The VWE-AgNPs were characterized by UV-visible spectroscopy, FTIR, SEM, and EDX. The synthesized particles showed good antibacterial properties against poultry bacteria Salmonella gallinarum and Salmonella enteritidis (growth reduction of 31 mm and 18 mm at 80 mg/mL AgNPs, respectively). The results demonstrated that VWE-AgNPs inhibited the growth of tested bacterial strains. The fabricated VWE-AgNPs also had the potential to act as a green photocatalyst for degradation of 87.7% of methylene blue (MB) and 90.76% of methyl orange (MO) nearly at 3.25 h and 1 h sunlight exposure time, respectively. The highest antifungal activity, which was determined to be 36.5 mm and 31.8 mm against Alternata sp. and C. albican, was discovered to be in VWE-AgNPs.
https://www.hindawi.com/journals/jchem/2023/6699622/

15. **Arif, M. (2023). A tutorial review on bimetallic nanoparticles loaded in smart organic polymer microgels/hydrogels. *Journal of Molecular Liquids, 375*. doi: 10.1016/j.molliq.2023.121346. Muhammad Arif (Chemistry/SSC) Date of Publication: April 2023 HJRS: W (Gold)**

The bimetallic nanoparticles and smart microgels/hydrogels are a particularly interesting combination that have received a lot of attention over the past ten years. These composite materials (bimetallic nanoparticles loaded in smart microgels/hydrogels) are a worthy candidate for a wide range of biological, environmental, and catalytic applications due to the sensitive behavior of microgels in their hybrid systems. There are numerous morphologies and architectural designs for hybrid microgels based on bimetallic nanoparticles reported in the literature. The morphology of microgels in hybrid systems is the key for their usage. For this reason, a specific assembly of hybrid microgels based on bimetallic nanoparticles is designed, specifically, for a particular purpose. This article reviews current developments in the synthesis, classification, characterization, properties, and applications of bimetallic nanoparticles loaded in microgels. The applications of bimetallic nanoparticles loaded in microgels in the environment, biomedicine, sensing, and catalysis have been covered in a tutorial approach.
https://www.sciencedirect.com/science/article/pii/S0167732223001496

16. **Arif, M.** (2023). **New synthesized ligands for detection of heavy metal ions.** *Journal of the Indian Chemical Society, 100*(3). doi: 10.1016/j.jics.2023.100931. **Muhammad Arif (Chemistry/SSC) Date of Publication: March 2023 HJRS: Y (Null)**

Some new chemo-sensors (4,4'-((1E,1'E)-(2,2'-dichloro-[1,1'-biphenyl]-4,4'-diyl)bis(diazene-2,1-diyl))bis(3,5-dihydroxybenzoic acid), 4-((E)-(4-(N-(4-((E)-(4-carboxy-2,6-dihydroxyphenyl)diazenyl)phenyl)sulfamoyl)phenyl)diazenyl)-3,5-dihydroxybenzoic acid, 4-((E)-(4-((4-((E)-(4-carboxy-2,6-dihydroxyphenyl)diazenyl)-2-sulfophenyl)amino)phenyl)diazenyl)-3,5-dihydroxybenzoic acid) were synthesized. These synthesized sensors were then characterized by FTIR, TLC, UV–Visible spectrophotometry, and NMR techniques. The sensors showed the best results for detection of all type of heavy metal ions simply by changing the colour of metal ion solution and by shifting in the λ_{max} values of sensors due to interactions.
https://www.sciencedirect.com/science/article/pii/S0019452223000547

17. **Arif, M.** (2023). **Catalytic degradation of azo dyes by bimetallic nanoparticles loaded in smart polymer microgels.** *RSC Advances, 13*(5), 3008-3019. doi: 10.1039/d2ra07932a. **Muhammad Arif (Chemistry/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

The contamination of water by azo dyes is increasing rapidly due to their waste use in textile industries. These dyes are very toxic for living things. Therefore, it is very important to remove these dyes from water. Various materials are reported for this purpose. Here, the most effective system of bimetallic nanoparticles in smart polymer microgels was prepared. The microgel system of *N*-isopropylmethacrylamide (NMA) (monomer) and methacrylic acid (MAa) (comonomer) was synthesized by a free radical precipitation polymerization method and then bimetallic (Ag/Ni) nanoparticles were encapsulated into the P(NMA-MAa) microgels by *in situ* reduction of both silver and nickel salts by NaBH₄ (reductant) after insertion of both (Ag⁺/Ni²⁺) ions. The P(NMA-MAa) microgels and Ag/Ni-P(NMA-MAa) hybrid microgels were characterized with FTIR, UV-vis, TGA, XRD, DLS, EDX, and STEM. The pH and temperature responsive behavior of Ag/Ni-P(NMA-MAa) was also evaluated. The catalytic efficiency of Ag/Ni-P(NMA-MAa) was assessed for degradation of methyl orange (MOr), congo red (CRe), eriochrome black T (EBlT) and methyl red (MRe) dyes under various conditions in aqueous medium. The apparent rate constant (k_0) value for MOr, CRe, EBlT and MRe was found to be 0.925 min⁻¹, 0.486 min⁻¹, 0.540 min⁻¹ and 0.525 min⁻¹ respectively. The Ag/Ni-P(NMA-MAa) was found to be an excellent recyclable catalyst.
https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07932a

18. **Arif, M. Fatima, U., Rauf, A.,** Farooqi, Z. H., **Javed, M., Faizan, M.,** & Zaman, S. (2023). **A New 2D Metal-Organic Framework for Photocatalytic Degradation of Organic Dyes in Water.** *Catalysts, 13*(2). doi: 10.3390/catal13020231. **Muhammad Arif, Urooj Fatima, Abdul Rauf, Mohsin Javed, Muhammad Faizan (Chemistry/SSC) Date of Publication: February 2023 HJRS: W (Bronze)**

Two-dimensional (2D) metal-organic frameworks (MOFs) are fascinating photocatalytic materials because of their unique physical and catalytic properties. Herein, we report a new (E)-4-(3-carboxyacrylamido) benzoic acid [ABA–MA] ligand synthesized under facile conditions. This ABA–MA ligand is further utilized to synthesize a copper-based 2D MOF via the solvothermal process. The resulting 2D MOF is characterized for morphology and electronic structural analysis using advanced techniques, such as proton nuclear magnetic resonance, Fourier-transform infrared spectroscopy, ultraviolet-visible spectroscopy, and scanning electron microscopy. Furthermore, 2D MOF is employed as a photocatalyst for degrading organic dyes, demonstrating the degradation/reduction of methylene blue (MeBl) dye with excellent catalytic/photodegradation activity in the absence of any photosensitizer or cocatalyst. The apparent rate constant (k_{ap}) values for the catalytic degradation/reduction of MeBl on the Cu(II)–[ABA-MA] MOF are reported to be 0.0093 min⁻¹, 0.0187 min⁻¹, and 0.2539 min⁻¹ under different conditions of sunlight and NaBH4. The kinetics and stability evaluations reveal the noteworthy photocatalytic potential of the Cu(II)–[ABA–MA] MOF for wastewater treatment. This work offers new insights into the fabrication of new MOFs for highly versatile photocatalytic applications.
https://www.mdpi.com/2073-4344/13/2/231

19. **Butt, M. H.,** Ain, Q. U., Yawer, M. A., Lakhani, A., & Hashmi, M. A. (2023). **Carboxyl substituted Bambus[6]uril as a novel macrocyclic receptor for cyanide anion: A DFT study.** *Computational and Theoretical Chemistry, 1222*. doi: 10.1016/j.comptc.2023.114081. **Muhammad Hamid Butt (Chemistry/SSC) Date of Publication: April 2023 HJRS: X (Clay)**

Using density functional theory calculations, the most probable conformation of CN⁻ based carboxyl substituted bambus[6]uril complex was investigated. The molecular complex shows the C3 symmetry in which the cyanide anion resides in the cavity of the macrocyclic complex. The parent macrocycle reduces the diameter of its inner cavity to adjust the anionic specie. Furthermore, we report the AIM and NCI analysis to interpret various non-covalent interactions between the CN⁻ and carboxyl-substituted **BU**[6] macrocycle. The results of NCI analysis show certain types of noncovalent interactions between the receptor and anion, which are responsible for the stability of the complex. Four N…….H-type interactions between the anion and hydrogen atoms of the methine

group in the macrocycle exhibit H-bonds, which are analyzed by QTAIM. The interaction energy of the optimized complex was –81.25 kcal/mol.
https://www.sciencedirect.com/science/article/pii/S2210271X23000634

20. Dar, A., Ahmad, M. N., Samin, G., Jahangir, M. M., Rehman, R., Anwar, J., . . . Jaber, M. M. (2023). Separation of Amino Acids, Dyes, and Pigments Using Novel Pressurized Circular TLC Assembly for Secure Medical Imaging Applications. *International Journal of Analytical Chemistry, 2023*. doi: 10.1155/2023/9914633. Jamil Anwar (Chemistry/SSC) Date of Publication: April 2023 HJRS: X (Null)

A novel pressurized flow system for circular thin-layer chromatography (PC-TLC) has been successfully established and employed for the separation of amino acids, dyes, and pigments for safe medical imaging applications. In this system, the mobile phase is applied to a regular TLC plate through the tube and needle of an intravenous infusion set. The needle was fused in a hole underneath the center of the plate, while the second side end of the tube was connected to a microburette containing the solvent. This new assembly proved itself better in terms of separation time (within 5 minutes) and controlled flow of the solvent and horizontal movement of analyte components over chromatograms with better separation and R_f values (glutamine: 0.26, valine: 0.44, phenylalanine: 0.60, chlorophyll a: 0.52, chlorophyll b: 0.43, xanthophyll: 0.18, carotenoid: 0.97, and pheophytin: 0.60) when a number of samples of amino acids, dyes, and pigments were separated by the developed apparatus and the conventional TLC procedure. The developed method was found distinctly rapid, precise, and eco-friendly (less solvent consuming) as compared to traditional ascending TLC.
https://www.hindawi.com/journals/ijac/2023/9914633/

21. Jayakumar, V., Mohideen, A. B. K., Saeed, M. H., Alsulami, H., Hussain, A., & Saeed, M. (2023). Development of Complex Linear Diophantine Fuzzy Soft Set in Determining a Suitable Agri-Drone for Spraying Fertilizers and Pesticides. *IEEE Access, 11*, 9031-9041. doi: 10.1109/ACCESS.2023.3239675. Muhammad Haris Saeed (Chemistry/SSC) Muhammad Saeed (Mathematic/SSC) Date of Publication: January 2023 HJRS: W (Silver)

The global agricultural sector is responsible for fulfilling the food requirements of the increasing population around the globe, alongside contributing to 28% of global employment. Drones are used for effective and efficient spray of fertilizers to reduce labor and the associated costs. Various drones are available in the market, each with pros and cons. The main aim of this paper is to select a suitable drone for spraying fertilizers in agri-land among the various attributes using a novel Complex Linear Diophantine Fuzzy Soft set algorithm. This novel concept is first introduced alongside its fundamental operations like $\oplus$ and $\otimes$. This hybrid structure has the properties of the Complex Linear Diophantine Fuzzy set and soft set. A decision-support system based on Complex Linear Diophantine Fuzzy Soft set was designed and applied on the multi-attribute decision making problem of selecting the best drone for spraying fertilizer on crops.
https://ieeexplore.ieee.org/abstract/document/10025728

22. Hassan, A. U., Mohyuddin, A., Güleryüz, C., Nadeem, S., Nkungli, N. K., Hassan, S. U., & Javed, M. (2023). Novel pull–push organic switches with D–π–A structural designs: computational design of star shape organic materials. *Structural Chemistry, 34*(2), 399-412. doi: 10.1007/s11224-022-01983-3. Ayesha Mohyuddin, Sohail Nadeem, Sadaf U. Hassan, Mohsin Javed (Chemistry/SSC) Date of Publication: April 2023 HJRS: X (Null)

The structural alteration with π-linkers was used to design a donor–acceptor type series of 2,2'-(pyrimidine-4,6-diyl)bis(2,3- dihydro-1,3-benzothiazole) (PB)-based chromophores (AH1–AH7) to exploit the adjustments in their optical characteristics. To investigate the electronic geometries, absorption wavelengths, charge transfer processes, and the efect of structural alterations on nonlinear optical (NLO) characteristics, density functional theory (DFT) simulations have been used. During the UV–visible study, several long-range and range separated functionals like B3LYP, CAM-B3LYP, B97XD, and APFD with the 6-311G+(d,p) basis set were used to select the efcient level at DFT. As a response, UV–vis data indicated an intriguing consistency at the B3LYP level across experimental and TD-DFT-based values of PB. All the designed molecules had a smaller energy band gap (0.84–3.67 eV) and wide absorption spectra inside the visible region. Natural bond orbital (NBO) results indicated a signifcant push–pull operation, with donors and π-conjugates exhibiting positive values and most acceptors exhibiting the minimum values. Electronic transformations between electron donors to acceptor moiety, Trifuoromethyl (TFM) via π-conjugated linkers were shown to have a superior linear <α>and nonlinear (βtotal) NLO values of 306–474 and 40–230 Debye-Angstrom−1 respectively. When chromophores with one phenyl π-linker were compared to those with the two π-linkers, the chromophores with the higher π-linker showed increased hyperpolarizability. The highest second-order hyperpolarizability (β) was found to be 230.11 DebyeAngstrom−1 which was about fve times higher than urea (standard). This research has shown that by manipulating the kind of π-spacers, novel metal-free NLO compounds may be created, which might be used for high-tech NLO purposes.
https://link.springer.com/article/10.1007/s11224-022-01983-3

23. **Iftikhar, R., Mazhar, A., Iqbal, M. S., Khan, F. Z., Askary, S. H., & Sibtain, H.** (2023). **Ring forming transformations of ynamides via cycloaddition.** *RSC Advances, 13*(16), 10715-10756. doi: 10.1039/d3ra00139c. **Syed Hassan Askary, Hifza Sibtain (Chemistry/SSC) Date of Publication: April 2023 HJRS: W (Bronze)**

Ynamides are *N*-alkyne compounds bearing an electron withdrawing group at the nitrogen atom. They offer unique pathways for the construction of versatile building blocks owing to their exceptional balance between reactivity and stability. Recently several studies have been reported that explore and illustrate the synthetic potential of ynamides and ynamide-derived advanced intermediates in cycloadditions with different reaction partners to yield heterocyclic cycloadducts of synthetic and pharmaceutical value. Cycloaddition reactions of ynamides are the facile and preferable routes for the construction of structural motifs having striking importance in synthetic, medicinal chemistry, and advanced materials. In this systematic review, we highlighted the recently reported novel transformations and synthetic applications that involved the cycloaddition reaction of ynamides. The scope along with the limitations of the transformations are discussed in detail.

https://pubs.rsc.org/en/content/articlehtml/2023/ra/d3ra00139c

24. **Javed, M., Iqbal, S., Qamar, M. A., Shariq, M., Ahmed, I. A., BaQais, A., . . . Shakir Khan, M. (2023). Fabrication of Effective Co-SnO2/SGCN Photocatalysts for the Removal of Organic Pollutants and Pathogen Inactivation.** *Crystals, 13*(2). doi: 10.3390/cryst13020163. **Mohsin Javed, Sana Iqbal, Muhammad Azam Qamar (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Honorable Mention)**

Substantial improvement is needed in efficient and affordable decolorization and disinfection methods to solve the issues caused by dyes and harmful bacteria in water and wastewater. This work involves the photocatalytic degradation of methylene blue (MB) as well as gram-negative and gram-positive bacteria by cobalt-doped tin oxide (Co-SnO$_2$) nanoparticles (NPs) and Co-SnO$_2$/SGCN (sulfur-doped graphitic carbon nitride) nanocomposites (NCs) under sunlight. The coprecipitation approach was used to synthesize the photocatalysts. Maximum methylene blue (MB) photocatalytic degradation was seen with the 7% Co-SnO$_2$ NPs compared to other (1, 3, 5, and 9 wt.%) Co-SnO$_2$ NPs. The 7% Co-SnO$_2$ NPs were then homogenized with different amounts (10, 30, 50, and 70 weight %) of sulfur-doped graphitic carbon nitride (SGCN) to develop Co-SnO$_2$/SGCN heterostructures with the most significant degree of MB degradation. The synthesized samples were identified by modern characterization methods such as FT-IR, SEM, EDX, UV-visible, and XRD spectroscopies. The Co-SnO$_2$/50% SGCN composites showed a significant increase in MB degradation and degraded 96% of MB after 150 min of sunlight irradiation. Both gram-negative (*E. coli*) and gram-positive (*B. subtiles*) bacterial strains were subjected to antibacterial activity. All samples were shown to have vigorous antibacterial activity against gram-positive and gram-negative bacteria, but the Co-SnO$_2$/50% SGCN composites exhibited the maximum bactericidal action. Thus, the proposed NC is an efficient organic/inorganic photocatalyst that is recyclable and stable without lowering efficiency. Hence, Co-SnO$_2$/50% SGCNNC has the potential to be employed in water treatment as a dual-functional material that simultaneously removes organic pollutants and eradicates bacteria.

https://www.mdpi.com/2073-4352/13/2/163

25. **Kosar, N., Bibi, M., Ullah, F., Gilani, M. A., Akhter, M. S., Ayub, K., & Mahmood, T. (2023). Reversible H2 Storage Capacity of Ni Functionalized Carbyne (C10) Complex.** *Journal of Inorganic and Organometallic Polymers and Materials, 33*(2), 515-528. doi: 10.1007/s10904-022-02516-5. **Naveen Kosar (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Honorable Mention)**

In this study, we explored the reversible hydrogen storage capacity of Ni functionalized C10 carbyne complex through density functional theory (DFT) and molecular dynamic (MD) calculations. ωB97X-D3/def2-TZVP and DLPNO-CCSD(T)/def2- TZVPP methods are used for the estimation of adsorption energies. NiC10 complex is observed to be more sensitive toward hydrogen adsorption compared to isolated C10 carbyne. The nH2-NiC10 complexes are stable when n≤5, and adsorption energies are in the range of −0.89 to −0.22 eV/H2 molecule while the hydrogen storage capacity is about 1.11 to 5.33 wt% for hydrogen molecule. For desorption of H2, molecular dynamic calculations are performed at ωB97X-D3 with def2-TZVP O using RCA ABMD package in which the complexes showed stability to desorption up to 2000 steps. This study illustrates the potential of nickel-doped carbyne C10 complex for the storage of hydrogen and applications in fuel cells.

https://link.springer.com/article/10.1007/s10904-022-02516-5

26. **Kosar, N., Wajid, S., Ayub, K., Gilani, M. A., & Mahmood, T. (2023). First, second and third order NLO response of alkaline earth metals doped C6O6Li6 organometallic complexes.** *Chemical Physics, 570*. doi: 10.1016/j.chemphys.2023.111894. **Naveen Kosar (Chemistry/SSC) Date of Publication: June 2023 HJRS: X (Clay)**

The geometric, electronic, linear and nonlinear (NLO) properties of pure $C_6O_6Li_6$ and alkaline earth metals (AEM) doped $C_6O_6Li_6$ organometallics are studied through quantum chemical methods. Interaction (E_{int}) and vertical ionization energies illustrate the thermodynamic and electronic stabilities of considered AEM@$C_6O_6Li_6$ organometallic complexes, respectively. The highest interaction energy value is noticed for Ca@$C_6O_6Li_6$ complex (−22.78 kcal/mol). After doping of alkaline earth metals, HOMO-LUMO energy gap (H-L

Egap) is remarkably reduced. The variation in H-L Egap indicates the conductive properties of these complexes which occur due to transfer of electrons from the alkaline earth metals to the $C_6O_6Li_6$ surface or *vice versa*. The electronic density shifting is also supported by natural bond orbital (NBO) charge and molecular orbitals analyses. UV–VIS analysis is used to confirm the electronic excitations. These organometallics show deep ultra-violet transparency below 200 nm which justifies their application in future laser devices. A noticeable NLO response is observed for these organometallics which is confirmed from the static first order hyperpolarizability (up to 1.90×10^4 au) and second order hyperpolarizability (up to 7.11×10^6 au) along with higher refractive index (up to 1.68×10^{-12} au) at 532 nm. The hyperpolarizability values are further enhanced at dynamic frequencies and these are increased up to 5.82×10^{10} au. These results illustrate the use of these organometallics in optical technologies for achieving better dc-Kerr effect and second harmonic generation effects.

https://www.sciencedirect.com/science/article/pii/S0301010423000769

27. **Kosar, N.,** Wajid, S., Ayub, K., & Mahmood, T. (2023). **Excellent Static and dynamic hyperpolarizabilities of TM@C6O6Li6 (TM = Sc, Ti, V, Cr and Mn) complexes to prove their NLO applications.** *Optik, 276*. **doi: 10.1016/j.ijleo.2023.170660.** Naveen Kosar (Chemistry/SSC) Date of Publication: April 2023 HJRS: X (Honorable Mention)

Static and dynamic hyperpolarizabilities of transition metals doped $C_6O_6Li_6$ (TM@$C_6O_6Li_6$, TM = Sc, Ti, V, Cr and Mn) organometallic complexes are explored for their nonlinear optical response. Interaction energies (E_{int}) of all TM@$C_6O_6Li_6$ reveal that these complexes are thermodynamically stable. The highest interaction energy value is noticed for Sc@$C_6O_6Li_6$ complex (-67.65 kcal mol^{-1}). After doping of transition metals on $C_6O_6Li_6$, HOMO-LUMO energy gap of respective complexes is significantly reduced and lies in the range of 1.50–2.08 eV, which notified the conducting behavior of complexes. The natural bond orbital charge (NBO) and molecular orbitals densities analyses are used to estimate the charge transfer in complexes and electronic densities of orbitals, respectively. UV-Vis analysis reflects that these complexes can be used in deep ultra-violet laser devices due to their transparency below 200 nm. NLO response is studied at both static and selected dynamic frequencies (532 nm and 1064 nm). The highest static first order hyperpolarizability value ($\beta_o = 2.05 \times 10^4$ au), third order hyperpolarizability ($\gamma_{tot} = 1.99 \times 10^7$ au) with higher refractive index ($n_2 = 1.86 \times 10^{-6}$ au) are observed for Cr@$C_6O_6Li_6$ complex. The nonlinear optical properties including dc-Kerr effect and second harmonic generation effects are further enhanced at dynamic frequencies and their values are increased up to 1.26×10^{12} au. These results illustrate the use of these organometallics in optical technologies for achieving better dc-Kerr effect and second harmonic generation effects.

https://www.sciencedirect.com/science/article/pii/S0030402623001560

28. **Kosar, N.,** Zari, L., Ayub, K., Gilani, M. A., & Mahmood, T. (2023). **Giant NLO response and ultraviolet transparency of superalakalis decorated C6O6Li6 complexes; a DFT perspective.** *Physica Scripta, 98*(6). **doi: 10.1088/1402-4896/accf4b.** Naveen Kosar (Chemistry/SSC) Date of Publication: June 2023 HJRS: W (Honorable Mention)

Materials having nonlinear optical (NLO) properties are the demand of optics and optoelectronics fields because of their widespread applications. Keeping in view the applications of NLO materials, some new superalkalis doped $C_6O_6Li_6$ complexes are introduced in this study having remarkable NLO response. Thermodynamic stability of nonlinear optical materials (NLO) is prime requirement of experimentalists for practical applications. All the considered complexes have high thermodynamic stability. Furthermore, these superalkali doped complexes reveal fabulous electronic properties. Superalkalis shift their outer shell electrons towards the $C_6O_6Li_6$ nanocluster, which act as diffuse excess electrons. The HOMO-LUMO gaps (H-L E_{gap}) of superalkali doped complexes are effectively reduced due to shifting of electrons that reveals their conducting properties. NBO charge analysis confirmed electron charge transfer from superalkalis to $C_6O_6Li_6$ surface. Linear and NLO properties of these complexes are estimated from first order polarizability (α_o) and hyperpolarizability (β_o) parameters. Among all complexes, $C_6O_6Li_6.K_3O$ has the highest first hyperpolarizability ($\beta_o = 6.02 \times 10^5$ au). TD-DFT analysis confirmed the ultraviolet transparency of doped complexes. Two level model is used to rationalize the trend of first hyperpolarizability and the internal factors responsible for the enhancement of NLO response.

https://iopscience.iop.org/article/10.1088/1402-4896/accf4b/meta

29. **Kurniawan, T. A.,** Haider, A., Ahmad, H. M., Mohyuddin, A., Umer Aslam, H. M., Nadeem, S., . . . Chew, K. W. (2023). **Source, occurrence, distribution, fate, and implications of microplastic pollutants in freshwater on environment: A critical review and way forward.** *Chemosphere, 325*. **doi: 10.1016/j.chemosphere.2023.138367.** Ahtisham Haider, Hafiz Muhammad Ahmad, Ayesha Mohyuddin, Hafiz Muhammad Umer Aslam, Sohail Nadeem, Mohsin Javed (Chemistry/SSC) Date of Publication: June 2023 HJRS: W (Gold)

The generation of microplastics (MPs) has increased recently and become an emerging issue globally. Due to their long-term durability and capability of traveling between different habitats in air, water, and soil, MPs presence in freshwater ecosystem threatens the environment with respect to its quality, biotic life, and

sustainability. Although many previous works have been undertaken on the MPs pollution in the marine system recently, none of the study has covered the scope of MPs pollution in the freshwater. To consolidate scattered knowledge in the literature body into one place, this work identifies the sources, fate, occurrence, transport pathways, and distribution of MPs pollution in the aquatic system with respect to their impacts on biotic life, degradation, and detection techniques. This article also discusses the environmental implications of MPs pollution in the freshwater ecosystems. Certain techniques for identifying MPs and their limitations in applications are presented. Through a literature survey of over 276 published articles (2000–2023), this study presents an overview of solutions to the MP pollution, while identifying research gaps in the body of knowledge for further work. It is conclusive from this review that the MPs exist in the freshwater due to an improper littering of plastic waste and its degradation into smaller particles. Approximately 15–51 trillion MP particles have accumulated in the oceans with their weight ranging between 93,000 and 236,000 metric ton (Mt), while about 19–23 Mt of plastic waste was released into rivers in 2016, which was projected to increase up to 53 Mt by 2030. A subsequent degradation of MPs in the aquatic environment results in the generation of NPs with size ranging from 1 to 1000 nm. It is expected that this work facilitates stakeholders to understand the multi-aspects of MPs pollution in the freshwater and recommends policy actions to implement sustainable solutions to this environmental problem.

https://www.sciencedirect.com/science/article/pii/S0045653523006343

30. **Kurniawan, T. A., Lo, W. H., Liang, X., Goh, H. H., Othman, M. H. D., Mohyuddin, A., . . . Chew, K. W. (2023). Heavy Metal Removal from Aqueous Solutions Using Biomaterials and/or Functional Composites: Recent Advances and the Way Forward in Wastewater Treatment Using Digitalization.** *Journal of Composites Science, 7*(2). doi: 10.3390/jcs7020084. **Ayesha Mohyuddin (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Null)**

Due to its low cost, over the past decades, biosorption technology has been extensively carried out to treat heavy metal-laden wastewater using biosorbents. Recent studies on heavy metal biosorption mechanisms and the simulation of mathematical modeling on the biosorption process have enhanced scientific understanding about the binding between target metal cations and the functional group on different surfaces of biomasses as a biosorbent. However, so far, none have provided an overview of mechanistic studies on heavy metal removal from aqueous solutions using inexpensive biosorbents. To close this knowledge gap, this article discusses the applicability of the surface complexation (SC) model for biosorption of a target pollutant. Insightful ideas and directions of future research in wastewater treatment using digital technologies are also presented. It was conclusive from a literature survey of 115 articles (1987–2023) that Aspergillus niger, Penicillium chrysogenum, and Rhizopus nigricans represent biomaterials that have substantial adsorption capacities, up to 200 mg of Au(I)/g, 142 mg of Th/g, and 166 mg of Pb(II)/g, respectively. The metal-binding mechanisms involved include ion exchange, surface complexation, and micro-precipitation. Ion exchange is the only mechanisms that play key roles in sequestering heavy metal using fungal cells with chitin and chitosan. X-ray energy dispersion (XED) and scanning electron microscopy (SEM) analysis were used to evaluate biosorption mechanisms of the inorganic pollutants using physico-chemical characterization on the cell surfaces of the biomass. As metal removal by the biosorbent is affected by its surface properties, surface complexation also occurs. The affinity of the surface complexation depends on the type of functional groups such as phosphate, carboxyl, and amine.

https://www.mdpi.com/2504-477X/7/2/84

31. **Mustafa, G. M., Maqbool, M., Ullah, Z., Noor, N. A., Muzamil, M., Mohammed Alanazi, Y., & Mumtaz, S. (2023). Computational investigations of optoelectronic properties of K2ScAuX6 (X = Cl, Br) double perovskites for energy harvesting devices.** *Chemical Physics, 571.* doi: 10.1016/j.chemphys.2023.111920. **Muhammad Maqbool (Chemistry/SSC) Date of Publication: July 2023 HJRS: X (Clay)**

Here we report a theoretical analysis of various technologically important physical properties of double perovskites K_2ScAuX_6 (X = Cl, Br) including thansport, optoelecronic, and strucutral. The computation of tolerance factor and estimation of entahly of formation remained key indicators to ensure the srucutal and thermodynamic stability of these compositions. The substitution of Br at Cl site increased the lattice parameter and reduced the bulk modulus. The computation of elastic constants-based modulus of elasticity revealed their ductile nature. The analysis of electronic band structure unveiled their indirect bandgap nature. Polarizability of material is accessed by computing the dielectric constant, scattering by extinction coefficient, absorption by refractive index, in addition to electrical and thermal conductivity and the Seebeck coefficient, highlighted their suitability for advanced technologically important applications in optoelectronic and thermoelectric industry.

https://www.sciencedirect.com/science/article/abs/pii/S0301010423001027

32. **Nauman Zahid, M., Asif, M., Sajid, H., Kosar, N., Akbar Shahid, M., Allangawi, A., . . . Mahmood, T. (2023). Therapeutic efficiency of B3O3 quantum dot as a targeted drug delivery system toward Foscarnet anti-HIV drug.** *Computational and Theoretical Chemistry, 1224.* doi: 10.1016/j.comptc.2023.114107. **Naveen Kosar (Chemistry/SSC) Date of Publication: June 2023 HJRS: X (Clay)**

In this study, B_3O_3 quantum dot is investigated via density functional theory (DFT) calculations as an antiviral drug carrier toward Foscarnet. Geometric analysis is carried out to find stable orientations of interaction between Foscarnet drug and the B_3O_3 quantum dot. As a result, three stable orientations are proposed. The E_{int} of the most stable orientation is −32.63 kcal/mol whereas the BSSE corrected energy is −26.98 kcal/mol. Noncovalent interaction index (NCI) and quantum theory of atoms in molecules (QTAIM) analyses are employed to understand the nature and the type of interactions taking place between drug and the B_3O_3 quantum dot. Their results indicated the presence of hydrogen bonding in the most stable complex (orientation A). The HOMO-LUMO analysis is performed to study the electronic properties of the interacting moieties. The lowest E_{gap} is observed in case of orientation A. The value of dipole moments and chemical descriptors showed the significant activity of B_3O_3 quantum dot toward Foscarnet drug molecule. The overall findings from this study suggest the B_3O_3 quantum dot as a potential drug carrier system for antiviral drugs.
https://www.sciencedirect.com/science/article/pii/S2210271X23000890

33. **Ramzan, M., Javed, M., Iqbal, S., Alhujaily, A., Mahmood, Q., Aroosh, K., . . . Elkaeed, E. B. (2023). Designing Highly Active S-g-C3N4/Te@NiS Ternary Nanocomposites for Antimicrobial Performance, Degradation of Organic Pollutants, and Their Kinetic Study.** *Inorganics, 11*(4). doi: 10.3390/inorganics11040156. **Maryam Ramzan, Mohsin Javed, Komal Aroosh** (Chemistry/SSC) Date of Publication: April 2023 HJRS: X (Clay)
The current research is about the synthesis of pure nickel sulfide, a series of Te (0, 0.5, 1, 1.5, 2, and 3 wt.%)-doped NiS (Te@NiS) nanoparticles (NPs), and a series of S-g-C_3N_4 (10, 30, 50, 70, and 80 wt.%)/Te@NiS nanocomposites (NCs), fabricated through a hydrothermal route. XRD and FTIR spectroscopic techniques demonstrated the successful synthesis of NPs and NCs. SEM-EDX images confirmed the flakelike structure and elemental constituents of the fabricated materials. Tauc plots were drawn, to calculate the band gaps of the synthesized samples. Te doping resulted in a significant reduction in the band gap of the NiS NPs. The photocatalytic efficiency of the NPs and NCs was investigated against MB, under sunlight. The results obtained for the photocatalytic activity, showed that 1%Te@NiS nanoparticles have an excellent dye degradation capacity in sunlight. This was made even better by making a series of SGCN/1% Te@NiS nanocomposites with different amounts of S-g-C_3N_4. When compared to NiS, Te@NiS, SGCN, and 70%SGCN/1%Te@NiS, the 70%SGCN/1%Te@NiS NCs have excellent antifungal ability. The higher impact of SGCN/Te@NiS, may be due to its enhanced ability to disperse and interact with the membranes and intracellular proteins of fungi. The 70%SGCN/1%Te@NiS NCs showed excellent antibacterial and photocatalytic efficiency. Thus, the 70%SGCN/1%Te@NiS NCs might prove fruitful in antibacterial and photocatalytic applications.
https://www.mdpi.com/2304-6740/11/4/156

34. **Saleem, Q., Shahid, S., Javed, M., Iqbal, S., Rahim, A., Mansoor, S., . . . Elkaeed, E. B. (2023). Synchronized electrochemical detection of hydroquinone and catechol in real water samples using a Co@SnO2-polyaniline composite.** *RSC Advances,* 13(15), 10017-10028. doi: 10.1039/d3ra00668a. **Qasar Saleem, Sammia Shahid, Mohsin Javed, Sana Mansoor** (Chemistry/SSC) Date of Publication: March 2023 HJRS: W (Bronze)
The conductive composite Co@SnO_2–PANI was successfully synthesized using hydrothermal/oxidative synthesis. Using differential pulse voltammetry, a glassy carbon electrode modified with a CoSnO_2–PANI (polyaniline)-based electrochemical biosensor has been created for the quick detection of two phenolics, hydroquinone (Hq) and catechol (Cat). Differential pulse voltammetry (DPV) measurements revealed two well-resolved, strong peaks for GCE@Co–SnO_2–PANI, which corresponded to the oxidation of Hq and Cat at 275.87 mV and +373.76 mV, respectively. The oxidation peaks of Hq and Cat mixtures were defined and separated at a pH of 8.5. High conductivity and remarkable selectivity reproducibility was tested by electrochemical impedance spectroscopy, chronoamperometry, and cyclic voltammetry techniques in standard solution and real water samples. The proposed biosensor displayed a low detection limit of 4.94 nM (Hq) and 1.5786 nM (Cat), as well as a large linear range stretching from 2×10^{-2} M to 2×10^{-1} M. The real-sample testing showed a good recovery for the immediate detection of Hq (96.4% recovery) and Cat (98.8% recovery) using the investigated sensing apparatus. The synthesized biosensor was characterized by XRD, FTIR, energy dispersive spectroscopy and scanning electron microscopy.
https://pubs.rsc.org/en/content/articlehtml/2021/9b/d3ra00668a

35. **Shehzadi, K., Tariq, A., Zubair, M., Mahmood, T., Kosar, N., Karakaya, I., . . . Rizwan, K. (2023). Synthesis of pyridine and furan based arylated ketones through palladium catalyst with DFT study of their static and frequency dependent NLO response.** *Inorganic Chemistry Communications, 151*. doi: 10.1016/j.inoche.2023.110566. **Naveen Kosar (Chemistry/SSC) Date of Publication: May 2023 HJRS: X (Clay)**
A series of pyridine and furan based ketones have been synthesized by Suzuki coupling of 2,6-pyridinedicarbonyl dichloride, furan-2-carbonyl chloride with various aryl boronic acids in existence of catalyst Pd(PPh$_3$)$_4$ and cesium carbonate in presence of toluene at 100 °C. The compounds were synthesized in good to high yields. Various functional moities were well tolerated under developed conditions of reaction. DFT studies are used to illustrate insight of geometrical, electronic, reactivity descriptor parameters optical & nonlinear optical properties and nonlinear refractive index of all synthesized compounds (3a-3g and 4a-4h). 3c is kinetically less

stable and moderately reactive among all these compounds. A highest β_o (1576.39 au) and nonlinear refractive index values are obtained for compound 3a where the strong electron withdrawing group (chloro-acyl group) is present at ortho position of the pyridine ring. According to the push pull mechanism, electronic displacement between electron donating and withdrawing groups through extended conjugation is responsible for change in nonlinear optical properties of the compound. Computational studies provide detail information about the synthesized compounds and their applicability in the field of organic reactivity, electronics, and optoelectronics for future work.

https://www.sciencedirect.com/science/article/pii/S1387700323001788

36. **Saleem, Q., Shahid, S.,** Rahim, A., Bajaber, M. A., Mansoor, S., **Javed, M., ... & Farouk, A. E. (2023). A highly explicit electrochemical biosensor for catechol detection in real samples based on copper-polypyrrole.** *RSC advances, 13*(20), 13443-13455. DOI: 10.1039/D2RA07847C. **Qasar Saleem, Sammia Shahid, Mohsin Javed (Chemistry/SSC) Sana Mansoor (ORIC) Date of Publication: May 2023 HJRS: W (Bronze)**

Catechol is a pollutant that can lead to serious health issues. Identification in aquatic environments is difficult. A highly specific, selective, and sensitive electrochemical biosensor based on a copper-polypyrrole composite and a glassy carbon electrode has been created for catechol detection. The novelty of this newly developed biosensor was tested using electrochemical techniques. The charge and mass transfer functions and partially reversible oxidation kinetics of catechol on the redesigned electrode surface were examined using electrochemical impedance spectroscopy and cyclic voltammetry scan rates. Using cyclic voltammetry, chronoamperometry, and differential pulse voltammetry, the characteristics of sensitivity (8.5699 μA cm^{-2}), LOD (1.52×10^{-7} μM), LOQ (3.52×10^{-5} μM), linear range (0.02–2500 μM), specificity, interference, and real sample detection were investigated. The morphological, structural, and bonding characteristics were investigated using XRD, Raman, FTIR, and SEM. Using an oxidation–reduction technique, a suitable biosensor material was produced. In the presence of interfering compounds, it was shown that it was selective for catechol, like an enzyme.

https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07847c

37. **Hassan, S. S., Javed, M.,** Akhtar, M. N., **Qamar, M. A.,** Ahmed, N., Saeed, M., **... & Asif, S. (2023). The photocatalytic and antibacterial potential of highly efficient S-scheme binary S-gC3N4@ Co-zinc ferrite nanocomposite.** *Optical Materials, 142*, https://doi.org/10.1016/j.optmat.2023.114046. **Syeda Saba Hassan, Mohsin Javed, Muhammad Azam Qamar, Komal Aoosh (Chemistry/SSC) Saima Asif (KRSS) Date of Publication: August 2023 HJRS: W (Honorable Mention)**

Dye contamination of water resources is a global issue threatening aquatic life and humans due to its persistence, toxicity, and carcinogenic potential; it must be resolved immediately. This paper reports the hydrothermally synthesized S-gC$_3$N$_4$/cobalt-zinc ferrite (S-GCN/Co-ZF) binary s-scheme heterojunction and its remarkable characteristics, including the lowest rate of charge carrier recombination and the highest absorption of solar energy with excellent photocatalytic and antibacterial potential. The photocatalytic performance of Co-ZF nanoparticles (0.5–12.5 wt%) was tested in the first phase to determine the ideal Co-doping into the ZF. The highest methylene blue photocatalytic degradation was shown by the as-synthesized 6.5% Co-ZF nanoparticles, which were then disseminated on sulphur-doped graphitic carbon nitride (S-GCN) nanosheets as an active constituent to create a series of 25–70 wt % S-GCN@6.5% Co-ZF nanocomposites in the subsequent stage. The optimized composite (55% S-GCN@6.5% CO-ZF) performed excellent photocatalytic performance and accomplished about 93% degradation of methylene blue within 120 min. The antibacterial potential of ZF, S-GCN, 6.5% Co-ZF, 55% S-GCN@6.5 %Co-ZF was examined against *Escherichia coli* and *Bacillus subtilis* bacteria. Among these samples, the 55% S-GCN@6.5%CO-ZF nanocomposite demonstrates excellent antibacterial potential. All the synthesized photocatalysts were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), energy-disperse X-ray (EDX), Fourier transform infrared (FTIR) and ultraviolet–visible (UV–Visible) spectroscopic techniques.

https://www.sciencedirect.com/science/article/abs/pii/S0925346723006183

38. **Zahid, Z., Rauf, A., Javed, M.,** Alhujaily, A., Iqbal, S., **Amjad, A., ... & Elkaeed, E. B. (2023). Photocatalytic Reduction of Cr (VI) to Cr (III) and Photocatalytic Degradation of Methylene Blue and Antifungal Activity of Ag/TiO2 Composites Synthesized via the Template Induced Route.** *Inorganics, 11*(3), 133. https://doi.org/10.3390/inorganics11030133. **Zunaira Zahid, Abdul Rauf, Mohsin Javed, Adnan Amjad, Muhammad Arif (Chemistry/SSC) Date of Publication: March 2023 HJRS: X (Clay)**

Water treatment through photocatalysts has become an important topic regarding environmental protection. In the present study, silver and TiO$_2$ (Ag/TiO$_2$) composites for photocatalysts were effectively synthesized by adopting the template induced method. The prepared samples were characterized using XRD, FTIR spectroscopy, SEM, and EDX. The constructed samples' particle size and shape were evaluated using a SEM, and the XRD patterns showed anatase crystalline phases. Their morphologies were controllable with changing concentration of reactants and calcination temperature. The synthesized composites act as catalyst in the degradation of methylene blue (MB) and reduction of Cr(VI) to Cr(III) under solar irradiation. In both of these

activities, the best result has been shown by the 0.01 Ag/TiO$_2$ composite. Methanol is used as the hole scavenger in the reduction of Cr(VI) to Cr(III). While the pH factor is important in the photocatalytic reduction of Cr(VI) to Cr(III). According to observations, *S. macrospora and S. maydis* were each subject to 0.01 Ag/TiO$_2$ nanocomposites maximum antifungal activity, which was 38.4 mm and 34.3 mm, respectively. The outcomes demonstrate that both photocatalytic and antifungal properties are effectively displayed by the constructed material.

https://www.mdpi.com/2304-6740/11/3/133

39. **Batool, F., Kurniawan, T. A., Mohyuddin, A.,** Othman, M. H. D., Anouzla, A., Meidiana, C., ... & Chew, K. W. (2023). **Fixed-Bed Studies of Landfill Leachate Treatment Using Chitosan-Coated Carbon Composite.** *Water, 15*(12), https://doi.org/10.3390/w15122263. **Fatima Batool, Tonni Agustiono Kurniawan, Ayesha Mohyuddin (Chemistry/SSC) Date of Publication: June 2023** HJRS: W (Silver)

The feasibility of a chitosan-coated coconut-shell (CS) carbon composite for landfill leachate treatment in a fixed-bed study was investigated in terms of COD and NH$_3$-N removal. The surface of the composite was characterized using SEM, FT-IR, and XRD to assess any changes before and after column operations. To enhance its cost-effectiveness, the saturated composite was regenerated using NaOH. The results showed that the composite had significantly better removal of both COD and NH$_3$-N, as compared to CS and/or chitosan ($p \leq 0.05$; ANOVA test), respectively. The breakthrough curve obtained from the fixed-bed studies exhibited an ideal "S" shape. The breakthrough points for the adsorbents followed the order of CS at BV 76 < chitosan at 200 BV < composite at BV 305. It was also found that a low flow rate and deeper bed depth of the packed adsorbent were necessary for achieving optimal column operations. The composite achieved 96% regeneration in the first cycle. However, even with the enhanced adsorption of target pollutants by the composite through chitosan coating, the treated effluents still could not meet the required COD and NH$_3$-N effluent limits of less than 200 and 5 mg/L, respectively, as mandated by legislation. Nonetheless, the findings suggest that low-cost composites derived from unused resources can be employed as effective adsorbents for wastewater treatment.

https://www.mdpi.com/2073-4441/15/12/2263

40. **Amjad, M., Mohyuddin, A., Nadeem, S., Ulfat, W.,** Saeed, S., Asghar, N., & Ahmed, S. (2023). **Development of biodegradable vinyl acetate and acrylic acid grafted gelatin copolymer for dye adsorption.** *Polymer Bulletin,* 1-17.https://doi.org/10.1007/s00289-023-04782-w. **Muhammad Amjad, Ayesha Mohyuddin, Sohail Nadeem, Wajad Ulfat (Chemistry/SSC) Date of Publication: April 2023** HJRS: X (Clay)

A novel biodegradable copolymer and nanocomposite with nickel-doped zinc oxide were developed using grafting acrylic acid and vinyl acetate as gelatin backbone in the presence of ammonium persulfate as an initiator. The copolymer and its nanocomposite were formed through free radical polymerization. The prepared copolymer and its nanocomposite were characterized using Fourier Transform Infrared Spectroscopy (FTIR), thermogravimetric analysis (TGA), and Differential Scanning Calorimetry (DSC). The intense bands at 1750 cm^{-1}, 1375 cm^{-1}, 1250 cm^{-1}, and 1050 cm^{-1}in the FTIR spectrum of polymers confirm the grafting of monomers of the gelatin backbone. The TGA analysis indicates that the copolymers were not wholly exhausted up to 500 °C, and adding nanoparticles enhanced the thermal stability. The degradation study revealed a 25.29% and 15.01% weight loss over two months for copolymer and nanocomposite, respectively. Results showed that the initial weight of the copolymer and its nanocomposite increased due to water adsorption and then decreased, as identified by the soil burial method. The copolymer is biodegradable, and the addition of nanoparticles (nanocomposite) increased its shelf life and resistance to soil microbes. The synthesized nanocomposite was evaluated as an adsorbent for methylene blue dye from an aqueous solution. The adsorbent copolymer gelatin-g-poly(vinyl-acetate-co-acrylic acid) with Ni-doped ZnO NPs may prove to be a new route toward pollution control for the removal of methylene blue, having a removal capacity of 521.26 mg/g.

https://link.springer.com/article/10.1007/s00289-023-04782-w

41. **Aroosh, K., Javed, M., Hussain, N., Alhujaily, A., Iqbal, S., Alotaibi, M. T., ... & Elkaeed, E. B. (2023). Construction of Te-ZnO@ SgC 3 N 4 Heterojunction Nanocomposites for the Efficient Removal of Methylene Blue, Antifungal Activity, and Adsorption of Cr (VI) Ion.** *Adsorption Science & Technology, 2023.* https://doi.org/10.1155/2023/6736182. **Komal Aroosh, Mohsin Javed, Muhammad Faizan (Chemistry/SSC) Date of Publication: June2023** HJRS: W (Honorable mentioned)

Heterojunctions have proven to be effective catalysts for removing organic pollutants and heavy metals from wastewater. The following study is also about the formation of 2D heterojunction tellurium-doped zinc oxide composite with sulfur-doped graphitic carbon nitride (Te-ZnO@S-g-C$_3$N$_4$) by adopting a low-cost, simple, and ecofriendly coprecipitation technique. Thiourea was calcined to prepare S-g-C$_3$N$_4$ using the thermal degradation method. The characterization of synthesized photocatalysts was carried out by using SEM-EDX, FTIR, and XRD. The results obtained showed that the incorporation of tellurium caused an alteration in the wurtzite structure of ZnO. SEM-EDX analysis validated the purity of the synthesized samples due to the absence

of any additional peaks. The decrease in the bandgap was also noted by the formation of composites. Using methylene blue as a reference dye, the UV-vis spectrophotometer was utilized to calculate the absorbance for photocatalytic degradation behavior. As a result of tellurium doping into the ZnO lattice, photocatalytic oxidation/reduction was improved, according to the results. 3Te-ZnO NPs showed the best degradation rate among dopant series, while an excellent overall degradation rate was noted by fabricated composite 3Te-ZnO@40S-g-C$_3$N$_4$. The best doped ZnO and composites were also used as sorbents for the abstraction of heavy metal (Cr(VI)) from water via adsorption. A definite rise in the removal efficiency percentage of chromium ions was observed by using these sorbents. The overall photo degradation rate and adsorption behavior noted were in ZnO<Te-ZnO<Te-ZnO@S-g-C$_3$N$_4$ order. When compared to ZnO, Te-ZnO, SCN, and Te-ZnO@40SCN, the 3Te-ZnO@40SCN NCs have outstanding antifungal potential. The improved dispersibility and interaction of 3Te-ZnO@40SCN with membrane and intracellular proteins of fungi may be the cause of the greater effect of Te-ZnO@40SCN.

https://www.hindawi.com/journals/ast/2023/6736182/

42. **Muqaddas, S., Javed, M., Nadeem, S., Asghar, M. A., Haider, A., Ahmad, M., ... & Ali, A. (2023). Carbon nanotube fiber-based flexible microelectrode for electrochemical glucose sensors. *ACS omega,* 8(2), 2272-2280. https://doi.org/10.1021/acsomega.2c06594. Mohsin Javed, Sohail Nadeem (Chemistry/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
Electrochemical sensors are gaining significant demand for real-time monitoring of health-related parameters such as temperature, heart rate, and blood glucose level. A fiber-like microelectrode composed of copper oxide-modified carbon nanotubes (CuO@CNTFs) has been developed as a flexible and wearable glucose sensor with remarkable catalytic activity. The unidimensional structure of CNT fibers displayed efficient conductivity with enhanced mechanical strength, which makes these fibers far superior as compared to other fibrous-like materials. Copper oxide (CuO) nanoparticles were deposited over the surface of CNT fibers by a binder-free facile electrodeposition approach followed by thermal treatment that enhanced the performance of non-enzymatic glucose sensors. Scanning electron microscopy and energy-dispersive X-ray analysis confirmed the successful deposition of CuO nanoparticles over the fiber surface. Amperometric and voltammetric studies of fiber-based microelectrodes (CuO@CNTFs) toward glucose sensing showed an excellent sensitivity of ∼3000 µA/mM cm^2, a low detection limit of 1.4 µM, and a wide linear range of up to 13 mM. The superior performance of the microelectrode is attributed to the synergistic effect of the electrocatalytic activity of CuO nanoparticles and the excellent conductivity of CNT fibers. A lower charge transfer resistance value obtained via electrochemical impedance spectroscopy (EIS) also demonstrated the superior electrode performance. This work demonstrates a facile approach for developing CNT fiber-based microelectrodes as a promising solution for flexible and disposable non-enzymatic glucose sensors.

https://pubs.acs.org/doi/full/10.1021/acsomega.2c06594

43. **Wang, D., Javid, M., Saleem, M. F., Wu, M., Shi, Y., Rauf, A., ... & Dong, X. (2023). A nanocomposite of dual-phase Fe/TiCN wrapped in nitrogen-doped carbon with magnetic and dielectric characters for superior microwave absorption. *Ceramics International, 49*(8), 12240-12250. https://doi.org/10.1016/j.ceramint.2022.12.076. Abdul Rauf (Chemistry/SSC) Date of Publication: April 2023 HJRS: W (Silver)**
A careful approach to the optimization of magnetic and dielectric losses in nanomaterials can improve the electromagnetic wave absorption loss performance for certain microwave absorption applications. In this study we prepared dual core (Fe/TiCN) coated with nitrogen (N) doped carbon shell nanocomposite by arc-discharge method under mix atmospheres of working gases and with varying elemental compositions. Among all nanocomposites, (Fe/TiC$_{0.7}$N$_{0.3}$)@N–C dual-core@ N- doped shell nanocomposite exhibits enhanced microwave absorption. Owing to the novel dual-core@ N-doped shell structure and numerous defects induced by doping N in carbon shells, an improved dielectric relaxation in composite is observed and the minimum reflection loss was reached −44.36 dB at 5.3 GHz for 4.8 mm thickness.

https://www.sciencedirect.com/science/article/abs/pii/S0272884222044881

44. **Arif, M., Raza, H., & Haroon, S. M. (2023). Nickel Nanoparticles Loaded in Smart Crosslinked Organic Polymer Microgels/Hydrogels: A Review. *JOM, 1*-18. https://doi.org/10.1007/s11837-023-05913-4. Muhammad Arif, Hamid Raza, Shah Muhammad Haroon (Chemistry/SSC) Date of Publication: June 2023 HJRS: W (Bronze)**
The unique mixture of smart crosslinked organic polymers and nickel (Ni) nanoparticles (NPs) has gained much attention over the past 10 years. The Ni NPs loaded in crosslinked organic polymers exhibit the properties of Ni NPs as well as smart crosslinked organic polymers. This review article describes the recent research developments in the fields of synthesis, classification, characterization techniques and stimulus-responsive behavior of Ni nanoparticles loaded in crosslinked organic polymers. The unique combination of Ni nanoparticles loaded in crosslinked organic polymers makes these hybrid microgels suitable for different fields such as catalysis, adsorption processes, corrosion resistance and hydrogen fuel production as reported in the

literature. Furthermore, the catalytic activity and factors affecting the catalytic efficiency of Ni nanoparticle-loaded systems are described along with other applications in this review article.
https://link.springer.com/article/10.1007/s11837-023-05913-4#citeas

45. **Siddiqa, A., Akhter, T., Faheem, M., Razzaque, S.,** Mahmood, A., Al-Masry, W., ... & Park, C. H. (2023). **Bismuth-Rich Co/Ni Bimetallic Metal–Organic Frameworks as Photocatalysts toward Efficient Removal of Organic Contaminants under Environmental Conditions.** *Micromachines, 14*(5), 899. **https://doi.org/10.3390/mi14050899.** Ayesha Siddiqa, Toheed Akhter, Muhammad Faheem, Shumaila Razzaque (Chemistry/SSC) Date of Publication: May 2023 HJRS: W (Bronze)
Active photocatalysts with an efficiency of 99% were prepared for the degradation of the industrial dye, methylene blue (MB), under visible light irradiation. These photocatalysts comprised Co/Ni-metal–organic frameworks (MOFs), to which bismuth oxyiodide (BiOI) was added as a filler to prepare Co/Ni-MOF@BiOI composites. The composites exhibited remarkable photocatalytic degradation of MB in aqueous solutions. The effects of various parameters, including the pH, reaction time, catalyst dose, and MB concentration, on the photocatalytic activity of the prepared catalysts were also evaluated. We believe that these composites are promising photocatalysts for the removal of MB from aqueous solutions under visible light.
https://www.mdpi.com/2072-666X/14/5/899

46. **Afzal, S., Shahid, S., Mansoor, S., Javed, M.,** Mahmood, S., Iqbal, S., . . . Ibrahium, H. A. (2023). **A facile approach for the bio-fabrication of monometallic manganese oxide nano-catalyst for enhanced photocatalytic degradation of dyes and drug.** *Inorganic Chemistry Communications*, 158. **doi: 10.1016/j.inoche.2023.111715.** Sehrish Afzal, Sammia Shahid, Sana Mansoor, Mohsin Javed (Chemistry/SSC) Date of Publication: December 2023 HJRS: X (Honorable Mention)
The present work describes a green method based on the utilization of egg white for the preparation of manganese oxide (MnO) nanoparticles. The egg white liquid acts as a reducing and stabilizing agent. Morphological, physical, and optical properties were evaluated by UV–visible spectroscopy, SEM, EDX, and XRD. MnO Nanoparticles have a particle size of 29 nm. Morphological studies show that synthesized nanoparticles exhibit a spherical shape. EDX spectrum shows the presence of distinct peaks of Mn and O atoms with the elemental composition of 50.43 % and 33.83 % respectively. The crystalline construction of nanoparticles was investigated using XRD analysis. To test the potential of these nanoparticles as photocatalysts for the breakdown of drugs and colors in industrial effluent, photocatalysis of the dyes Methylene Blue, Bromophenol Blue, and the antibiotic Moxifloxacin HCl was carried out under sunshine. Maximum degradation efficiency achieved was 92.75 %, 84.60 %, and 73.92 % respectively.
https://www.sciencedirect.com/science/article/abs/pii/S1387700323013278

47. **Batool, F., Mohyuddin, A., Amjad, A.,** ul Hassan, A., **Nadeem, S., Javed, M., Rauf, A.,** . . . Kurniawan, T. A. (2023). **Removal of Cd(II) and Pb(II) from synthetic wastewater using Rosa damascena waste as a biosorbent: An insight into adsorption mechanisms, kinetics, and thermodynamic studies.** *Chemical Engineering Science,* 280. **doi: 10.1016/j.ces.2023.119072.** Fatima Batool, Ayesha Mohyuddin, Adnan Amjad, Sohail Nadeem, Mohsin Javed, Abdul Rauf (Chemistry/SSC) Date of Publication: October 2023 HJRS: W (Gold)
Due to their toxicity to public health, the presence of inorganic pollutants in the aquatic environment have become a global concern. This work investigates the technical feasibility of R. damascena waste as a biosorbent (RWB) in batch studies for the removal of Cd(II) and Pb(II) from synthetic wastewater. The biomass waste is abundantly available from rose oil industries in Lahore (Pakistan). To improve its treatment performance for metals removal, the biomass waste is pretreated with H2SO4 and NaOH, respectively. To understand the roles of functional groups on the RWB during biosorption, Fourier Transform infrared (FT-IR) spectroscopy and scanning electron microscope (SEM) analyses were used to compare its surface area before and after adsorption. At the same initial metal concentration of 25 mg/L, it was found that the chemically modified R. damascena could remove 95% and 91% of Pb(II) and Cd(II), respectively, under the optimum conditions: pH 6.5, reaction time: 2 h, 10 g/L of dose, and 120 rpm of shaking speed. Its metal adsorption capacities were 24.9 and 24.8 mg/g for Pb(II) and Cd(II), respectively. The Langmuir isotherm was applicable to simulate the adsorption of both target metals, while the pseudo-second order fitted well their kinetics. The characterization results implied the roles of certain functional groups of the biosorbent as electron donors. This indicates that H-bonding was involved in the chemisorption of target metals by the biosorbent. In spite of their encouraging findings, treated effluents were still unable to meet the required discharge limits of 0.05 and 0.005 mg/L for Pb(II) and Cd(II), respectively, mandated by local legislation. This reveals that another subsequent treatment using biological process such as activated sludge is required to complement their removal from wastewater samples. Overall, this work reveals the applicability of R. damascena waste as a biosorbent for heavy metal removal.
https://www.sciencedirect.com/science/article/abs/pii/S0009250923006280

48. **Hassan, A. U., Sumrra, S. H., Li, Y., Mohyuddin, A., Noreen, S., Noreen, S., & Nkungli, N. K. (2023). DFT exploration: Optical and conduction band switching in indaceno donor moiety and its TiO2 adsorbed complexes for an efficient ON-OFF ratio.** *Materials Science and Engineering: B,* **298. doi: 10.1016/j.mseb.2023.116855.** Ayesha Mohyuddin (Chemistry/SSC) Date of Publication: December 2023 HJRS: W (Bronze)

This research paper explores the potential of solvent-assisted band engineering in an indaceno crystal, 9,18-bis(2,4,6-trimethylphenyl)dinaphtho[1,2-d:1,2-d']s-indaceno[1,2-b:5,6-b']bisthiophene (9,18-IDC), and TiO2 adsorbed complexes for breakthroughs in photovoltaic (PV) applications. Using density functional theory (DFT) calculations. The results demonstrate promising prospects for enhancing PV performance by conduction band (CB) engineering. In UV–Vis analysis, DMSO stands out as the most promising candidate exhibiting an absorption maxima (λmax) of 517 nm. These findings contribute to a deeper understanding of the role of solvent-assisted optical and CB engineering in optimizing the efficiency of PV systems. The DMSO was the best solvent, exhibiting an open circuit voltage (Voc) of 0.92 eV, a fill factor (FF) of 0.8994, a short circuit current (Jsc) of 36.12 mA/cm2, and a maximum incident power (Pmax) of 29.89 W, making it a promising choice for PV applications. This study can pave the way for developing PVs as more efficient and sustainable energy solutions.

https://www.sciencedirect.com/science/article/abs/pii/S0921510723005974

49. **Hassan, A. U., Sumrra, S. H., Mustafa, G., Mohyuddin, A., Imran, M., Mehmood, R. F., & Mohyuddin, A. (2023). Novel pull–push solar switches with a D-π-D-π-A framework of the thiophene core: computed absorbance/fluorescence ability with device parameters.** *Structural Chemistry.* **doi: 10.1007/s11224-023-02172-6.** Ayesha Mohyuddin (Chemistry/SSC) Date of Publication: April 2023 HJRS: X (Null)

The new design of 6,6'-di(thiophen-2-yl)-4,4'-bipyrimidine (DTB)-based organic dyes (TCIT1-TCIT6) for dye-sensitized solar cell (DSSC) application was systematically designed by a donor (D), π-linker, and acceptor (A) design to form the D-π-D-π-A structure. The exchange–correlation (XC) as well as long-range corrected (LC) functionals were utilized to represent these dyes in density functional theory (DFT) and time-dependent DFT (TD-DFT) techniques. The TD-CAM-B3LYP approach was perfectly matched the DTB dye. Energy gaps between highest occupied molecular orbitals (HOMOs) and lowest unoccupied molecular orbitals (LUMOs) ranged between 1.73-2.92 eV. Their light-harvesting efficiency (LHE) values ranged between 0.001-0.106 eV with dye TCIT5 with the highest value. The open circuit voltage calculated against the DTB as donor moiety ranged 2.45–3.64 eV with positive values to demonstrate their ON position in their solar devices. All the dyes showed a very short excited-state lifetime ranging between 0.0001-0.0051 ns which showed how easily they can shift from an excited- (fluorescent) to ground-state position. Improved results for DSSCs were provided by the intended dyes in addition to their high horizontal dipole moment (μnormal) and open circuit photovoltage (eVOC). It benefits increased efficiency as a result. The findings of the current theoretical analysis show that all D-π-D-π-A dyes may be suitable sensitizers for DSSC applicability.

https://link.springer.com/article/10.1007/s11224-023-02172-6#Abs1

50. **Hassan, A. U., Sumrra, S. H., Mustafa, G., Zubair, M., Mohyuddin, A., Noreen, S., & Imran, M. (2023). Creating intense and refined NLO responses by utilizing dual donor structural designs in A-π-D-π-D-π-A type organic switches: computed device parameters.** *Structural Chemistry.* **doi: 10.1007/s11224-023-02138-8.** Ayesha Mohyuddin (Chemistry/SSC) Date of Publication: February 2023 HJRS: X (Null)

New organic dyes (H1-H6) for their promising applications as dye sensitized solar cell (DSSCs) were theoretically designed from 6,6'-di(thiophen-2-yl)-4,4'-bipyrimidine (TB) moiety in acceptor (A), π-spacer, and donor (D) type architecture to create A-π-D-π-D-π-A framework. After their benchmarking study against various exchange correlation (XC) and long-range corrected (LC) functional, the CAM-B3LYP produced accurate results so as selected for further density functional theory (DFT) and time dependent DFT (TD-DFT) studies. The frontier molecular orbitals (FMOs) were analyzed for their electron transfer properties, and their energies of the highest occupied molecular orbital (EHOMO) and the lowest unoccupied molecular orbital (ELUMO) were used to assess various electronic properties. Their energy differences (EH-L) ranged between 1.69 and 2.03 eV indicating their good responsiveness to electron injection (Ginj) being the values greater than 0.2 eV. The maximum absorbance of the dyes was reported around the 388–406 nm while their starting material (TB) had this value to be 371 nm. This redshift was significant with an intensification of electron-withdrawing groups on the dye structures. The dyes were evaluated for their device related parameters like their light harvesting efficiency, open circuit voltage, exciton binding energies, and exciton life times which were found in their promising values. The dyes were analyzed for their linear (α), first (βtotal), and second (γtotal) order nonlinear responses and were found to have significantly higher responses, not only against their starting materials but also those reported in literature for standard molecules (urea and p-nitric acid). Among the dyes under study, dye H4 exhibits the highest molecular polarizability (α) and hyperpolarizability (β and γ) values thanks to two CN substituted units on each ends. These dyes are most likely to have possible optical and photonic uses. Also, according to the results of the current theoretical research, all of these dyes may function as effective photosensitizer for their DSSC application.

51. **Hassan, A. U., Sumrra, S. H., Zafar, M., Mohyuddin, A., Noreen, S., & Güleryüz, C. (2023). DFT-guided structural modeling of end-group acceptors at Y123 core for sensitizers as high-performance organic solar dyes and NLO responses. *Journal of Molecular Modeling, 29*(8). doi: 10.1007/s00894-023-05668-4. Ayesha Mohyuddin (Chemistry/SSC) Date of Publication: July 2023 HJRS: X (Null)**
Context: The organic solar cells (OSCs) are being developed with the goal of improving their photovoltaic capabilities. Here, utilizing computational methods, six new nonfullerene acceptors (NFA) comprising dyes (A1–A6) have been created by end-group alterations of the Y123 framework as a standard (R). Methods: The DFT-based investigations at B3LYP/6-31G + (d,p) level were applied to evaluate their properties. The planar geometries associated with these structures, which lead to improved conjugation, were validated by the estimation of molecular geometries. Dyes A1–A6 have shorter E gap than R, according to a frontier molecular orbital (FMO) investigation, which encourages charge transfer in them. The dyes with their maximum absorption range were shown by optical properties to be 692–711 nm, which is significantly better than R with its 684 nm range. Their electrostatic and Mulliken charge patterns provided additional evidence of the significant separation of charges within these structures. All the dyes A1–A6 had improved light harvesting efficiency (LHE) values as compared to Y123, highlighting their improved capacity to generate charge carriers by light absorption. With the exception of dye A4, all newly developed dyes might have a superior rate of charge carrier mobility than R, according to reorganization energies λ re. Dyes A3 and A4 had the greatest open-circuit voltage (V oc). Dye A3 exhibited improvement in all of its examined properties, making it a promising choice in DSSC applications. Graphical Abstract: [Figure not available: see fulltext.]
https://link.springer.com/article/10.1007/s00894-023-05668-4#article-info

52. **Hassan, M., Baig, M. M., Yousaf, S., Faheem, M., Hussain, A., Niaz, B., . . . Lee, S. G. (2023). Efficient water splitting catalyst: Low-temperature selenization of Co and Ni hydroxide nanosheets on carbon cloth for enhanced electro-catalytic activity. *Diamond and Related Materials,* 139. doi: 10.1016/j.diamond.2023.110298. Muhammad Faheem (Chemistry/SSC) Date of Publication: November 2023 HJRS: W (Bronze)**
The primary challenge in achieving full water splitting is the high cost of Pt/C-based materials and efficient electrocatalysts for both the oxygen evolution reaction (OER) and the hydrogen evolution reaction (HER). In this investigation, Co and Ni based selinides as a bifunctional electrocatalyst was produced by using electrodeposition technique on carbon cloth (CC) as supportive material following low-temperature selenization, Co and Ni hydroxide nanosheets were transformed into CoNiSe-based carbon cloth, which performed superb electro-catalytic activity for water splitting. Due to the unique morphology and collaborative effect of CoSe-CC/NiSe-CC, the Tafel slope values for HER and OER are 64.2 and 59.2 mVdec−1. which is comparable to the standard 48.6 and 58.4 mVdec−1 values of RuO2 and Pt/C. Remarkably, cobalt and nickel-based CC exhibit exceptional stability and catalytic activity towards overall water splitting in the basic medium as compared to higher-priced catalysts such as RuO2 and Pt/C. This composite also requires 1.6 V to drive a current density of 10 mA cm−2 for overall Water splitting in an alkaline medium.
https://www.sciencedirect.com/science/article/abs/pii/S0925963523006234

53. **Hassan, S. U., Khalid, H., Shafique, S., Farid, M. A., Saeed, M. H., Ali, Z., . . . Park, Y. K. (2023). Investigating catalytic oxidative desulfurization of model fuel using hollow PW12/TiO2@MgCO3 and performance optimization via box-behnken design. *Chemosphere,* 339. doi: 10.1016/j.chemosphere.2023.139662. Sidra Shafique, Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: October 2023 HJRS: W (Platinum)**
A facile and eco-friendly synthesis of PW12/TiO2@MgCO3 hollow tubes (PW12 ·~· H3[PW12O40] = polyoxometalate) using a soluble and reusable MgCO3·3H2O micro-rods template was reported for the first time. The resultant hollow tubes were characterized by Fourier transform infrared spectroscopy (FT-IR), UV–visible spectroscopy, powder X-ray diffraction (PXRD), energy-dispersive X-ray spectroscopy (EDX), and scanning electron microscopy (SEM), which indicated that the [PW12O40]3- structure remained intact within the hollow tubes. Furthermore, the specific surface area (88.982 m2/g) and average pore size (2.6 nm) of the PW12/TiO2@MgCO3 hollow tubes were calculated using the Brunauer-Emmett-Teller (BET) analysis. This study explored the catalytic performance of PW12/TiO2@MgCO3 hollow tubes using a three-level Box-Behnken design (BBD), through which optimization curves were designed. The desulfurization of model fuel using hollow tubes was optimally performed when the catalyst dose, time, temperature, and oxidant/sulfur (O/S) were 20–80 gm, 80–120 min, 25–80 °C and 3–8 molar ratio, respectively. These results were further processed, and the experiments were replicated twenty-nine times using a model based on two quadratic polynomials to create a response surface methodology (RSM). This permits a mathematical correlation linking the desulfurization and experimental parameters. The optimal performance of reaction mixture was evaluated to be 80 mg for catalyst concentration, 25 °C of temperature, reaction time of 100 min, and 5.5 for oxidant/sulfur molar ratio from 20 mL of octane simulation oil containing 350 ppm dibenzothiophene (DBT). The predicted desulfurization rate of the model fuel under these optimal conditions was 95.3%. The

correspondence between the experimental results and predicted values was verified based on regression analysis, with an R2 value greater than 0.99. These hollow tubes could be used for their desulfurization properties ten times a row without significantly reducing catalytic activity.
https://www.sciencedirect.com/science/article/abs/pii/S004565352301929X

54. **Hayat, K., Shkeel, M., Iqbal, M. A., Khalid, M., Quah, C. K., Wong, Q. A., . . . Hameed, S. (2023). Inhibition of cell proliferation by azolium salts and silver(I)-N-heterocyclic carbene complexes: Synthesis, spectral and X-ray crystallographic characterizations.** *Inorganica Chimica Acta,* **557. doi: 10.1016/j.ica.2023.121694. Mahwish Shkeel (Chemistry/SSC) Date of Publication: November 2023 HJRS: X (Clay)**
The study focuses on the synthesis, characterization, and evaluation of silver (I)-N-heterocyclic carbene complexes for their inhibitory effect on cell proliferation. The benzimidazolium salts (3–5) and their respective silver complexes (6–8) were synthesized and characterized by various techniques including FTIR, NMR and X-ray crystallography. The salts and complexes were then evaluated for their ability to inhibit the proliferation of four different cancer cell lines (EA.hy926, HeLa, MDA-MB-231 and A549). MTT assay demonstrated that the salts and complexes exhibited potent cytotoxicity towards all cancer lines. The study highlights the importance of N-heterocyclic carbene ligands in the development of silver-based drugs with anticancer properties.
https://www.sciencedirect.com/science/article/abs/pii/S0020169323003195

55. **Iftikhar, S., Zahra, N., Rubab, F., Sumra, R. A., Khan, M. B., Abbas, A., & Jaffari, Z. H. (2023). Artificial neural networks for insights into adsorption capacity of industrial dyes using carbon-based materials.** *Separation and Purification Technology,* **326. doi: 10.1016/j.seppur.2023.124891. Raazia Abrar Sumra (Chemistry/SSC) Date of Publication: December 2023 HJRS: W (Clay)**
Organic waste-derived carbon-based materials (CBMs) are commonly applied in sustainable wastewater treatment and waste management. CBMs can remove toxic, non-biodegradable and carcinogenic pollutants such as dyes which include indigo, triphenylmethyl, azo, anthraquinone and phthalocyanine derivatives. Nonetheless, their diverse composition, surface properties, presence of numerous surface functional groups and the altering adsorption experimental conditions to which they are applied against the elimination of organic dyes make it challenging to completely understand the removal mechanism. Herein, a dataset of 1514 data points was compiled from various published peer-reviewed journals along with additional adsorption experiments conducted in this study. Artificial neural networks (ANN) based machine learning (ML) model was compared with other ML and a deep learning model named Tab-Transformer and the findings proposed ANN showed superior prediction performance for adsorption capacity as a function of adsorbent synthesis conditions, adsorbent physical characteristics and adsorption experimental conditions. The hyperparameters of ANN model was optimized using Bayesian optimizer and the batch size, activation and units were proven to be more important than the number of hidden layers and learning rate. The ANN model exhibits a higher coefficient of determination (R2 = 0.98) and lower root mean square error (RMSE = 46.95 mg/g) values for test dataset. Feature importance using SHapley Additive exPlanations (SHAP) analysis suggested that the adsorption characteristics with 51.4% was the most important in the ANN prediction followed by the adsorption experimental condition (31.2%) and adsorbent synthesis condition (17.4%). Moreover, the impact of six most important features were individually analyzed. Finally, a detailed discussion on the environmental impact of the presented ANN model is also included.
https://www.sciencedirect.com/science/article/abs/pii/S1383586623017999

56. **Ikhlaq, A., Hussain, A., Gilani, S. R., Qazi, U. Y., Akram, A., Al-Sodani, K. A. A., & Javaid, R. (2023). Synergistically ozone and Fe-zeolite based catalytic purification of milk from heavy metals and pathogens.** *International Journal of Environmental Science and Technology,* **20(10), 10613-10620. doi: 10.1007/s13762-022-04718-3. A. Akram (Chemistry/SSC) Date of Publication: October 2023 HJRS: W (Bronze)**
Milk adulteration leads to the contamination of milk, and it can pose serious health hazards to humans. It may contaminate the milk with organics, heavy metals, and pathogens. The existing treatment methods such as thermal treatment of milk have certain limitations, such as it initiates thermal reactions that may lead to protein denaturation, non-enzymatic browning, and loss of milk quality. Therefore, in a current investigation, the authors for the first time proposed a novel innovative solution to decontaminate the milk from pathogens and toxic metals (Cd, Pb, and Cr) by implying a catalytic ozonation process using Fe-zeolite-4A (Fe-Z4A) as a catalyst. In this method, a synergistic O3/Fe-Ze4A process was found to be highly efficient for removing toxic metals (Cd, Pb, and Cr) and faecal coliforms from milk. It was found that 100% removal efficiency was achieved for the above-mentioned contaminants in 20 min of reaction time with O3 0.9 mg/min and catalyst dose of 5 g, respectively. Therefore, it is suggested that the O3/Fe-Ze4A based catalytic ozonation process may be utilized to purify milk at household levels.
https://link.springer.com/article/10.1007/s13762-022-04718-3

57. **Inam, H., Fatima, U., Shahid, S., Mansoor, S., Yasin, A., Javed, M., . . . Elkaeed, E. B. (2023). Nanotheranostic fabrication of iron oxide for rapid photocatalytic degradation of organic dyes and antifungal potential.**

Journal of Saudi Chemical Society, **27**(5). doi: 10.1016/j.jscs.2023.101689. Hina Inam, Urooj Fatima, Sammia Shahid, Sana Mansoor, Amina Yasin, Mohsin Javed (Chemistry/SSC) Date of Publication: September 2023 HJRS: W (Bronze)

This research work includes the fabrication of iron oxide nanoparticles (Fe_2O_3 NPs) by green construction approach using Wisteria sinensis leaves extract. Due to its eco-friendly approach, the synthesis of iron oxide NPs (Fe_2O_3 NPs) using various plant sources, such as plant parts, and microbial cells have gained a lot of attention in recent years. Cost-effectiveness and ease of availability make Wisteria sinensis leaves extract a potential candidate for the construction of iron oxide NPs. The various key features like biocompatibility, non-toxicity capping, and stabilizing agents present in biological sources are advantageous for usage in a variety of applications. The phytoconstituents present in the leaf extract of Wisteria sinensis serve as reducing and stabilizing agents. The biologically fabricated (Fe_2O_3 NPs) were analyzed using FT-IR, XRD, UV–vis spectroscopy, and SEM. In the present work, the antioxidant and photocatalytic dye degradation efficiency of Fe_2O_3 NPs has been studied. The dye degradation efficiency of methylene blue dye was found to be 87% at 180 min upon exposure to sunlight. The capacity of Fe_2O_3 NPs to scavenge 2,2-diphenyl-1-picrylhydrazyl hydrate free radicals (DPPH) was examined using a UV–Vis spectrophotometer. The study compared the radical scavenging activity (RSA) of Fe_2O_3 nanoparticles (NPs) with that of the standard antioxidant ascorbic acid. The results demonstrated that Fe_2O_3 NPs have a greater ability to scavenge radicals than ascorbic acid. The half-maximal inhibitory concentration (IC50) of Fe_2O_3 NPs was observed to range from 0.12 to 0.17. Furthermore, Fe_2O_3 NPs displayed the highest antifungal activity, with an inhibition zone of 26.8 mm against F. oxysporum. These findings suggest that the biologically synthesized Fe_2O_3 NPs possess potent antimicrobial and dye degradation properties.

https://www.sciencedirect.com/science/article/pii/S1319610323000935

58. Iqbal, M. A., Akhter, T., Faheem, M., Mahmood, A., Al-Masry, W., Nadeem, S., . . . Park, C. H. (2023). **Metal-free, visible light-mediated atom transfer radical polymerization of hydroxypropyl cellulose-graft-poly(methyl methacrylate)s: effect of polymer side chains on thermo-responsive behavior of hydroxypropyl cellulose.** *Cellulose,* **30**(12), 7519-7533. doi: 10.1007/s10570-023-05345-y. Muhammad Asif Iqbal, Toheed Akhter, Muhammad Faheem (Chemistry/SSC) Date of Publication: August 2023 HJRS: W (Gold)

We exploited organic photo-redox-catalyzed atom transfer radical polymerization (O-ATRP) to synthesize a thermo-responsive polymer with a narrow molecular weight distribution. Poly(methyl methacrylate) (PMMA) chains were polymerized from a hydroxypropyl cellulose (HPC)-based macroinitiator using metal-free O-ATRP under visible-light irradiation. This O-ATRP is mediated by 1,2,3,5-tetrakis (carbazol-9-yl)-4,6-dicyanobenzene (4CzIPN), a photoredox catalyst with a substantial excited-state reduction potential, low cost, and ease of preparation. The synthesis of a series of PMMA-grafted HPC (PMMA-g-HPC) was characterized by various analytical methods, including FTIR spectroscopy, NMR spectroscopy, TGA, and GPC analysis. The lower critical solution temperature (LCST) of the polymers was determined by measuring the transmittance of the polymer solution as a function of the temperature at various pH values. Consequently, we expanded the LCST window of the HPC-based polymers and generated the opposite pH dependency of the LCST by forming PMMA-g-HPCs. Our "grafting-from" synthetic approach and thermo-responsive polymers, which are controllable in full range of physiological conditions, are promising in a variety of biological, electronics, and biosensor applications, particularly in drug delivery systems.

https://link.springer.com/article/10.1007/s10570-023-05345-y#Abs1

59. Ali, M., Bibi, Z., Younis, M. W., Majeed, K., & Iqbal, M. A. (2023). **First-principles investigation of structural, mechanical, and optoelectronic properties of Hf2AX (A=Al, Si and X=C, N) MAX phases.** *Journal of the American Ceramic Society.* doi: 10.1111/jace.19567. Muhammad Wasim Younis, Muhammad Asif Iqbal (Chemistry/SSC) Date of Publication: 2023 HJRS: W (Silver)

In this work, we have employed the first-principles calculations to investigate the phase stability and mechanical and optoelectronic characteristics of Hf2AX (A=Al, Si and X=C, N) MAX phases. Phase stabilities of Hf2AX compounds have been evaluated by the formation enthalpy computations and phonon dispersion curves, which indicate that all studied compounds are structurally and dynamically stable. The mechanical stability has been determined by elastic stiffness constants, which confirms that the studied MAX phases are mechanically stable. The computed results for Pugh's and Poisson ratios indicate the brittle nature of Hf2AX MAX phases. It is interesting to note that Si-based MAX phases possess high values of B/G, indicating that they are harder than Al-based compounds. The obtained band structures and partial density of states indicate the metallic character of all Hf2AX compounds. The strong hybridization of d-orbitals of Hf with p-orbitals of N and the comparatively weaker hybridization of p-orbitals (Hf) with Al/Si p-orbitals is observed. The presence of pseudogaps near the Fermi energy level emerges due to the orbital hybridization involving Hf, Al/Si, and C/N atoms. The analysis of charge density difference maps reveals the presence of a strong covalent bond between the Hf and C/N atoms, whereas a relatively weaker covalent bond is seen between the Hf and Al/Si atoms. Furthermore, numerous optical characteristics have been investigated to account for the behavior of the Hf2AX compounds to those of impinging electromagnetic rays. The highest absorptivity is noticed within the

energy range of 7.5–12.5 eV. The optical spectra in the range of 1.7 eV (IR) to 9 eV ultraviolet (UV) have been observed for the investigated MAX phases, predicting their suitability as proficient energy absorbers within the UV region. The Intriguing properties of Hf2AX compounds are anticipated to be appropriate materials for a variety of applications.

https://ceramics.onlinelibrary.wiley.com/doi/full/10.1111/jace.19567

60. **Ali, Z., Ikhlaq, A., Qazi, U. Y., Akram, A., Ul-Hasan, I., Alazmi, A., . . . Javaid, R. (2023). Removal of Disperse Yellow-42 Dye by Catalytic Ozonation Using Iron and Manganese-Loaded Zeolites.** *Water (Switzerland),* **15(17). doi: 10.3390/w15173097. Asia Akram (Chemistry/SSC) Date of Publication: September 2023 HJRS: W (Silver)**

In this research, the efficiency of the catalytic activity of iron and manganese-loaded (bimetallic) sodium zeolite was investigated for the ozonation-based removal of disperse yellow 42 dye. The impregnation method was used to deposit Fe and Mn on the surface of sodium zeolite. The morphological analysis of sodium zeolite before and after Fe and Mn deposition was conducted by SEM, EDX, and FTIR. It was found that several variables, including the ozone dose, contact time, pH, catalyst dose, and hydroxyl radical scavenger action, greatly influenced the efficiency of dye removal. The chemical oxygen demand (COD) removal by catalytic ozonation using Fe and Mn-loaded sodium zeolite from real dye textile wastewater was also investigated. After 30 min of treatment with catalytic ozonation at pH 6, the maximum 73% removal of disperse yellow 42 dye was achieved with a catalyst dose of 0.5 g and an ozone dose supply of 1.8 mg/min. In catalytic ozonation with the hydroxyl radical scavenger effect (HRSE), the decline in removal efficiency from 73% to 61% demonstrated that removal efficiency was highly dependent on hydroxyl radical production. The COD removal efficiency in the real textile wastewater was 59% with the ozonation process, which increased to 79% after catalytic ozonation.

https://www.mdpi.com/2073-4441/15/17/3097

61. **Ameen, R., Rauf, A., Mohyuddin, A., Javed, M., Iqbal, S., Nadeem, S., . . . Elkaeed, E. B. (2023). Excellent antimicrobial performances of Cu(II) metal organic framework@Fe3O4 fused cubic particles.** *Journal of Saudi Chemical Society,* **27(6). doi: 10.1016/j.jscs.2023.101762. Riffat Ameen (Chemistry/SSC) Date of Publication: November 2023 HJRS: W (Bronze)**

Metal-organic frameworks have been used as antibacterial agents because of their effective antibacterial properties. In this research, nanocomposites of copper (II)- benzene-1,4-dicarboxylic acid metal–organic framework with iron oxide [Cu-MOF@Fe3O4] were prepared via a simple hydrothermal route. X-ray analysis reveals the crystallinity of the structure while FTIR analysis confirms the existence of Cu-based MOFs functional group. Cu-MOF@Fe3O4 scans using Scanning Electron Microscopy (SEM) reveal irregular clusters of cubic particles fused with Fe3O4 nanoparticles. Energy Dispersive X-ray (EDX) spectrum of Cu-MOF@Fe3O4 provides the evidence of elemental composition by showing the peaks of iron, oxygen, copper and carbon. Using the minimum inhibitory concentration (MIC) and zone of inhibition assays, the antimicrobial activity of the Cu-MOF and Cu-MOF@Fe3O4 against E. coli and B. subtilis were evaluated. The antibacterial results have shown that the Cu-MOF@Fe3O4 has higher antibacterial performance against E. coli as compared with B. subtilis as compared to Cu-MOF, Fe3O4 and ligands only. On the other hand, the Cu-MOF@Fe3O4 composites exhibit excellent antifungal potential when compared to the ligand, commercial nanoparticles, Cu(NO3)2·3H2O, iron oxide, Cu-MOF. The exploration of antibacterial mechanism revealed that the Cu-MOF@Fe3O4 composite favors slow release of metal ions and prolonged biocidal effect.

https://www.sciencedirect.com/science/article/pii/S1319610323001667

62. **Khan, S., Iqbal, S., Taha, M., Hussain, R., Rahim, F., Shah, M., . . . Rauf, M. (2023). Synthesis, in vitro biological assessment, and molecular docking study of benzimidazole-based thiadiazole derivatives as dual inhibitors of α-amylase and α-glucosidase.** *Frontiers in Chemistry,* **11. doi: 10.3389/fchem.2023.1125915. Muhammad Rauf (Chemistry/SSC) Date of Publication: May 2023 HJRS: W (Silver)**

The clinical significance of benzimidazole-containing drugs has increased in the current study, making them more effective scaffolds. These moieties have attracted strong research interest due to their diverse biological features. To examine their various biological significances, several research synthetic methodologies have recently been established for the synthesis of benzimidazole analogs. The present study aimed to efficiently and quickly synthesize a new series of benzimidazole analogs. Numerous spectroscopic techniques, including 1H-NMR, 13C-NMR, and HREI-MS, were used to confirm the synthesized compounds. To explore the inhibitory activity of the analogs against α-amylase and α-glucosidase, all derivatives (1–17) were assessed for their biological potential. Compared to the reference drug acarbose (IC50 = 8.24 ± 0.08 μM), almost all the derivatives showed promising activity. Among the tested series, analog 2 (IC50 = 1.10 ± 0.10 & 2.10 ± 0.10 μM, respectively) displayed better inhibitory activity. Following a thorough examination of the various substitution effects on the inhibitory capacity of α-amylase and α-glucosidase, the structure-activity relationship (SAR) was determined. We looked at the potential mechanism of how active substances interact with the catalytic cavity of the targeted enzymes in response to the experimental results of the anti-glucosidase and anti-amylase.

Molecular docking provided us with information on the interactions that the active substances had with the various amino acid residues of the targeted enzymes for this purpose.
https://www.frontiersin.org/articles/10.3389/fchem.2023.1125915/full

63. **Kosar, N.,** Kanwal, S., Hamid, M. H. S. A., Ayub, K., Gilani, M. A., Imran, M., . . . Mahmood, T. (2023). Role of Delocalization, Asymmetric Distribution of π-Electrons and Elongated Conjugation System for Enhancement of NLO Response of Open Form of Spiropyran-Based Thermochromes. *Molecules,* 28(17). doi: 10.3390/molecules28176283. **Naveen Kosar (Chemistry/SSC) Date of Publication: August 2023 HJRS: W (Silver)**

Switchable nonlinear optical (NLO) materials have widespread applications in electronics and optoelectronics. Thermo-switches generate many times higher NLO responses as compared to photo-switches. Herein, we have investigated the geometric, electronic, and nonlinear optical properties of spiropyranes thermochromes via DFT methods. The stabilities of close and open isomers of selected spiropyranes are investigated through relative energies. Electronic properties are studied through frontier molecular orbitals (FMOs) analysis. The lower HOMO-LUMO energy gap and lower excitation energy are observed for open isomers of spiropyranes, which imparts the large first hyperpolarizability value. The delocalization of π-electrons, asymmetric distribution and elongated conjugation system are dominant factors for high hyperpolarizability values of open isomers. For deep understanding, we also analyzed the frequency-dependent hyperpolarizability and refractive index of considered thermochromes. The NLO response increased significantly with increasing frequency. Among all those compounds, the highest refractive index value is observed for the open isomer of the spiropyran 1 ($1.99 \times 10{-}17$ cm2/W). Molecular absorption analysis confirmed the electronic excitation in the open isomers compared to closed isomers. The results show that reversible thermochromic compounds act as excellent NLO molecular switches and can be used to design advanced electronics.
https://www.mdpi.com/1420-3049/28/17/6283

64. **Kosar, N.,** & Mahmood, T. (2023). Outstanding NLO response of K3O@thia[n]circulenes; a DFT and molecular dynamics perspective. *Physica Scripta,* 98(10). doi: 10.1088/1402-4896/acf893. **Naveen Kosar (Chemistry/SSC) Date of Publication: October 2023 HJRS: X (Honorable Mention)**

The nonlinear optical (NLO) response of superalkali (K3O) doped thia[7&8]circulenes (1–18) is analyzed through density functional theory (DFT) calculations. The high interaction energies illustrate thermodynamic feasibility of these complexes. Natural bond orbital (NBO) charge analysis confirmed that electronic charge is transferred from K3O toward thia[7&8]circulenes. Additionally, the lowest unoccupied molecular orbital (LUMO)—the highest occupied molecular orbital (HOMO) energy gaps are reduced up to 0.81 eV after doping. Polarizability (αo) and the first hyperpolarizability (βo) values are used to estimate NLO response of doped circulenes. The highest αo and βo obtained for K3O doped thia[7&8]circulene (9) are 7297 au and 3.03×108 au, respectively. Two level model illustrates that the excited dipole moment as decisive factor for enhancement of NLO response. The electronic excitation is confirmed from ultraviolet-visible (UV–vis) spectroscopic analysis where all doped circulenes showed bathochromic shift. Ab initio molecular dynamics depicts strong interaction and high thermal stability of K3O doped thia[7]circulene 9. Thus, K3O doping on thia[n]circulenes (n = 7&8) remarkably enhanced the NLO response which assures the use of respective complexes in designing of building blocks for future optics.
https://iopscience.iop.org/article/10.1088/1402-4896/acf893/meta

65. **Kosar, N.,** Noreen, S., Ayub, K., Imran, M., & Mahmood, T. (2023). Structural, Non-linear optical response and ultraviolet transparency of superalkalis (Li3O, Na3O, K3O)-doped bowel shape silicon carbide nanoclusters. *Inorganic Chemistry Communications,* 157. doi: 10.1016/j.inoche.2023.111328. **Naveen Kosar (Chemistry/SSC) Date of Publication: November 2023 HJRS: X (Honorable Mention)**

In the current study, the effect of superalkalis (Li3O, Na3O, and K3O) doping over bowl shaped silicon carbide (b-SiC) for geometrical, electronic and nonlinear properties has been investigated using DFT theory. The results revealed that doped b-SiC nanoclusters possess high thermodynamic stability as revealed from interaction energy up to −165.85 kcal/mol. The frontier molecular orbitals illustrate the occupation of electronic density in orbitals. Natural bond orbital charge analysis confirms the charge transfer from superalkalis to the b-SiC nanocluster. Furthermore, the electronic properties are rationalized from total density of states spectra. The highest first hyperpolarizability value (5979.99 au) is observed for isomer O of K3O@b-SiC complexes. The electronic excitation is analyzed through UV–VIS analysis. Two-level model describing the internal factors responsible for enhancement of NLO response is also studied. The present work gives a guideline for the synthesis of nonlinear optical materials with greater efficiencies which can be used as building blocks in the modern world of optoelectronics.
https://www.sciencedirect.com/science/article/abs/pii/S1387700323009401

66. **Kosar, N.,** Sajid, H., Ahmed, M. Z., Ayub, K., & Mahmood, T. (2023). Superalkalis fabricated Te-containing [8]circulenes as outstanding NLO materials; a DFT perspective. *Computational and Theoretical Chemistry,*

1226. doi: 10.1016/j.comptc.2023.114226. Naveen Kosar (Chemistry/SSC) Date of Publication: August 2023 HJRS: X (Null)

There is a growing demand for thermodynamically stable and highly polarizable materials with excess electrons in the fields of optics. In this study, a new class of theoretically designed materials (AxY@C16Te8 (A = K, Na, Li, and x = 2, 3 4)) are explored for optoelectronic and nonlinear (NLO) applications via DFT calculations. Various superalaklis (AxY (Y = O, N, F and x = 2, 3, 4)) are doped on C16Te8 nano-surface. The outcomes of DFT revealed high thermodynamic stability of these complexes. Natural bond orbital (NBO) charge analysis illustrated that charge transfer occurred from superalkali toward Te-containing [8]circulene (C16Te8). HOMO – LUMO energy gap is reduced after doping. Moreover, (AxY@C16Te8 (A = K, Na, Li, x= 2, 3 4, and Y = O, N, F) complexes exhibit remarkably large nonlinear optical (NLO) response. The static first hyperpolarizability (β_o) of these complexes ranges between $3.28 \times 10^3 - 2.60 \times 10^5$ au. The NLO response of the designed complexes is further explored by computing second hyperpolarizability (γ_{tot}), frequency-dependent hyperpolarizability, and nonlinear refractive index.

https://www.sciencedirect.com/science/article/abs/pii/S2210271X23002086

67. **Kosar, N., Wajid, S., Ayub, K., Gilani, M. A., Binti Zainal Arfan, N. H., Sheikh Abdul Hamid, M. H., . . . Mahmood, T. (2023). Giant NLO response and deep ultraviolet transparency of dual (alkali/alkaline earth) metals doped C6O6Li6 electrides.** *Heliyon*, **9(8). doi: 10.1016/j.heliyon.2023.e18264. Naveen Kosar (Chemistry/SSC) Date of Publication: August 2023 HJRS: W (Gold)**

The designing of new materials having outstanding nonlinear optical (NLO) response is much needed for use in latest optics. Herein, the geometric, electronic and NLO properties of alkali and alkaline earth metals doped C6O6Li6 (alk-C6O6Li6-alkearth, alkearth = Ca, Mg, Be and alk = K, Na, Li) electrides is studied via quantum chemical approach. The interaction energies (Eint) are examined to illustrate their thermodynamic stability. The strong interaction energy of -39.99 kcal mol-1 is observed for Ca–C6O6Li6–Li electride in comparison to others. Frontier molecular orbitals (FMOs) energy gap of considered complexes is changed due to the electronic density shifting between metals and C6O6Li6 surface, which notifies the semi conducting properties of these electrides. The FMOs isodensities and natural bond orbital (NBO) charge analysis are performed to justify charge transfer between dopants and complexant. UV–Visible study also confirmed the application of these electrides as deep ultra-violet laser devices. NLO response is studied through calculation of first hyperpolarizability (β_o). The highest β_o value of 1.68×10^5 au is calculated for Mg–C6O6Li6–K electride. NLO response is further rationalized by three- and two-level models approach.

https://www.cell.com/heliyon/pdf/S2405-8440(23)05472-5.pdf

68. **Kurniawan, T. A., Haider, A., Mohyuddin, A., Fatima, R., Salman, M., Shaheen, A., . . . Ali, I. (2023). Tackling microplastics pollution in global environment through integration of applied technology, policy instruments, and legislation.** *Journal of Environmental Management,* **346. doi: 10.1016/j.jenvman.2023.118971. Ahtisham Haider (Chemistry/SSC) Date of Publication: November 2023 HJRS: W (Platinum)**

Microplastic pollution is a serious environmental problem that affects both aquatic and terrestrial ecosystems. Small particles with size of less than 5 mm, known as microplastics (MPs), persist in the environment and pose serious threats to various species from micro-organisms to humans. However, terrestrial environment has received less attention than the aquatic environment, despite being a major source of MPs that eventually reaches water body. To reflect its novelty, this work aims at providing a comprehensive overview of the current state of MPs pollution in the global environment and various solutions to address MP pollution by integrating applied technology, policy instruments, and legislation. This review critically evaluates and compares the existing technologies for MPs detection, removal, and degradation, and a variety of policy instruments and legislation that can support the prevention and management of MPs pollution scientifically. Furthermore, this review identifies the gaps and challenges in addressing the complex and diverse nature of MPs and calls for joint actions and collaboration from stakeholders to contain MPs. As water pollution by MPs is complex, managing it effectively requires their responses through the utilization of technology, policy instruments, and legislation. It is evident from a literature survey of 228 published articles (1961–2023) that existing water technologies are promising to remove MPs pollution. Membrane bioreactors and ultrafiltration achieved 90% of MPs removal, while magnetic separation was effective at extracting 88% of target MPs from wastewater. In biological process, one kg of wax worms could consume about 80 g of plastic/day. This means that 100 kg of wax worms can eat about 8 kg of plastic daily, or about 2.9 tons of plastic annually. Overall, the integration of technology, policy instrument, and legislation is crucial to deal with the MPs issues.

https://www.sciencedirect.com/science/article/abs/pii/S0301479723017590

69. **Kurniawan, T. A., Othman, M. H. D., Adam, M. R., Liang, X., Goh, H., Anouzla, A., Mohyuddin, A... Chew, K. W. (2023). Chromium Removal from Aqueous Solution Using Natural Clinoptilolite.** *Water (Switzerland),* **15(9). doi: 10.3390/w15091667. Ayesha Mohyuddin (Chemistry/SSC) Date of Publication: May 2023 HJRS: W (Silver)**

This work investigates the applicability of clinoptilolite, a natural zeolite, as a low-cost adsorbent for removing chromium from aqueous solutions using fixed bed studies. To improve its removal performance for the inorganic pollutant, the adsorbent is pretreated with NaCl to prepare it in the homoionic form of Na+ before undertaking ion exchange with Cr3+ in aqueous solution. This work also evaluates if treated effluents could meet the required effluent discharge standard set by legislation for the target pollutant. To sustain its cost-effectiveness for wastewater treatment, the spent adsorbent is regenerated with NaOH. It was found that the clinoptilolite treated with NaCl has a two-times higher Cr adsorption capacity (4.5 mg/g) than the as-received clinoptilolite (2.2 mg/g). Pretreatment of the clinoptilolite with NaCl enabled it to treat more bed volume (BV) (64 BV) at a breakthrough point of 0.5 mg/L of Cr concentration and achieve a longer breakthrough time (1500 min) for the first run, as compared to as-received clinoptilolite (32 BV; 250 min). This suggests that pretreatment of clinoptilolite with NaCl rendered it in the homoionic form of Na+. Although pretreated clinoptilolite could treat the Cr wastewater at an initial concentration of 10 mg/L, its treated effluents were still unable to meet the required Cr limit of less than 0.05 mg/L set by the US Environmental Protection Agency (EPA).

https://www.mdpi.com/2073-4441/15/9/1667

70. **Amjad, M., Mohyuddin, A., Ulfat, W.**, Ahmed, S., & Hassan, A. U. (2023). **Silver hybridized polymer nanocomposite for efficient encapsulation of toxic dye from aqueous solution.** *Nanotechnology for Environmental Engineering,* **8(4), 891-898. doi: 10.1007/s41204-023-00335-8.** Muhammad Amjad, Ayesha Mohyuddin, Wajad Ulfat **(Chemistry/SSC) Date of Publication: December 2023** HJRS: Y (Null)

This work synthesized eco-friendly silver hybridized polymer nanocomposite (Ag@PNC) via a free radical mechanism. The Ag@PNC consists of a network of starch grafted to vinyl acetate (VA), lactic acid (LA), and Methylmethacrylate (MMA), which was reinforced with silver nanoparticles (AgNPs). The effect of incorporation of AgNPs into composite and properties was studied using different techniques, i.e., FTIR, SEM, EDS, and TGA/DTG. The SEM analysis indicates that the pore size of the Ag@PNC decreased with the blending of AgNPs, increasing the composite adsorption capacity and thermal stability. The FTIR confirms the grafting of monomers on starch and thermal degradation and melting of the composite assessed by TGA/DTG. Further, the adsorption kinetics and isotherm data indicate that the pseudo-second-order ($R2 = 0.9898$) and Langmuir adsorption isotherm ($R2 = 0.99829$) are suitable for the composite with a maximum adsorption capacity of 561.2563 mg/g. These results indicate the potential of synthesized nanocomposite in water treatment at a low cost with efficient reusability.

https://link.springer.com/article/10.1007/s41204-023-00335-8#Abs1

71. **Amjad, M., Mohyuddin, A., Javed, M., Iqbal, S., Liaquat, R., Alotaibi, M. T., Ulfat,W., . . Elkaeed, E. B. (2023). Synthesis of novel biodegradable starch-PMA and Ag@starch-PMA polymer composite for boosting charge separation ability and superior photocatalytic performance.** *Journal of Materials Science: Materials in Electronics,* **34(21). doi: 10.1007/s10854-023-10997-4.** Muhammad Amjad, Ayesha Mohyuddin, Mohsin Javed, Wajad Ulfat **(Chemistry/SSC) Date of Publication: July 2023** HJRS: X (Honorable Mention)

One of the main issues confronting researchers is the removal of hazardous organic dyes from industrial effluent. In this work, a biodegradable starch-based polymer (starch-PMA) and silver blend (Ag@starch-PMA) nanocomposite were developed by a free radical process and employed as adsorbents for efficiently removing the hazardous dyes from industrial wastewater. The synthesized polymer adsorbent's ability to bind to the methylene blue dye in water was tested under optimal conditions. The techniques, including FTIR, indicate the functional groups, TGA/DTG provide the thermal degradation of Ag@starch-PMA (76%) and starch-PMA (90%) at 520 °C and 500 °C, respectively. The surface morphology of the composites was investigated using SEM, and their biodegradation was examined using the soil burial technique. Further, in the adsorption process, parameters like adsorbent dose (0.15 g), pH range (2–12), and dye solution concentration (10 ppm) are optimized. The experimental data indicate the adsorption efficiency of Ag@starch-PMA (95%) and starch-PMA (92%) under the basic pH (8.4–10.4) and further remains constant. The qmax of starch-PMA (522.7834 mg/g) and Ag@starch-PMA (541.2563 mg/g) were assessed by Freundlich adsorption isotherm. In addition, linear fitting kinetic data of starch-PMA ($R2 = 0.8619$) and Ag@starch-PMA ($R2 = 0.9898$) showed that the adsorbents follow the pseudo-first order and pseudo-second order of reaction, respectively. A unique adsorbent for the removal of MB dye from an aqueous solution may therefore be found in the resultant nanocomposite.

https://link.springer.com/article/10.1007/s10854-023-10997-4#Abs1

72. **Arif, M. (2023a). A Critical Review of Palladium Nanoparticles Decorated in Smart Microgels.** *Polymers,* **15(17). doi: 10.3390/polym15173600.** Muhammad Arif **(Chemistry/SSC) Date of Publication: September 2023** HJRS: W (Silver)

Palladium nanoparticles (Pd) combined with smart polymer microgels have attracted significant interest in the past decade. These hybrid materials have unique properties that make them appealing for various applications in biology, environmental remediation, and catalysis. The responsive nature of the microgels in these hybrids holds great promise for a wide range of applications. The literature contains diverse morphologies and

architectures of Pd nanoparticle-based hybrid microgels, and the architecture of these hybrids plays a vital role in determining their potential uses. Therefore, specific Pd nanoparticle-based hybrid microgels are designed for specific applications. This report provides an overview of recent advancements in the classification, synthesis, properties, characterization, and uses of Pd nanostructures loaded into microgels. Additionally, the report discusses the latest progress in biomedical, catalytic, environmental, and sensing applications of Pd-based hybrid microgels in a tutorial manner.
https://www.mdpi.com/2073-4360/15/17/3600

73. **Arif, M.** (2023b). **A review on advanced research of combine life of polystyrene (hard) and organic polymer (soft) materials: from 2018 to present.** *Zeitschrift fur Physikalische Chemie.* doi: 10.1515/zpch-2022-0142. **Muhammad Arif** (Chemistry/SSC) Date of Publication: June 2023 HJRS: X (Clay)

The utilization of a combination of soft and hard materials with a core shell morphology (CSM) represents a distinctive approach for harnessing the properties of a single material. This field has garnered significant attention over the past decade. Core shell systems based on polystyrene offer a remarkable amalgamation of a solid component (polystyrene) and a flexible organic polymer, thereby enhancing the potential for catalysis, biological applications, and environmental studies within the core shell system (CSS). Various configurations of polystyrene-based CSS have been extensively documented in existing literature. The structural design of CSS plays a pivotal role in determining its applicability, which is why a specific morphology is depicted for each unique application. This review provides a comprehensive overview of the latest advancements in the classification, synthesis, properties, characterization, and applications of polystyrene-based CSS. Additionally, it briefly discusses the recent developments in drug delivery, sensing, environmental studies, and catalysis involving polystyrene-based CSS over the past six years.
https://www.ingentaconnect.com/content/degruyter/zpch/2023/00000237/00000007/art00002

74. **Arif, M.** (2023c). **A review on copper nanoparticles loaded in smart microgels.** *Materials Today Communications,* 36. doi: 10.1016/j.mtcomm.2023.106580. **Muhammad Arif** (Chemistry/SSC) Date of Publication: August 2023 HJRS: W (Bronze)

The metal nanoparticles loaded in smart crosslinked polymers is a unique combination which has had a lot of attention during the last two decades. Their stimuli responsive behavior makes them suitable for various applications. Therefore, it is a very necessary condition to provide previous knowledge to the new researchers. Thus, a comprehensive review has been written on copper nanoparticles loaded in smart microgels. The anchimeric designing and morphologies of copper nanoparticles in microgel systems have been described. The systematic synthetic methods as well as characterization techniques are also explained to the new researchers for selection a suitable method. The stimuli responsive behavior of these systems under various conditions of temperature, pH, and ionic strength etc. is also illustrated in this review. Various applications of copper nanoparticles loaded in microgels like catalysis (catalytic hydrogen generation, reduction of nitroarenes, organic dyes, and coupling reactions), removal of dyes through adsorption, synthesis of biodiesel, conducting materials, anti-bacterial, drug delivery and sensing have also been discussed critically. The innovative prospects for the future have also been highlighted to help the new researchers working on copper nanoparticles loaded in smart microgels.
https://www.sciencedirect.com/science/article/abs/pii/S2352492823012710

75. **Arif, M., Raza, H., Haroon, S. M., Naseem, K., Majeed, H., Tahir, F., . . . Ul Mahmood, S. (2023). Copper (II) ions extraction by poly(N-vinylcaprolactam-mathacrylic acid) microgels for in situ reduction formation of copper nanoparticles to reduce pollutants.** *Journal of Molecular Liquids,* 392. doi: 10.1016/j.molliq.2023.123541. **Muhammad Arif** (Chemistry/SSC) **Hammad Majeed** (Chemistry/KUSC) Date of Publication: December 2023 HJRS: W (Gold)

It is very important to eliminate organic dyes and most of the toxic transition metal ions from water because they are hazardous substances for livings. Many systems are reported to eliminate organic pollutants or transition metal ions solely from water. A new systematic way has been developed for effectively removal of both metal ions and organic pollutants (nitroarenes and toxic dyes). For this purpose, a spherical poly(N-vinylcaprolactam-co-methacrylic acid) P(NVC-MAAc) microgel system was developed by free radical precipitation polymerization (FRPP) method. The XRD, FTIR, SEM, DLS, and TEM techniques were used for characterization of P(NVC-MAAc) system and then used that system as an adsorbent for removal of copper (II) ions from water under a variety of conditions, including different P(NVC-MAAc) concentrations, pH, copper (II) ions contents, and agitation times. Various adsorption isotherms were applied to evaluate the best fitted adsorption isotherms for extraction of copper (II) ions with P(NVC-MAAc) microgel system. Furthermore, the kinetics of copper (II) ion adsorption on P(NVC-MAAc) were investigated using the pseudo-1st order (P1O), intra-particle diffusion model (InPDM), pseudo-2nd order (P2O), and Elovich model (EM). The loaded copper (II) ions in P(NVC-MAAc) microgel were then in-situ reduced to generate copper nanoparticles (NPs). The resulted [Cu-P(NVC-AAc)] hybrid microgels were used as catalyst to reduce toxic pollutants from water such as 4-nitrophenol (4NiP), 4-nitroaniline (4NiA), chromium (VI) ions (ChVI), rhodamine-B (RhB), methyl orange

(MeO), and eyosin-Y (EyY). The values of apparent rate constant (kapp) for 4NiP, 4NiA, ChVI, RhB, MeO and EyY were found 0.725 min−1, 0.587 min−1, 0.097 min−1, 0.821 min−1, 0.860 min−1, and 0.833 min−1 respectively. As a result, a broad range of new organic transformations can be efficiently catalyzed by the Cu-P(NVC-MAAc) system.
https://www.sciencedirect.com/science/article/abs/pii/S0167732223023474

76. **Asif, H. M., Zafar, F., Ahmad, K., Iqbal, A., Shaheen, G., Ansari, K. A., . . . Ghaffar, S. (2023). Synthesis, characterization and evaluation of anti-arthritic and anti-inflammatory potential of curcumin loaded chitosan nanoparticles.** *Scientific Reports,* **13(1). doi: 10.1038/s41598-023-37152-7. Khalil Ahmad (Chemistry/SSC) Date of Publication: December 2023 HJRS: W (Platinum)**

Curcumin is a phytochemical isolated from the dried rhizome of Curcuma longa L. family Zingiberaceae which possesses versatile biological activities and has hydrophobic properties. The current study was conducted to fabricate, and optimize curcumin loaded chitosan and Sodium tripolyphosphate (STPP) nanoparticles (NPs) to improve the bioavailability of curcumin. NPs were fabricated employing the Ionic gelation method. Four formulations were developed based on the selected variables like STPP and chitosan concentration, rotations per minute (rpm), temperature, and pH of chitosan solution. NPs were characterized for morphology, drug-polymer compatibility, yield, particle size, encapsulation efficiency, release behavior, anti-inflammatory and anti-arthritic activity compared to curcumin and standard drug. Fourier transform infrared spectroscopy (FTIR) shows nanoparticle compatibility. The maximum yield was 60%. Entrapment efficiency ranged from 45 to 65%. Curcumin NPs and standard drug 600 μg/ml shows 59% and 70% anti-inflammatory activity by HRB membrane stabilization method respectively which are greater than curcumin alone whereas anti-arthritic activity by protein denaturation method which is also comparable to standard drug and greater than curcumin was 66 and 70% respectively. Statistical analysis shows the mean significant difference at $p \leq 0.05$. The study concluded that curcumin-loaded chitosan and STPP NPs formulated successfully by the Ionic gelation method, which increased curcumin absorption leading to a reduced dosing rate and improved patient compliance.
https://www.nature.com/articles/s41598-023-37152-7#Abs1

77. **Asif, M., Qureshi, S., Sajid, H., Kosar, N., Gilani, M. A., Ayub, K., . . . Mahmood, T. (2023). Sensing Performance of Heptazine-Based C3N4 Quantum Dot toward Highly Toxic Environmental Pollutants, Amides, and Acetyl Derivatives.** *Journal of Inorganic and Organometallic Polymers and Materials.* **doi: 10.1007/s10904-023-02798-3. Naveen Kosar (Chemistry/SSC) Date of Publication: July 2023 HJRS: W (Honorable Mention)**

The detection of toxic molecules has gained imperial attention to protect living organisms and their environment. The broadly explored sensor behaviour of triazine-based C3N4 reveals their ultra-high sensitivity towards numerous toxic molecules e.g., chemical welfare agents. However, another potential analogue of C3N4 composed of heptazine exhibits remarkable electrical and optical properties but has not been much explored in sensor technology, especially for toxic pollutants. Keeping this in mind, the sensing performance of heptazine-based g-C3N4 is explored for the detection of toxic amides by using First Principles calculations. In this context, acryloyl amide (C2H3CONH2), acryloyl chloride (C2H3COCl), fluoroacetic acid (C2H3FCOOH), flouroaceta amide (C2H2FONH2), flouroacetyl chloride (C2H2FOCl) are selected as toxic pollutants; herein, for the ease of understanding, these molecules are represented as AAM, ACl, FAAc, FAA, & FACl, respectively. The electrochemical sensitivity of g-C3N4 is determined via geometric, energetic, and electronic properties analysis, whereas the photochemical sensitivity is explored by UV–Vis absorption analysis based on TD-DFT calculations. The interaction energies of studied molecules on C3N4 range between − 9.09 and - 23.39 kcal/mol depending upon the type of interactions e.g., hydrogen bonding or dispersion, which are explained on the basis of Symmetry Adopted Perturbation Theory, Non-Covalent Interaction Index, and Quantum Theory of Atoms in Molecules analyses. The density of State analysis, Frontier Molecular Orbitals and NBO charge transfer characterized that the electronic behaviour of g-C3N4 can be an effective sensor material with a semiconducting nature and significant charge transfer. Lastly, UV–Vis absorption analysis confirms the photosensitivity of g-C3N4 upon interaction with toxic molecules.
https://link.springer.com/article/10.1007/s10904-023-02798-3#Abs1

78. **Aslam, A. A., Hassan, S. U., Saeed, M. H., Kokab, O., Ali, Z., Nazir, M. S., . . . Aslam, A. A. (2023). Cellulose-based adsorbent materials for water remediation: Harnessing their potential in heavy metals and dyes removal.** *Journal of Cleaner Production,* **421. doi: 10.1016/j.jclepro.2023.138555. Muhammad Haris Saeed (Chemistry/SSC) Date of Publication: October 2023 HJRS: W (Platinum)**

Dyes and heavy metals pose significant threats to both human health and the environment as key pollutants. While various methods exist for treating contaminated water, these approaches are often costly, energy-intensive, and produce hazardous waste that requires careful disposal. Consequently, there is a pressing need for cost-effective, highly efficient, and environmentally friendly processes for wastewater treatment. The adsorption method, specifically utilizing non-toxic and biodegradable materials such as cellulose-based substances, has gained attention as a clean, sustainable, and effective approach for water purification. Cellulose possesses hydroxyl groups that facilitate the binding of chemical species, thereby enhancing

contaminant adsorption. This review explores the application of cellulose and modified cellulosic materials in water purification, highlighting their exceptional capacity for adsorbing heavy metals and dyes. Cellulose and its derivatives show great promise as materials for water purification, and this review elucidates their reusability, challenges, and future prospects.
https://www.sciencedirect.com/science/article/abs/pii/S0959652623027130

79. Aslam, M., Ahmad, S. R., Imtiaz, Z., Aslam, H. M. U., Baqar, M., & Qadir, A. (2023). Risk assessment of microplastics in fish assemblage based on ecological preferences in an interconnected and polluted river system. *Human and Ecological Risk Assessment, 29*(7-8), 1109-1133. doi: 10.1080/10807039.2023.2239942. Hafiz Muhammad Umar Aslam (Chemistry/SSC) Date of Publication: September 2023 HJRS: W (Bronze)

Risk assessment of microplastics (MPs) contamination in the assemblage of 15 important fish species with different feeding habits and microhabitats was studied in the River Ravi, Pakistan. Fishes with different feeding habits (omnivore, herbivore, and carnivore) and microhabitat preferences (surface, column, and bottom dweller) were sampled at Balloki and Sidhnai barrages during the post-monsoon seasons of 2019–2020. The gastrointestinal tract (GIT) of fish samples were found to be contaminated with MPs, with an average of 28.1 ± 20.7 MPs/individual and 26.8 ± 15.9 MPs/individual at Balloki and Sidhnai barrages, respectively. The surface dweller fish exhibited the highest MPs abundance, followed by the bottom dweller and column dweller. In addition, the highest MPs recovered from the omnivore generalist feeding group as compared to herbivores and carnivores. The fibers were the most abundant shape and generally made up of polyethylene terephthalate (PET) and polyethylene (PE). These PET and PE (low-density MPs) exhibit low hazard level, whereas high-density MPs with high hazard level and rarely present in GIT of sampled fishes. Based on MP polymer toxicity assessment, nine fish species were categorized in minor risk, two species in medium risk, and four species in highrisk group. Bottom dwelling fishes were at the highest plastic polymer risk level III due to the presence of a high density of MPs with high toxicity hazards. The high-risk prone fishes are under direct threat from MPs pollution, which may disrupt the ecological integrity of the river ecosystem and human health. The findings of the current study highlight the urgent need to address plastic pollution issues in River Ravi, and will be helpful for managers, researchers, and fisheries experts to mitigate this emerging challenge.
https://www.tandfonline.com/doi/full/10.1080/10807039.2023.2239942

80. Maqbool, M., Akhter, T., Hassan, S. U., Mahmood, A., Al-Masry, W., & Razzaque, S. (2023). Development of a chromium oxide loaded mesoporous silica as an efficient catalyst for carbon dioxide-free production of ethylene oxide. *RSC Advances, 13*(46), 32424-32432. doi: 10.1039/d3ra05858a. Muhammad Maqbool (Chemistry/SSC) Date of Publication: November 2023 HJRS: W (Bronze)

Ethylene oxide (EO) is a significant raw material used in many commodities for consumers, particularly ethoxylates, polymers, and certain other glycol derivatives. We synthesized a catalyst by incorporation of chromium oxide into a mesoporous silica material (Cr/MSM) via the hydrothermal method, an effective catalyst for partial ethylene oxidation for producing carbon dioxide (CO_2) free EO. Subsequently, XRD, BET, XPS, and TEM were used to analyse the structural characteristics of the Cr/MSM catalyst. The catalytic performance of the synthesized catalyst was assessed in the liquid-phase epoxidation (LPE) of ethylene, utilizing peracetic acid (PAA) as an oxidant. This approach not only circumvented the generation of CO_2 but also mitigated the risk of metal leaching. Confirmation of the successful production of EO was achieved through GC chromatography, where the presence of a peak with a retention time (RT) of 8.91 minutes served as conclusive evidence. We systematically explored a range of reaction parameters, including temperature, catalyst concentration, the molar ratio of ethylene to PAA, and solvent effect. This comprehensive investigation aimed to fine-tune the reaction conditions, ultimately improving ethylene conversion and enhancing the selectivity of the catalyst for EO production. This approach can effectively resolve the issues of greenhouse gas emissions and metal leaching that had been associated with previously reported catalysts.
https://pubs.rsc.org/en/content/articlehtml/2023/ra/d3ra05858a

81. Naseem, K., Arif, M., Anwar, A., Haider, S., & Akhtar, M. S. (2023). Investigating adsorptive potential of Raphanus caudatus leaves biomass for methyl orange dye: isotherm and kinetic study. *Zeitschrift fur Physikalische Chemie.* doi: 10.1515/zpch-2023-0255. Muhammad Arif (Chemistry/SSC) Date of Publication: June 2023 HJRS: X (Clay)

This study emphasis the removal of methyl orange (MO) from aqueous medium by Raphanus caudatus powdered leaves biomass. Functional groups involved in the removal of MO dye from aqueous medium by leave biomass were identified by Fourier transform infrared (FTIR) spectroscopy analysis. It was seen that removal of dye molecules from aqueous medium was affected by the change in adsorption condition such as adsorbent dose, agitation time and pH of the medium. Maximum adsorption capacity of Raphanus caudatus leave biomass powder for MO dye was found as 30.86 mg/g. Regression factor (R^2) value indicates the best fitting of Langmuir isotherm model for the adsorption process. Amount of adsorption energy calculated by Dubinin-Radushkevich (DR) isotherm model illustrates the chemical bond formation between dye and biomass

particles. Recyclability results depict that biomass showed good adsorption capacity value for MO up to 4th reusability cycle.

https://www.degruyter.com/document/doi/10.1515/zpch-2023-0255/html

82. **Rasheed, H. M., Rauf, A., Arif, M., Mohyuddin, A., Javid, M., Nadeem, S., Haroon, M. S, Raza, H, Mahmood, S. U. (2023). Selective Removal of Lead (II) Ions from Wastewater with Fabricated ZnO-PVA Membrane.** *JOM.* **doi: 10.1007/s11837-023-05957-6. Hafiza Mehwish Rasheed, Abdul Rauf, Muhammad Arif, Ayesha Mohyuddin, Sohail Nadeem, Shah Muhammad Haroon, Hamid Raza (Chemistry/SSC) Date of Publication: July 2023 HJRS: W (Bronze)**

Water contamination is a serious threat to living organisms and the contamination is increasing day by day due to versatile applications of heavy metal ions. Various types of materials have been reported for removal of these heavy metal ions from water but selection of heavy metal ions from wastewater is still a serious issue. In this regard, a ZnO-PVA-coated membrane was designed for the selective removal of Pb^{+2} ions from wastewater. The procedure known as sol–gel was adopted in order to produce ZnO nanoparticles by using the extract of bio-inspired Azadirachta indica (neem) leaves. Then, ZnO-PVA was synthesized for coating the membrane by a simple solution-casting process. The system was characterized by XRD, FTIR, FESEM, EDX, and XPS. The ZnO-PVA-coated membrane was applied for the extraction of toxic metal ions present in polluted water. The coated membrane selectively removed the Pb^{+2} ions from the contaminated water solution. The removal efficiency of the ZnO-PVA-coated membrane for Pb^{+2} ions was found to be 93.99% at pH = 4. The kinetic study and adsorption isotherm indicated that the monolayer membrane well-chemisorbed Pb^{+2} ions. The highest possible Pb^{+2} ions adsorption capacity calculated by the adsorption isotherm was found to be 218.47 mg/g.

https://link.springer.com/article/10.1007/s11837-023-05957-6#Abs1

83. **Razzaq, H., Siddique, A., Farooq, S., Razzaque, S., Ahmad, B., Tahir, S., & Nawaz, H. (2023). Hybrid ionogel membrane of PVDF incorporating ionic liquid-reduced graphene oxide for the removal of heavy metal ions from synthetic water.** *Materials Science and Engineering: B,* **296. doi: 10.1016/j.mseb.2023.116680. Shumaila Razzaque (Chemistry/SSC) Date of Publication: October 2023 HJRS: W (Bronze)**

The biggest challenge around the world is water contamination by heavy metal ions. The detrimental effects of heavy metals on humans as well as on aquatic ecosystems are of great concern. In this regard, membrane technology is playing its role in the separation of these non-biodegradable heavy metal ions from the waste water, though improvement in the technology is still the need of time. The present work deals with the novel strategy of developing PVDF/rGO nanocomposite membrane with the inclusion of IL via phase inversion method to remove heavy metal ions. Inclusion of rGO and IL as filler into the PVDF hydrophobic matrix improved the antifouling characteristics and solvent contents of the hybrid ionogel membranes. In addition, the decrease in the contact angle from 90° (Pure PVDF) to 46° (PVDF/IL/rGO) was observed pointing towards the hydrophilic nature of the resulting membranes. Among various compositions, 0.5 w/v % rGO demonstrated maximum efficiency by removing up to 90% of various divalent cations including Cu^{2+}, Cd^{2+}, $Zn^{2+,}$ and Mn^{2+}.The flux recovery ratio was observed to be 94% after testing the membrane several times. Up to 70% removal of As^{3+} from the same membrane is a hope to design a membrane with improved efficiency for removing As^{3+}.

https://www.sciencedirect.com/science/article/pii/S0921510723004221

84. **Riaz, T., Asghar, A., Shahzadi, T., Shahid, S., Mansoor, S., Asghar, A., Javed, M, . . . Elkaeed, E. B. (2023). Green synthesis of ZnO and Co-ZnO using Brassica rapa leave's extract and their activities as antioxidant agents, efficient adsorbents, and dye removal agents.** *Journal of Saudi Chemical Society,* **27(5). doi: 10.1016/j.jscs.2023.101716. Sammia Shahid, Sana Mansoor & Mohsin Javed (Chemistry/SSC) Date of Publication: September 2023 HJRS: W (Bronze)**

The wastewater released from industries contains many harmful materials like organic dyes and toxic metal ions which badly affect our environment. Nanotechnology is one of the unique approaches to reducing these chemicals. In current research work monometallic ZnO and Co-ZnO bimetallic NPs were synthesized from Brassica rapa leave's extract and then these were employed for the elimination of methylene blue (MB) and metal ions of Cu (II). Characterization was done by several analytical techniques such as EDX, FTIR, UV–Visible spectroscopy, SEM and XRD. The average diameter of ZnO and Co-ZnO BMNPs was found to be 32.94 nm and 13.82 nm assessed by XRD analysis. The SEM investigation revealed that the produced NPs had a spherical shape. Three distinct methods have opted to determine the antioxidant potential of synthesized NPs. Different factors like pH, contact time, NPs conc., dye conc. and temperature were studied for the elimination of dye while for the eradication of Cu (II) ions; pH, contact time, NPs conc. and adsorbate doses were studied. Adsorption isotherm and kinetic studies were employed for MB and Cu (II) ions elimination while thermodynamic studies were also done for the elimination of MB.

https://www.sciencedirect.com/science/article/pii/S1319610323001205

85. Saddique, Z., **Faheem, M.,** Habib, A., UlHasan, I., Mujahid, A., & Afzal, A. (2023). Electrochemical Creatinine (Bio) Sensors for Point-of-Care Diagnosis of Renal Malfunction and Chronic Kidney Disorders. *Diagnostics,* 13(10). doi: 10.3390/diagnostics13101737. **Muhammad Faheem (Chemistry/SSC) Date of Publication: May 2023** **HJRS: X (Honorable Mention)**

In the post-pandemic era, point-of-care (POC) diagnosis of diseases is an important research frontier. Modern portable electrochemical (bio)sensors enable the design of POC diagnostics for the identification of diseases and regular healthcare monitoring. Herein, we present a critical review of the electrochemical creatinine (bio)sensors. These sensors either make use of biological receptors such as enzymes or employ synthetic responsive materials, which provide a sensitive interface for creatinine-specific interactions. The characteristics of different receptors and electrochemical devices are discussed, along with their limitations. The major challenges in the development of affordable and deliverable creatinine diagnostics and the drawbacks of enzymatic and enzymeless electrochemical biosensors are elaborated, especially considering their analytical performance parameters. These revolutionary devices have potential biomedical applications ranging from early POC diagnosis of chronic kidney disease (CKD) and other kidney-related illnesses to routine monitoring of creatinine in elderly and at-risk humans.

https://www.mdpi.com/2075-4418/13/10/1737

86. Saeed, M. H., Kosar, N., Hassan, S. U., Nadeem, S., Mohammed, M. A., Abd Ghani, M. K., & Abdulkareem, K. H. (2023). Determination of bandgap of period 3, 4, and 5 transition metal dopants on zinc oxide using an artificial neural network based approach. *Chemometrics and Intelligent Laboratory Systems,* 242. doi: 10.1016/j.chemolab.2023.104983. **Muhammad Haris Saeed, Naveen Kosar & Sohail Nadeem (Chemistry/SSC) Date of Publication: November 2023** **HJRS: W (Bronze)**

Artificial intelligence (AI) and machine learning (ML) have rapidly emerged as valuable tools for chemical research, offering new ways to analyze and understand complex chemical systems. This research article investigates the use of adaptive neuro-fuzzy inference system (ANFIS) and multi-layer perceptron (MLP) models to predict the bandgap of transition metal doped zinc oxide (ZnO). The opto-electronic properties of transition metal doped ZnO complexes are of significant interest because of their applications is optoelectronic systems. The MLP and ANFIS models were trained using a dataset of experimentally measured bandgap values and the corresponding structural parameters of the doped ZnO systems. The performance of the models was evaluated using statistical metrics i.e., RMSE, R, and MAE. The results showed that both MLP and ANFIS models were capable of accurately predicting the bandgap of transition metal doped ZnO. However, the ANFIS model demonstrated superior performance with higher accuracy and better generalization ability. The study provides a useful approach for predicting the bandgap of transition metal doped ZnO using machine learning techniques and may contribute to the development of advanced optoelectronic devices.

https://www.sciencedirect.com/science/article/abs/pii/S0169743923002332

87. Sarfraz, S., Saeed, M., **Javed, M.,** Hussain, N., Iqbal, S., Amin, S., . . . Elkaeed, E. B. (2023). Validation of a Cost-Effective RP-HPLC Method for Quantitative Investigation of Daclatasvir Dihydrochloride in Pharmaceutical Formulations. *Journal of Chemistry,* 2023. doi: 10.1155/2023/4908091. **Mohsin Javed (Chemistry/SSC) Date of Publication: August 2023** **HJRS: Y (Null)**

A well-known direct-acting antiviral (DAA) drug called daclatasvir may be used to treat chronic hepatitis C virus (HCV) infection. Herein, we reported a selective, precise, and a cost-effective analytical method for the measurement of an active pharmaceutical ingredient (API) of daclatasvir dihydrochloride in drug substances as well as drug products via the reversed-phase RP-HPLC technique. To obtain greater separation, the majority of the chromatographic conditions were improved. Best separation findings were achieved under chromatographic conditions with an HPLC column of USP L1 (150 × 4.6 mm, 5 μm) by utilizing a combination of acetonitrile and buffer solution of KH_2PO_4 (30 : 70, v/v) as a mobile phase at a stream rate of 1 mL.min^{-1} with a finding at 300 nm and a column temperature of 40°C. Linearity was examined in the range of 90–210 ppm (R^2 = 0.999) for daclatasvir dihydrochloride. The new technique has been verified using industry-recognized criteria, including applicability, system precision, accuracy, robustness, specificity, range, linearity, quantification limit, reagent stability, and detection limit. All the measured metrics were determined to be within acceptable limits using the criteria of the Worldwide Council for Harmonisation (ICH). In pharmaceutical labs, daclatasvir dihydrochloride may be analyzed qualitatively and quantitatively using the well-established RP-HPLC technique. Our study also highlights the need to evaluate the greenness of the method developed using a recognized tool ,i.e., Analytical Greenness Metrics (AGREE).

https://www.hindawi.com/journals/jchem/2023/4908091/

88. Siddique, R., Zahoor, A. F., Ahmad, S., **Ahmad, H.,** & Hussain, A. (2023). Studying the impact of anti-oxidant extract of different vegetables on the formation of PAHs in rabbit meat. *International Journal of Nanotechnology,* 20(5-10), 719-730. doi: 10.1504/IJNT.2023.134044. **Hamad Ahmad (Chemistry/SSC) Date of Publication: October 2023** **HJRS: Y (Null)**

This study investigated the impact of vegetable extracts comprising anti-oxidant properties to decrease the generation of polycyclic aromatic hydrocarbons (PAHs) in fried rabbit meat. PAHs are powerful noxious compounds produced in well-done processed meat products. The PAHs yields are connected with diversified factors, such as type of meat, heating temperature as well as time, processing technique, additives and storage time of meat. Meat samples were cooked without spices. Extraction of PAHs was done through saponification methodology using potassium hydroxide in methanol and purified with silica gel column methodology. Prepared samples were quantified through gas chromatography with mass spectrometry (GC-MS). Results depicted that the use of spinach as an anti-oxidant would produce less PAHs.
https://www.inderscienceonline.com/doi/abs/10.1504/IJNT.2023.134044

89. **Ulfat, W., Mohyuddin, A., Amjad, M., Othman, M. H. D., Gikas, P., & Kurniawan, T. A. (2023). Fabrication, characterization, and application of light weight thermal insulation material from combined buffing dust and plaster of paris for construction industry.** *Journal of Environmental Management,* **347. doi: 10.1016/j.jenvman.2023.119129. Wajad Ulfat, Ayesha Mohyuddin & Muhammad Amjad (Chemistry/SSC) Date of Publication: December 2023 HJRS: W (Platinum)**

Buffing dust, generated from tannery industries, is a source of air pollution in Pakistan. Valorization of the waste into another useful material is important to deal with the environmental pollution, while reducing waste disposal costs in landfills. To demonstrate its technological strength, this work fabricates a thermal insulation material made of plaster of Paris and the buffing dust (from tanning waste) in the form of a composite with superior mechanical properties and low thermal conductivity. Buffing dust with concentrations ranging from 5 to 20% (w/w) were loaded in the composite. The samples synthesized were made slurry of plaster of Paris, buffing dust, and water at ambient temperature. The physico-mechanical properties of composite were analyzed. It was found that the composite had better thermal insulation properties than the panels of the plaster of Paris. Its thermal conductivity was reduced to 15% after adding buffing dust (20% w/w). All the materials had physico-chemical properties like tensile strength (0.02 MPa and 0.06 MPa), density (700-400 kg/m3), water absorption (5.2–8.6%) and thermal conductivity (0.17000–0.09218 W/m-K). Thermogravimetric analysis showed that the material was thermally stable at temperatures ranging from 145 to 177 °C, while FT-IR results revealed that the composite contained O–H, N–H, and Cdouble bondO functional groups. SEM analysis displayed that the composite's homogeneity was reduced with low voids due to buffing dust addition, while EDX analysis showed that the composite contained 23.62% of S, 26.76% of Ca, 49.2% of O and 0.42% of C. This implies that buffing dust could be recycled to manufacture heat insulation materials for construction sector to reduce air pollution, while minimizing energy consumption. By integrating the buffing dust from tanning waste and the plaster of Paris as a composite for construction sector, this work promotes the recycling of unused waste, while saving public funds. Instead of paying landfill fees and polluting soil, the waste may be recycled at lower cost, while reducing environmental damage.
https://www.sciencedirect.com/science/article/abs/pii/S0301479723019175

90. **Umar, M., Ajaz, H., Javed, M., Iqbal, S., Shuaib Khan, M., Alhujaily, A., . . . Ibrahium, H. A. (2023). Synthesis and characterization of highly efficient Te-doped Mn3O4 and s-g-C3N4 /Te- Mn3O4 nanocomposites as an excellent antimicrobial and photocatalytic agent.** *Inorganic Chemistry Communications,* **157. doi: 10.1016/j.inoche.2023.111353. Mohsin Javed (Chemistry/SSC) Date of Publication: November 2023 HJRS: X (Honorable Mention)**

This work aims to synthesize manganese oxide nanoparticles (Mn3O4NPs) using a co-precipitation method and analyzed them through XRD, SEM and FT-IR. The XRD analysis confirmed the tetragonal hausmanite structure of the Mn3O4 NPs, while SEM revealed an average particle size of 9–20 nm. Kinetic studies demonstrated the efficient photooxidation of methylene blue with first-order kinetics under UV or visible light. Degradation efficiencies varied between 82% and 93% depending on the light source. Furthermore, we used the zone inhibition approach to assess the antibacterial potency of various Mn3O4 NP contents alongside human pathogenic bacteria, namely Escherichia coli and Staphylococcus aureus. The results of the qualitative antibacterial tests revealed that E. coli, a Gram-negative bacterium, is more sensitive to Mn3O4 NPs than are Gram-positive bacteria, with a maximum zone diameter of 28 mm (S. aureus). Alternatively, it was determined that S-g-C3N4/Te-Mn2O3 had the maximum antifungal activity against Alternaria solani at 28.9 mm and against. Colletotrichum gloeosporioides at 47.3 mm.
https://www.sciencedirect.com/science/article/abs/pii/S1387700323009656

91. **Umar, M., Ajaz, H., Javed, M., Mansoor, S., Iqbal, S., Alhujaily, A., . . . Elkaeed, E. B. (2023). Designing of Te-doped ZnO and S-g-C3N4 /Te-ZnO nano-composites as excellent photocatalytic and antimicrobial agents.** *Polyhedron,* **245. doi: 10.1016/j.poly.2023.116664. Mohsin Javed & Sana Mansoor (Chemistry/SSC) Date of Publication: November 2023 HJRS: X (Clay)**

Today, it is crucial but challenging to develop a narrow bandgap photo-catalyst that can eliminate contaminants when exposed to visible light. In this work, we synthesized the ZnO, Te-doped ZnO, and s-g-C3N4 assisted Te-doped ZnO nanoparticles by a susceptible and economical co-precipitation method. Different

techniques were employed to characterize the compounds like XRD confirms the formation of pure wurtzite phase present within ZnO nanoparticles. The morphology of produced nanoparticles was studied using FESEM, which reveals that ZnO nanoparticles develop into spherical particles whereas doped particles take the form of nano-sheets with a regular hexagonal pattern. The FT-IR and UV visible spectrum was used to measure the functional groups and optical properties of compounds. The doped compound shows the maximum efficiency of degradation against methylene blue dye under sunlight exposure. Furthermore, E. coli and S. aureus were used as test subjects for the antibacterial activity of these synthetic compounds. On the other hand, the greatest antifungal activity of S-g-C3N4/Te-ZnO against C. albicans was calculated to be 44.6 mm, and 26.5 mm against E. salmonicolor. Te-doped ZnO nanoparticles with the aid of S-g-C3N4 showed remarkable photocatalytic and antimicrobial activities.

https://www.sciencedirect.com/science/article/abs/pii/S0277538723003868

92. **Umar, M., Ajaz, H., Javed, M., Mansoor, S., Iqbal, S., Rauf, A., . . . Elkaeed, E. B. (2023). Design of a highly efficient heterostructure of transition metal tellurides with outstanding photocatalytic and antimicrobial potential.** *Journal of Saudi Chemical Society,* **27(6). doi: 10.1016/j.jscs.2023.101760. Mohsin Javed & Sana Mansoor (Chemistry/SSC) Date of Publication: November 2023 HJRS: W (Bronze)**

This work aimed to synthesize an effective material having greater potential to reduce water pollution caused by industrial waste and exhibit efficient antibacterial potential. The transition metals (Manganese-Mn, Zinc-Zn) and post transition metal (Tin-Sn) reacted with TeO_2 in a stoichiometric ratio by adopting a solid-state reaction. The crystallite size of the synthesized compounds $MnTeO_3$ (D1), $ZnTeO_3$ (D2), and $SnTe_3O_8$ (D3) was measured by the Debye-Scherrer formula by extracting data from the FWHM. D1 and D2 exhibit the orthorhombic structure whereas D3 has a simple cubic structure and crystalline size was measured by FWHM i.e., 221 nm, 458 nm, and 153 nm. Catalytic degradation efficiency for the removal of MB dye was found to be in the range of 66%-73%. Additionally, these substances have strong antimicrobial action alongside both bacteria and fungi, such as *Escherichia coli*, *Staphylococcus aureus* with maximal zone inhibitions of 35.0 mm and 12.5 mm for each kind of bacterium. The highest antifungal activity of Mn integrated was estimated to be 37.2 mm versus *Aspergillus niger* and 15.1 mm alongside *Coccidioides*. According to the findings, the manufactured material has effective photocatalytic and antimicrobial activities.

https://www.sciencedirect.com/science/article/pii/S1319610323001643

93. **Waheed Uz, Z., Ayub, R., Dar, A., & Anwar, J. (2023). Determination of Diclofenac Sodium in Pharmaceutical Preparations by Computational Image Scanning Densitometry.** *Journal of the Chemical Society of Pakistan,* **45(3), 237-242. doi: 10.52568/001248/JCSP/45.03.2023. Waheed-uz-Zuman (Chemistry/SSC) Date of Publication: June 2023 HJRS: Y (Null)**

Diclofenac sodium is a nonsteroidal anti-inflammatory drug which cures by reducing substances in the body that cause pain and inflammation. There is always a risk of heart attack and stroke in case of taking excess of the drug. In present study a simple, fast and cost-effective method is devised for the assay of diclofenac sodium in locally available pharmaceutical preparations. The method is based on the reaction of the drug with 2, 4-DNPH (2, 4-Dinitro phenyl hydrazine). Microquantities of the drug gave green coloured spots when mixed with 2,4-DNPH on a pre-coated TLC plate, in the presence of potassium iodate and lithium hydroxide. The spots were scanned by using a flatbed scanner and the images obtained were computationally quantified with the help of custommade software to measure the optical density. The reaction parameters were optimized, and the results were compared with the standard spectrophotometric method.

https://jcsp.org.pk/issueDetail.aspx?aid=76e5a0ea-6426-4856-91cb-c2771c44f5ef

94. **Waheed Uz, Z., Dar, A., Anwar, J., & Munir, A. (2023). Photocatalytic Degradation of Malachite Green Dye with UV/H2O2 System in presence of Transition Metal Ions.** *Journal of the Chemical Society of Pakistan,* **45(4), 302-308. doi: 10.52568/001284/JCSP/45.04.2023. Waheed-uz-Zuman (Chemistry/SSC) Date of Publication: August 2023 HJRS: Y (Null)**

The chemical degradation of Malachite Green dye has been studied by using UV/H2O2 system in presence of transition metal ions (Fe2+, Mn2+ and Ti2+). The degradation reaction was carried out by circulating the aqueous dye solution in a custom-made UV reactor with the help of a variable speed peristaltic pump. The effects of initial concentration of dye, concentration of Hydrogen peroxide, operating temperature, pH, Ultrasound vibrations and transition metal ions were investigated on the time required for complete degradation of the dye. It has been found that under optimum conditions the dye could be degraded in minimum possible time especially in presence of transition metals like iron. The intermediate products obtained during the degradation process were subjected to FTIR spectroscopy for structural analysis. The residue spectra did not show any band revealing the presence of any aromatic ring. To check the completion of the reaction the final residue was analyzed for total organic carbon (TOC). All such tests indicated that the dye has been completely degraded leaving no detectable residue.

https://jcsp.org.pk/issueDetail.aspx?aid=2ed23a28-2d8e-49a4-86b4-3b910d839308

95. Waheed Uz, z., Salman, M., Farooq, U., Dar, A., Haq, I., Burhan, T., . . . Shafique, U. (2023). Determination of Cyanide at Trace Levels by Computational Scanning Densitometry. *Current Analytical Chemistry,* 19(6), 466-471. doi: 10.2174/1573411019666230616085924. Waheed-uz-Zuman (Chemistry/SSC) Date of Publication: August 2023 HJRS: Y (Null)

Introduction: Cyanide is one of the most commonly present anions in industrial effluents, highly toxic to human and animal life. Therefore, its determination in aqueous media by simple, portable, and quick methods is required. Objective: This study aims to develop a simple and quick method to determine this anion at the micro level in aqueous media without using any expensive instrument. Method: The method is based on treating the microliter sample of aqueous cyanide with the classical Lassaigne's reagents on a TLC plate. After heating in an oven for a few minutes, a deep blue spot of ferric ferrocyanide complex appeared on the plate. The color depth of the spots was measured by scanning the TLC plate and analyzing the image with an indigenous software package. Result: As a result of fusion with metallic sodium, carbon and nitrogen of the organic compound combine to form cyanide, which first reacts with Fe(II) to form hexacyanoferrate ion $[Fe(CN)6]4-$ that further combines with Fe(III) to create a neutral deep blue colored coordination complex, ferric ferrocyanide $Fe4[Fe(CN)6]3$.

https://www.ingentaconnect.com/content/ben/cac/2023/00000019/00000006/art00007

96. Younis, M. W., Akhter, T., Yousaf, M., Munir, J., Naeem, H., & Ali, M. (2023). Layer-sliding-mediated reversible tuning of interfacial electronic and optical properties of intercalated ZrO2/MoS2 van der Waals heterostructure. *Journal of Materials Research.* doi: 10.1557/s43578-023-01209-0. M. W. Younis & Toheed Akhter (Chemistry/SSC) Date of Publication: November 2023 HJRS: W (Honorable Mention)

Effective techniques capable of tuning the properties of van der Waals (vdW) layered materials in a controllable as well as reversible manner are elusive. To demonstrate our proposed technique, an advantageous two-dimensional heterostructure (HS) is modeled using ZrO_2 and MoS_2 layers. Afterwards, variation of structural, electronic, interfacial and optical properties is performed by sliding one layer of the intercalated ZrO_2/MoS_2 vdW-HS over another. Electronic band structure calculations show a transition from metallic to semiconducting character upon Li intercalation. As the layer-sliding proceeds, mixing of bands across the Fermi level occurs and is intensified resulting in a metallic character vdW-HS obtained at the completion of the sliding pathway. It is found that Li-intercalation greatly upturns the charge transfer towards $2H–ZrO_2$ layer as compared to the unintercalated vdW-HS. Dielectric function is profoundly affected by Li-intercalation, and the maximum absorption region and polarization is reduced by 31 and 28%, respectively.

https://link.springer.com/article/10.1557/s43578-023-01209-0#Abs1

Department of Life Sciences

1. Mahmood, A., Samad, A., Shah, A. A., Wadood, A., Alkathiri, A., Alshehri, M. A., ... & Umair, M. (2023). A novel biallelic variant in the Popeye domain-containing protein 1 (POPDC1) underlies limb girdle muscle dystrophy type 25. *Clinical Genetics*, *103*(2), 219-225. doi: 10.1111/cge.14238. Muhammad Umair (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Bronze)

POPDC1 also known as BVES, is a highly conserved transmembrane protein, important for striated muscle function and homeostasis. Pathogenic variants in the POPDC1 gene are associated limb-girdle muscular dystrophy type 25 (LGMDR25). In the present study, we performed trio-whole exome sequencing (WES) followed by Sanger sequencing on a single family having LGMD clinical features. Protein modeling of all POPDC1 missense variants (POPDC1Pro134Leu, POPDC1Ile193Ser, and POPDC1Ser201Phe) associated with LGMDR25 were performed using Molecular Dynamics (MD) simulation. We identified a homozygous missense variant (c.401C>T; p.Pro134Leu) in the POPDC1 gene. Altered 3D structure, disruptive fluctuation, less compactness, and instability were observed in all the three variants of POPDC1 protein models. In comparison, POPDC1Ser201Phe protein dynamics were more unstable than other variants. Functional study of newly identified variant would add key answers to underlying mechanisms of the disease.

https://onlinelibrary.wiley.com/doi/full/10.1111/cge.14238

2. Hussain, N., Shabbir, R. M. K., Ahmed, H., Afzal, M. S., Ullah, S., Ali, A., ... & Cao, J. Prevalence of different tick species on livestock and associated equines and canine from different agro-ecological zones of Pakistan. *Frontier in Veterinary Sciences.* 9, 1089999. doi: 10.3389/fvets.2022.1089999. Muhammad Sohail Afzal (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Gold)

Ticks are ectoparasites that act as vectors for transmission of various pathogens to wild and domesticated animals and pose a serious threat to human health. Because of the hot and humid conditions in different agro-ecological zones of Pakistan, ticks are abundant and parasitize a variety of animals. The aim of this study was to identify different tick species and distribution on different hosts especially livestock, such as sheep, goat, cattle, buffalo, and camel, and livestock associated canines and equines, such as horse, donkey, and dog, across different agro-ecological zones of Pakistan. The ticks samples were collected and morphologically identified at genus and species level using morphological keys under stereomicroscope. A total of 2,846 animals were

examined for the tick infestation, and 408 animals were tick-infested. Eleven tick species belonging to 4 genera were identified: Hyalomma anatolicum, Hyalomma scupense, Hyalomma dromedarii, Hyalomma isaaci, Rhipicephalus microplus, Rhipicephalus haemaphysaloides, Rhipicephalus turanicus, Haemaphysalis cornupunctata, Haemaphysalis montgomeryi, Haemaphysalis bispinosa, and Ixodes kashmiricus. The overall tick prevalence was 14.3%; host-wise infestation rate was 12.2% in sheep; 12.6%, goat; 11.7%, buffalo; 11.7%, cattle; 19.6%, camel; 27.4%, donkey; 23.5%, horse; and 24.3%, dog. Tick infestation of different animals differed on the basis of the zones. Camels showed the highest tick infestation rate in zones 1 and 2 (21.4 and 26.7%, respectively), whereas donkeys showed the highest infestation rate in zones 3, 4, 6, and 7 (25, 39.3, 3.3, and 21.4%, respectively). The infestation rates of Hyalomma and Rhipicephalus were the highest in zone 2 (71.4 and 52.9%, respectively). The infestation rate of Hyalomma was the highest (47.4%) in sheep; Haemaphysalis (46.9%), goat; Rhipicephalus (69.7%), buffalo; Rhipicephalus (62.3%), cattle; Hyalomma (70%), camel; Ixodes (60.9%), donkey; Ixodes (75%), horse; and Rhipicephalus (61.1%), dog. This study showed the diversity and infestation rate of different ticks with respect to their hosts and agro-ecological zones of Pakistan. High tick burdens and infestation rates are responsible for the spread of different tick-borne infections, resulting in loss of animal productivity and posing a threat to animal and human health. Understanding different tick species and their distribution across different zones will be helpful for developing efficient control strategies against different tick born infections.

https://www.frontiersin.org/articles/10.3389/fvets.2022.1089999/full

3. **Hamid, A., Zafar, A., Latif, S., Peng, L., Wang, Y., Liaqat, I., Afzal, M. S., ... & Aftab, M. N. (2023). Enzymatic hydrolysis of low temperature alkali pretreated wheat straw using immobilized β-xylanase nanoparticles.** *RSC Advances, 13*(2), 1434-1445.doi: 10.1039/d2ra07231a. **Muhammad Sohail Afzal (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

A low temperature alkali (LTA) pretreatment method was used to treat wheat straw. In order to obtain good results, different factors like temperature, incubation time, NaOH concentration and solid to liquid ratio for the pretreatment process were optimized. Wheat straw is a potential biomass for the production of monomeric sugars. The objective of the current study was to observe the saccharification (%) of wheat straw with immobilized magnetic nanoparticles (MNPs). For this purpose, immobilized MNPs of purified β-xylanase enzyme was used for hydrolysis of pretreated wheat straw. Wheat straw was pretreated using the LTA method and analyzed by SEM analysis. After completion of the saccharification process, saccharification% was calculated by using a DNS method. Scanning electron micrographs revealed that the hemicellulose, cellulose and lignin were partially removed and changes in the cell wall structure of the wheat straw had caused it to become deformed, increasing the specific surface area, so more fibers of the wheat straw were exposed to the immobilized β-xylanase enzyme after alkali pretreatment. The maximum saccharification potential of wheat straw was about 20.61% obtained after pretreatment with optimized conditions of 6% NaOH, 1/10 S/L, 30 °C and 72 hours. Our results indicate the reusability of the β-xylanase enzyme immobilized magnetic nanoparticles and showed a 15% residual activity after the 11th cycle. HPLC analysis of the enzyme-hydrolyzed filtrate also revealed the presence of sugars like xylose, arabinose, xylobiose, xylotriose and xylotetrose. The time duration of the pretreatment has an important effect on thermal energy consumption for the low-temperature alkali method.

https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07231a

4. **Khan, M. S., Khan, I. M., Ahmad, S. U., Rahman, I., Khan, M. Z., Khan, M. S. Z., Abbas, Z, ... & Liu, Y. (2023). Immunoinformatics design of B and T-cell epitope-based SARS-CoV-2 peptide vaccination.** *Frontiers in Immunology,* 13, 1001430. .doi: 10.3389/fimmu.2022.1001430. **Zain Abbas (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Gold)**

SARS-COV-2 is a virulent respiratory virus, first identified in China (Wuhan) at the end of 2019. Scientists and researchers are trying to find any possible solution to this deadly viral disease. Different drug source agents have been identified, including western medicine, natural products, and traditional Chinese medicine. They have the potential to counteract COVID-19. This virus immediately affects the liver and causes a decrease in oxygen levels. In this study, multiple vacciome approaches were employed for designing a multi-epitope subunit vaccine for battling against SARS-COV-2. Vaccine designing, immunogenicity, allergenic, and physico-chemical assessment were performed by using the vacciome approach. The vaccine design is likely to be antigenic and produce potent interactions with ACE2 and NSP3 receptors. The developed vaccine has also been given to in-silico cloning models and immune response predictions. A total number of 12 CTL and 12 HTL antigenic epitopes were predicted from three selected covid-19 virulent proteins (spike protein, nucleocapsid protein, and membrane proteins, respectively) based on C-terminal cleavage and MHC binding scores. These predicted epitopes were amalgamated by AYY and GPGPG linkers, and a β-defensins adjuvant was inserted into the N-terminus of this vaccine. This analysis shows that the recommended vaccine can produce immune responses against SARS-COV-2. Designing and developing of the mentioned vaccine will require further experimental validation.

https://www.frontiersin.org/articles/10.3389/fimmu.2022.1001430/full

5. **Ajmal, M., Muhammad, H., Nasir, M., Shoaib, M., Malik, S. A., & Ullah, I. (2023). Haploinsufficiency of EXT1 and Heparan Sulphate Deficiency Associated with Hereditary Multiple Exostoses in a Pakistani Family.** *Medicina*, *59*(1), 100.doi: 10.3390/medicina59010100. Irfan Ullah (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Bronze)

Hereditary multiple exostoses (HME) is a disease characterized by cartilage-capped bony protuberances at the site of growth plates of long bones. Functional mutations in the exostosin genes (EXT1 and EXT2) are reported to affect the hedgehog signalling pathways leading to multiple enchondromatosis. However, the exact role of each EXT protein in the regulation of heparan sulphate (HS) chain elongation is still an enigma. In this study, a Pakistani family with HME is investigated to find out the genetic basis of the disease. Materials and Methods: Genotyping of eight members of the family by amplifying microsatellite markers, tightly linked to the EXT1 and EXT2 genes. Results: The study revealed linkage of the HME family to the EXT1 locus 8q24.1. Sanger sequencing identified a heterozygous deletion (c.247Cdel) in exon 1 of EXT1, segregating with the disease phenotype in the family. In silico analysis predicted a shift in the frame causing an early stop codon (p.R83GfsX52). The predicted dwarf protein constituting 134 amino acids was functionally aberrant with a complete loss of the catalytic domain at the C-terminus. Interestingly, an alternative open reading frame 3 (ORF3) caused by the frame shift is predicted to encode a protein sequence, identical to the wild type and containing the catalytic domain, but lacking the first 100 amino acids of the wild-type EXT1 protein. Conclusion: Consequently, haploinsufficiency could be the cause of HME in the investigated family as the mutated copy of EXT1 is ineffective for EXT-1/2 complex formation. The predicted ORF3 protein could be of great significance in understanding several aspects of HME pathogenesis.

https://www.mdpi.com/1648-9144/59/1/100

6. **Ullah, I., Sattar, S., Ali, I., Farid, A., Ullah, A., Eid, R. A., ... & Ullah, I. (2023). Molecular Epidemiology of Cystic Echinococcosis in Rural Baluchistan, Pakistan: A Cross-Sectional Study.** *Pathogens,* 12(1), 40. doi:10.3390/pathogens12010040. Irfan Ullah (Life Science/SSC) Date of Publication: January 2023 HJRS: X (Honorable Mention)

Cystic echinococcosis (CE), or hydatid cyst disease (HCD), is a zoonosis of significant importance caused by the cestode of Echinococcus granulosus sensu lato (s. l.) that affects mainly nomadic populations and has substantial economic consequences. Due to the 76% rural and nomadic population, Baluchistan is a highly endemic region in Pakistan for CE; however, it has not yet been investigated for CE. For this purpose, this study was carried out to investigate the molecular epidemiology of CE in this region. In total, 23 human hydatid cyst samples were collected from tertiary health care units in Baluchistan and processed for DNA extraction, which was then followed by sequencing of the cox1 mitochondrial gene of all 23 collected samples, genotyping, and phylogenetic and haplotype analysis. Most subjects were livestock owners (39.13%) in rural settings (73.91%). Most patients (73.19%) were pet owners (dogs) and used water from open sources for drinking. The liver was the most affected organ (52.17%), followed by the lungs (17.39%). Sequence analysis based on the cox1 gene revealed that EG genotype 1 (G1) was the most prevalent (56.52%), followed by G3 (34.78%), while some samples (8.7%) were identified as the Echinococcus canadensis (G6/7) genotype. A total of five haplotypes were detected with high haplotype diversity (0.80) and low nucleotide diversity (0.033). Phylogenetic analysis revealed two diverse sub-clades, each of G1 and G3 isolates from Baluchistan, that were evolutionarily related to previously reported G1 and G3 isolates from Pakistan and China. On the other hand, the G6/7 isolates of this study were evolutionarily identical to the already reported G6/7 isolates from Pakistan, Turkey, and Kazakhstan. This study concludes that diverse G1 and G3 EG isolates are present in this part of Pakistan, while the G6/G7 genotype was reported for the first time from Baluchistan.

https://www.mdpi.com/2076-0817/12/1/40

7. **Yousuf, F. A., Azam, I., Tareen, A. K., Kazmi, K. A., Muhammad, J. S., & Iqbal, M. P. (2023). Association of the BB genotype of the ABO gene with the risk of acute myocardial infarction in hospital base study.** *Pakistan Journal of Medical Sciences*, *39*(1).doi:10.12669/pjms.39.1.5905. Muhammad Pervaiz Iqbal (Life Science/SSC) Date of Publication: January-February 2023 HJRS: X (Honorable Mention)

The ABO gene locus has been identified to be associated with myocardial infarction in patients with coronary heart disease. The primary focus of this hospital-based study was to explore the relationship of ABO blood groups and ABO genotypes with acute myocardial infarction (AMI) in Karachi, Pakistan. Methods: In a comparative cross-sectional study, an equal number of adult AMI patients and healthy controls (n=275 in each group; age range 30-70 years, both males and females) were recruited from the Aga Khan University and NICVD, Karachi, with informed consent. The blood samples were analyzed for ABO blood groups and other biomarkers. PCR followed by RFLP techniques were employed for determining the ABO genotypes. Multinomial regression was used to evaluate the association of genotypes with the risk of AMI. Results: Thirteen different combinations of ABO genotypes were observed while the O2O2 and A2A2 genotypes were not detected. No significant association based on the distribution of blood groups A, B, O and AB among AMI patients and healthy individuals was observed. The odds of AMI were 3.32 times in subjects with BB genotype as compared to subjects with OO genotypes after adjustment of age, gender, body mass index, heart rate, total cholesterol, and waist

circumference [AOR (95% CI) =3.32 (1.36-8.08), p-value =0.008]. Conclusion: Our hospital-based study indicates that ABO genotype BB was significantly associated with the risk of AMI. This harmful effect of the BB genotype could have a possible relationship with AMI's development in the Pakistani population.
https://pjms.org.pk/index.php/pjms/article/view/5905

8. **Rafeeq, M. M., Umair, M., Bilal, M., Habib, A. H., Waqas, A., Sain, Z. M., ... & Ali, R. H. (2023). A novel biallelic variant further delineates PRDX3-related autosomal recessive cerebellar ataxia.** *Neurogenetics*, **1-6. doi: 10.1007/s10048-022-00701-9. Muhammad Umair (Life Science/SSC) Date of Publication: January 2023 HJRS: X (Honorable Mention)**
Cerebellar ataxias (CAs) comprise a rare group of neurological disorders characterized by extensive phenotypic and genetic heterogeneity. In the last several years, our understanding of the CA etiology has increased significantly and resulted in the discoveries of numerous ataxia-associated genes. Herein, we describe a single affected individual from a consanguineous family segregating a recessive neurodevelopmental disorder. The proband showed features such as global developmental delay, cerebellar atrophy, hypotonia, speech issues, dystonia, and profound hearing impairment. Whole-exome sequencing and Sanger sequencing revealed a biallelic nonsense variant (c.496A > T; p. Lys166*) in the exon 5 of the PRDX3 gene that segregated perfectly within the family. This is the third report that associates the PRDX3 gene variant with cerebellar ataxia. In addition, associated hearing impairment further delineates the PRDX3 associated gene phenotypes.
https://link.springer.com/article/10.1007/s10048-022-00701-9

9. **Ahmad, Z., Liaqat, R., Palander, O., Bilal, M., Zeb, S., Ahmad, F., ... & Umair, M. (2023). Genetic overview of postaxial polydactyly: updated classification.** *Clinical Genetics*, **103**(1), **3-15.doi: 10.1111/cge.14224. Muhammad Umair (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**
Polydactyly or polydactylism, also known as a hyperdactyly, is a congenital limb defect with various morphologic phenotypes. Apart from physical and functional impairments, the presence of polydactyly is an indication of an underlying syndrome in the newborn. Usually, it follows as an autosomal dominant/recessive inheritance pattern with defects in the limb development's anteroposterior patterning. Although mutations in several genes have been associated with polydactyly; however, the exact underlying cause, pathways, and disease mechanisms are still unexplored, thus making it of multi-factorial origin. Polydactyly is divided into three subtypes; radial, ulnar, and central polydactyly. So far, 11 loci (PAPA1-PAPA11) and seven human genes have been reported to cause non-syndromic postaxial polydactyly in humans, including the ZNF141, GLI3, IQCE, GLI1, FAM92A1, KIAA0825, and DACH1. In this review, we discuss emerging evidences of clinical and molecular characterization of polydactyly types in term of the involvement of newly associated genes and loci for non-syndromic postaxial polydactyly, and how these might impact our understanding of the genetic mechanisms and molecular etiology involved in the cause of polydactyly.
https://onlinelibrary.wiley.com/doi/full/10.1111/cge.14224

10. **Awan, U. A., Farooq, N., Sarwar, A., Jehangir, H. M. S., Hashmi, M. S., Alamgir, M., Khurram, M., & Afzal, M. S., (2023). Cytogenetic abnormalities in patients with hematological malignancies in Lahore city, Pakistan.** *Brazilian Journal of Biology*, **83, e249911. doi: 10.1590/1519-6984.249911. Usman Ayub Awan, Muhammad Khurram, Muhammad Sohail Afzal (Life Sciences/SSC) Date of Publication: Jan-Dec 2023 HJRS: X (Null)**
Hematological and hematopoietic cells malignancies of the genes and hematopoietic cells are associated with the genetic mutation, often at the chromosomal level. The standard cytogenetic study is widely accepted as one of the main diagnostics and prognostic determinants in patients. Therefore, the current descriptive and cross-sectional study sought to determine the cytogenetic analysis of frequent hematological malignancies in Pakistan. A total of 202 peripheral bone marrow or blood samples from patients with benign and malignant hematological malignancy were taken using a conventional G-banding technique. Among enrolled patients, the mean age was 21.5 years ± 23.4, and gender-wise distribution showed a marked predominance of the male 147 (73%) population compared to the female 55 (27%). Patients in the age group (2-10 years) had the highest frequency, 48 (24%), of hematological neoplasms, followed by age (11-20 years) with 40 (20%). Normal karyotypes (46, XX/46, XY) was found in 51% (n=103) patients. Furthermore, the frequency of complex karyotype was 30 (15%), while normal was seen in 171 (85%) patients. Pre-B Acute Lymphoblastic Leukemia (Pre-B ALL) was the most prevalent malignancy of 66 (33%), followed by Chronic Myelogenous Leukemia (CML) of 41 (20%) and Acute Lymphocytic Leukemia of 29 (14%). Translocation was the most prevalent 50 (25%), followed by hypotriploidy 14 (7%) and monosomy 8 (4%) on chromosome aberration analysis. In addition, t(9:22) translocation was found to be 20 (10%) in CML, with the majority in the age group (31-40 years). This study recommends that karyotyping should be tested frequently in hematological conditions because it may provide insight into the relative chromosomal changes associated with particular malignancies.
https://www.scielo.br/j/bjb/a/tLT9M7jLG8DhMb7n854XXhB/?lang=en#

11. **Pasha, U., Nisar, H., Nisar, H., Abid, R., Ashraf, N. M., & Sadaf, S. (2023). Molecular Dynamic Simulations Unravel the Underlying Impact of Missense Mutation in Autoimmunity Gene PTPN22 on Predisposition to Rheumatoid Arthritis.** *Journal of Interferon & Cytokine Research,* **43(3), 1-12. doi: 10.1089/jir.2022.0216.** Haseeb Nisar (Life Science/SSC) Date of Publication: March 2023 HJRS: X (Clay)

Genetic mutations in various proteins have been implicated with increased risk or severity of rheumatoidarthritis (RA) in different population groups. In the present case–control study, we have investigated the riskassociation of single nucleotide mutations present in some of the highly reported anti-inflammatory proteinsand/or cytokines, with RA susceptibility in the Pakistani subjects. The study involves 310 ethnically anddemographically similar participants from whom blood samples were taken and processed for DNA extraction.Through extensive data mining, 5 hotspot mutations reported in 4 genes, that is, interleukin (IL)-4(-590;rs2243250),IL-10(-592; rs1800872),IL-10(-1082; rs1800896),PTPN22(C1858T; rs2476601), andTNFAIP3(T380G; rs2230926), were selected for RA susceptibility analyses using genotyping assays. The results dem-onstrated the association of only 2 DNA variants [rs2243250 (odds ratio, OR=2.025, 95% confidence interval,CI=1.357–3.002,P=0.0005 Allelic) and rs2476601 (OR=4.25, 95% CI=1.569–11.55,P=0.004 Allelic)]with RA susceptibility in the local population. The former single nucleotide mutation was nonfunctional,whereas the latter, residing in the exonic region of a linkage-proven autoimmunity genePTPN22,was involvedin R620/W620substitution. Comparative molecular dynamic simulations and free-energy calculations revealeda radical impact on the geometry/confirmation of key functional moieties in the mutant protein leading to arather weak binding of W620variant with the interacting receptor (SRC kinase). The interaction imbalance andbinding instabilities provide convincing clues about the insufficient inhibition of T cell activation and/orineffective clearance of autoimmune clones—a hallmark of several autoimmune disorders. In conclusion, thepresent research describes the association of 2 hotspot mutations inIL-4promoter andPTPN22gene with RAsusceptibility in the Pakistani study cohort. It also details how a functional mutation inPTPN22impacts theoverall protein geometry, charge, and/or receptor interactions to contribute to RA susceptibility.

https://www.liebertpub.com/doi/epdf/10.1089/jir.2022.0216

12. **Wahla, A. Q., Anwar, S., Fareed, M. I., Ikram, W., Ali, L., Alharby, H. F., . . . Ali, S. (2023). Immobilization of metribuzin-degrading bacteria on biochar: Enhanced soil remediation and bacterial community restoration.** *Frontiers in Microbiology, 13*. **doi: 10.3389/fmicb.2022.1027284.** Muhammad Irfan Fareed (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Silver)

Metribuzin (MB), a triazinone herbicide is extensively sprayed for weed control in agriculture, has been reported to contaminate soil, groundwater, and surface waters. In soil, MB residues can negatively affect not only the germination of subsequent crops but also disturb soil bacterial community. The present study describes the use of biochar as a carrier material to immobilize MB-degrading bacterial consortium, for remediation of MB-contaminated soil and restoration of soil bacterial community in soil microcosms. The bacterial consortium (MB3R) comprised four bacterial strains, i.e., *Rhodococcus rhodochrous* AQ1, *Bacillus tequilensis* AQ2, *Bacillus aryabhattai* AQ3, and *Bacillus safensis* AQ4. Significantly higher MB remediation was observed in soil augmented with bacterial consortium immobilized on biochar compared to the soil augmented with un-immobilized bacterial consortium. Immobilization of MB3R on biochar resulted in higher MB degradation rate (0.017 Kd^{-1}) and reduced half-life (40 days) compared to 0.010 Kd^{-1} degradation rate and 68 day half-life in treatments where un-immobilized bacterial consortium was employed. It is worth mentioning that the MB degradation products metribuzin-desamino (DA), metribuzin-diketo (DK), and metribuzin desamino-diketo (DADK) were detected in the treatments where MB3R was inoculated either alone or in combination with biochar. MB contamination significantly altered the composition of soil bacteria. However, soil bacterial community was conserved in response to augmentation with MB3R immobilized on biochar. Immobilization of the bacterial consortium MB3R on biochar can potentially be exploited for remediation of MB-contaminated soil and protecting its microbiota.

https://www.frontiersin.org/articles/10.3389/fmicb.2022.1027284/full

13. **Jan, S. M., Fahira, A., Shi, Y., Khan, M. I., Jamal, A., Umair, M., ... Wadood, A. (2023). Integrative Genomic Analysis of m6a-SNPs Identifies Potential Functional Variants Associated with Alzheimer's Disease.** *ACS Omega, 8*(14), 13332-13341. **doi: 10.1021/acsomega.3c00696.** Muhammad Umair (Life Science/SSC) Date of Publication: March 2023 HJRS: W (Bronze)

Alzheimer's disease (AD) is a neurodegenerative disorder that affects 35 million people worldwide. However, no potential therapeutics currently are available for AD because of the multiple factors involved in it, such as regulatory factors with their candidate genes, factors associated with the expression levels of its corresponding genes, and many others. To date, 29 novel loci from GWAS have been reported for AD by the Psychiatric Genomics Consortium (PGC2). Nevertheless, the main challenge of the post-GWAS era, namely to detect significant variants of the target disease, has not been conducted for AD. N6-methyladenosine (m6a) is reported as the most prevalent mRNA modification that exists in eukaryotes and that influences mRNA nuclear export, translation, splicing, and the stability of mRNA. Furthermore, studies have also reported m6a's association with

neurogenesis and brain development. We carried out an integrative genomic analysis of AD variants from GWAS and m6a-SNPs from m6AVAR to identify the effects of m6a-SNPs on AD and identified the significant variants using the statistically significance value (p-value.
https://pubs.acs.org/doi/pdf/10.1021/acsomega.3c00696

14. **Mahmood, A., Samad, A., Shah, A. A., Wadood, A., Alkathiri, A., Alshehri, M. A., . . . Umair, M. (2023). A novel biallelic variant in the Popeye domain-containing protein 1 (POPDC1) underlies limb girdle muscle dystrophy type 25.** *Clinical Genetics, 103*(2), 219-225. doi: 10.1111/cge.14238. **Muhammad Umair (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Bronze)**
POPDC1 also known as BVES, is a highly conserved transmembrane protein, important for striated muscle function and homeostasis. Pathogenic variants in the POPDC1 gene are associated with limb-girdle muscular dystrophy type 25 (LGMDR25). In the present study, we performed trio-whole exome sequencing (WES) followed by Sanger sequencing on a single family having LGMD clinical features. Protein modeling of all POPDC1 missense variants (POPDC1Pro134Leu, POPDC1Ile193Ser, and POPDC1Ser201Phe) associated with LGMDR25 were performed using Molecular Dynamics (MD) simulation. We identified a homozygous missense variant (c.401C>T; p.Pro134Leu) in the POPDC1 gene. Altered 3D structure, disruptive fluctuation, less compactness, and instability were observed in all the three variants of POPDC1 protein models. In comparison, POPDC1Ser201Phe protein dynamics were more unstable than other variants. Functional study of newly identified variant would add key answers to underlying mechanisms of the disease.
https://onlinelibrary.wiley.com/doi/full/10.1111/cge.14238

15. **Meng, T., Chen, X., He, Z., Huang, H., Lin, S., Umair, M., . . . Feng, D. (2023). ATP9A knockdown leads to neurite fracture and retraction.** *Molecular Psychiatry, 28*(3), 967. doi: 10.1038/s41380-023-01961-z. **Muhammad Umair (Life Science/SSC) Date of Publication: March 2023 HJRS: W (Platinum)**
https://pubmed.ncbi.nlm.nih.gov/36899213/

16. **Meng, T., Chen, X., He, Z., Huang, H., Lin, S., Umair, M.,, . . . Feng, D. (2023). ATP9A deficiency causes ADHD and aberrant endosomal recycling via modulating RAB5 and RAB11 activity.** *Molecular Psychiatry, 28*(3), 1219-1231. doi: 10.1038/s41380-022-01940-w. **Muhammad Umair (Life Science/SSC) Date of Publication: March 2023 HJRS: W (Platinum)**
ATP9A, a lipid flippase of the class II P4-ATPases, is involved in cellular vesicle trafficking. Its homozygous variants are linked to neurodevelopmental disorders in humans. However, its physiological function, the underlying mechanism as well as its pathophysiological relevance in humans and animals are still largely unknown. Here, we report two independent families in which the nonsense mutations c.433C>T/c.658C>T/c.983G>A (p. Arg145*/p. Arg220*/p. Trp328*) in ATP9A (NM_006045.3) cause autosomal recessive hypotonia, intellectual disability (ID) and attention deficit hyperactivity disorder (ADHD). Atp9a null mice show decreased muscle strength, memory deficits and hyperkinetic movement disorder, recapitulating the symptoms observed in patients. Abnormal neurite morphology and impaired synaptic transmission are found in the primary motor cortex and hippocampus of the Atp9a null mice. ATP9A is also required for maintaining neuronal neurite morphology and the viability of neural cells in vitro. It mainly localizes to endosomes and plays a pivotal role in endosomal recycling pathway by modulating small GTPase RAB5 and RAB11 activation. However, ATP9A pathogenic mutants have aberrant subcellular localization and cause abnormal endosomal recycling. These findings provide strong evidence that ATP9A deficiency leads to neurodevelopmental disorders and synaptic dysfunctions in both humans and mice, and establishes novel regulatory roles for ATP9A in RAB5 and RAB11 activity-dependent endosomal recycling pathway and neurological diseases.
https://www.nature.com/articles/s41380-022-01940-w

17. **Nishikawa, M., Scala, M., Umair, M., Ito, H., Waqas, A., Striano, P., . . . Nagata, K. I. (2023). Gain-of-function p.F28S variant in RAC3 disrupts neuronal differentiation, migration and axonogenesis during cortical development, leading to neurodevelopmental disorder.** *Journal of Medical Genetics, 60*(3), 223-232. doi: 10.1136/jmedgenet-2022-108483. **Muhammad Umair (Life Science/SSC) Date of Publication: March 2023 HJRS: W (Gold)**
Background RAC3 encodes a Rho family small GTPase that regulates the behaviour and organisation of actin cytoskeleton and intracellular signal transduction. Variants in RAC3 can cause a phenotypically heterogeneous neurodevelopmental disorder with structural brain anomalies and dysmorphic facies. The pathomechanism of this recently discovered genetic disorder remains unclear. Methods: We investigated an early adolescent female with intellectual disability, drug-responsive epilepsy and white matter abnormalities. Through exome sequencing, we identified the novel de novo variant (NM_005052.3): c.83T>C (p.Phe28Ser) in RAC3. We then examined the pathophysiological significance of the p.F28S variant in comparison with the recently reported disease-causing p.Q61L variant, which results in a constitutively activated version of RAC3. Results: In vitro analyses revealed that the p.F28S variant was spontaneously activated by substantially increased intrinsic GTP/GDP-exchange activity and bound to downstream effectors tested, such as PAK1 and MLK2. The variant

suppressed the differentiation of primary cultured hippocampal neurons and caused cell rounding with lamellipodia. In vivo analyses using in utero electroporation showed that acute expression of the p.F28S variant caused migration defects of excitatory neurons and axon growth delay during corticogenesis. Notably, defective migration was rescued by a dominant negative version of PAK1 but not MLK2. Conclusion: Our results indicate that RAC3 is critical for brain development and the p.F28S variant causes morphological and functional defects in cortical neurons, likely due to the hyperactivation of PAK1.

https://jmg.bmj.com/content/60/3/223.abstract

18. **Rafeeq, M. M., Murad, H. A. S., Najumuddin, Ullah, S., Ahmed, Z., Alam, Q., . . . Umair, M. (2023). Case report: A novel de novo loss of function variant in the DNA-binding domain of TBX2 causes severe osteochondrodysplasia. *Frontiers in Genetics, 13*. doi: 10.3389/fgene.2022.1117500. Muhammad Umair (Life Science/SSC) Date of Publication: January 2023 HJRS: W (Bronze)**

Background: T-box family members are transcription factors characterized by highly conserved residues corresponding to the DNA-binding domain known as the T-box. TBX2 has been implicated in several developmental processes, such as coordinating cell fate, patterning, and morphogenesis of a wide range of tissues and organs, including lungs, limbs, heart, kidneys, craniofacial structures, and mammary glands. Methods: In the present study, we have clinically and genetically characterized a proband showing a severe form of chondrodysplasia with developmental delay. Whole-exome sequencing (WES), Sanger sequencing, and 3D protein modeling were performed in the present investigation. Results: Whole-exome sequencing revealed a novel nonsense variant (c.529A>T; p.Lys177*; NM_005994.4) in TBX2. 3D-TBX2 protein modeling revealed a substantial reduction of the mutated protein, which might lead to a loss of function (LOF) or nonsense-mediated decay (NMD). Conclusion: This study has not only expanded the mutation spectrum in the gene TBX2 but also facilitated the diagnosis and genetic counseling of related features in affected families.

https://www.frontiersin.org/articles/10.3389/fgene.2022.1117500/full

19. **Riaz, S., Ahmed, H., Kiani, S. A., Afzal, M. S., Simsek, S., Celik, F., . . . Cao, J. (2023). Knowledge, attitudes and practices related to neglected tropical diseases (schistosomiasis and fascioliasis) of public health importance: A cross-sectional study. *Frontiers in Veterinary Science, 10*. doi: 10.3389/fvets.2023.1088981. Muhammad Sohail Afzal (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Gold)**

Background: Snails play an important role as an intermediate host in various parasitic diseases, which are referred to as snail-borne parasitic diseases (SBPDs). The prevalence of the SBPDs, schistosomiasis and fascioliasis is low in Pakistan compared to other countries. The present study investigated knowledge, attitudes, and practices related to these two SPBDs and risk factors associated with them among the humans living in close contact with livestock and pets from three regions of Pakistan: Punjab, Islamabad and Azad Jammu and Kashmir (AJK). Methods: A cross-sectional survey was conducted using a structured questionnaire to assess participants' knowledge, attitude and practices related to schistosomiasis and fascioliasis during 2021–2022. Results: The majority of the 507 participants who were interviewed had good knowledge of schistosomiasis and fascioliasis: 43% were aware of schistosomiasis and 57% were aware of fascioliasis, but only 25% knew about snails as an intermediate host. Most respondents had a positive attitude toward treatment, prevention and control of the diseases but they did not have any healthcare facilities. Conclusion: This study highlights the importance of the public's awareness for the need to control SBPDs. It also draws attention to the need for health education for risk reduction and the prevention of SBPDs in endemic areas.

https://www.frontiersin.org/articles/10.3389/fvets.2023.1088981/full

20. **Samad, A., Ajmal, A., Mahmood, A., Khurshid, B., Li, P., Umair, M., . . . Wadood, A. (2023). Identification of novel inhibitors for SARS-CoV-2 as therapeutic options using machine learning-based virtual screening, molecular docking and MD simulation. *Frontiers in Molecular Biosciences, 10*. doi: 10.3389/fmolb.2023.1060076. Muhammad Umair (Life Science/SSC) Date of Publication: March 2023 HJRS: W (Bronze)**

The new coronavirus SARS-COV-2, which emerged in late 2019 from Wuhan city of China was regarded as causing agent of the COVID-19 pandemic. The primary protease which is also known by various synonymous i.e., main protease, 3-Chymotrypsin-like protease (3CL^{PRO}) has a vital role in the replication of the virus, which can be used as a potential drug target. The current study aimed to identify novel phytochemical therapeutics for 3CL^{PRO} by machine learning-based virtual screening. A total of 4,000 phytochemicals were collected from deep literature surveys and various other sources. The 2D structures of these phytochemicals were retrieved from the PubChem database, and with the use of a molecular operating environment, 2D descriptors were calculated. Machine learning-based virtual screening was performed to predict the active phytochemicals against the SARS-CoV-2 3CL^{PRO}. Random forest achieved 98% accuracy on the train and test set among the different machine learning algorithms. Random forest model was used to screen 4,000 phytochemicals which leads to the identification of 26 inhibitors against the 3CL^{PRO}. These hits were then docked into the active site of 3CL^{PRO}. Based on docking scores and protein-ligand interactions, MD simulations have been performed using 100 ns for the top 5 novel inhibitors, ivermectin, and the APO state of 3CL^{PRO}. The post-dynamic analysis i.e,.

Root means square deviation (RMSD), Root mean square fluctuation analysis (RMSF), and MM-GBSA analysis reveal that our newly identified phytochemicals form significant interactions in the binding pocket of 3CL^{PRO} and form stable complexes, indicating that these phytochemicals could be used as potential antagonists for SARS-COV-2.
https://www.frontiersin.org/articles/10.3389/fmolb.2023.1060076/full

21. **Shahid, S., Batool, S., Khaliq, A., Ahmad, S., Batool, H., Sajjad, M., & Akhtar, M. W. (2023). Improved catalytic efficiency of chimeric xylanase 10B from Thermotoga petrophila RKU1 and its synergy with cellulases. *Enzyme and Microbial Technology, 166*. doi: 10.1016/j.enzmictec.2023.110213. Aasia Khaliq, Hina Batool (Life Science/SSC) Date of Publication: May 2023 HJRS: X (Clay)**

TpXyl10B is a glycoside hydrolase family 10 xylanase of hyperthermophile *Thermotoga petrophila* RKU-1. This enzyme is of considerable importance due to its thermostability. However, in its native state, this enzyme does not possess any carbohydrate-binding module (CBM) for efficient binding to plant biomass. In this study CBM6 from *Clostridium thermocellum* was attached to the N- and C-termini of TpXyl10B, thereby producing the variants TpXyl10B-B6C and TpXyl10B-CB6, respectively. TpXyl10B-B6C showed 5–7 folds increased activity on Beechwood xylan and the different types of plant biomass as compared to that from the catalytic domain only. However, the activity of TpXyl10B-CB6 decreased 0.6–0.8 folds on Beechwood xylan and plant biomass compared to the catalytic domain. We explained these results through molecular modeling, which showed that binding residues of CBM6's cleft B, which were previously reported to show no contribution towards binding due to steric hindrance from a loop region, were exposed in a favorable position in TpXyl10B-B6C such that they efficiently bound the substrate. In contrast, these binding residues of CBM6 in TpXyl10B-CB6 were exposed opposite to the catalytic residues; thus, binding to the substrate resulted in decreased exposure of catalytic residues to the substrate. CD spectroscopy and thermostability assays showed that TpXyl10B-B6C was highly thermostable, having a melting point > 90 °C, which is relatively higher than that of the other variant, TpXyl10B-CB6. In addition, this xylanase variant showed synergism with cellulases for the hydrolysis of plant biomass. Therefore, TpXyl10B-B6C, an engineered xylanase in this study, can be a valuable candidate for industrial applications.
https://www.sciencedirect.com/science/article/pii/S0141022923000212

22. **Kakar, M. U., Karim, H., Shabir, G., Iqbal, I., Akram, M., Ahmad, S., ... & Salari, H. (2023). A review on extraction, composition, structure, and biological activities of polysaccharides from different parts of Nelumbo nucifera. *Food Science & Nutrition.* doi: 10.1002/fsn3.3376. Muhammad Akram (Life Science/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**

Nelumbo nucifera (lotus plant) is an important member of the Nelumbonaceae family. This review summarizes the studies conducted on it since the past 15 years to provide an understanding on future areas of focus. Different parts of this plant, that is, leaves, roots, and seeds, have been used as food and for the treatment of various diseases. Polysaccharides have been extracted from different parts using different methods. The manuscript reviews the methods of extraction of polysaccharides used for leaves, roots, and seeds, along with their yield. Some methods can provide better yield while some provide better biological activity with low yield. The composition and structure of extracted polysaccharides have been determined in some studies. Although mono-saccharide composition has been determined in various studies, too little information about the structure of polysaccharides from N. nucifera is available in the current literature. Different useful biological activities have been explored using in vivo and in vitro methods, which include antioxidant, antidiabetic, antitumor, anti-osteoporotic, immunomodulatory, and prebiotic activities. Antitumor activity from polysaccharides of lotus leaves is yet to be explored, besides lotus root has been underexplored as compared to other parts (leaves and seeds) according to our literature survey. Studies dedicated to the successful use of combination of extraction methods can be con-ducted in future. The plant provides a therapeutic as well as nutraceutical potential; however, antimicrobial activity and synergistic relationships of polysaccharides from different parts of the plant need further exploration.
https://onlinelibrary.wiley.com/doi/pdf/10.1002/fsn3.3376

23. **Jahanfar, S., Gahavami, M., Khosravi-Darani, K., Jahadi, M., Mohsin, H., Todorov, S. D., & Tripathid, A. D. The effect of antioxidant properties of free and encapsulated rosemary extract in liposome on the oxidation process of canola oil. *International Journal of Food Science & Technology.* https://doi.org/10.1111/ijfs.16450. Hareem Mohsin (Life Science/SSC) Date of Publication: April 2023 HJRS: W (Bronze)**

The antioxidant property of rosemary extract as a natural antioxidant on the oxidation process of canola oil has been reported and compared with the synthetic antioxidant butylated hydroxytoluene (BHT) (at 200 mg L^{-1}). The effect of free and liposomal encapsulated rosemary extract at concentrations of 200, 600 and 1000 mg L^{-1} was evaluated on improving the oxidative stability of canola oil at 120°C using the Rancimat method. The changes in peroxide value, anisidine, TOTOX and thiobarbituric acid (TBA) have been determined by the Schaal oven test at 60°C. Liposomal rosemary extracts were prepared by the Mozafari method. Then

physicochemical properties (Z-potential, particle size and encapsulation efficiency (EE)) were determined. EE and the Z-potential of liposomes were obtained at 54.59% and −65.1 mV, respectively. The particle size of empty and extract containing liposomes was determined 583.5 nm and 265.4 nm, respectively. The total polyphenol content of the rosemary extract by reagent of the Folin–Ciocalteu's phenol was determined as 164.2 mg gallic acid g^{-1} extract. Also, the activity of free radical scavenging of both liposomal encapsulated and free extracts, by the 2-2-diphenyl-1-picrylhydrazyl (DPPH) method, were 84.57% and 92.5%, respectively. The induction periods of oil containing liposomal rosemary extract at 600, 1000 mg L^{-1} and free extract in level 1000 mg L^{-1} was higher in comparison with samples containing BHT and blank ($P \leq 0.05$). The incorporation of rosemary extract especially in liposome form into oil delayed the oxidation process. Based on the results of this study, to inhibit oil oxidation, rosemary extract, especially in the liposomal form, can be applied instead of synthetic antioxidants such as BHT.
https://ifst.onlinelibrary.wiley.com/doi/10.1111/ijfs.16450

24. **Mirza, Z.A., Naeem, A., Syed, A., Mateen, R. M., Fareed, M. I., & Husaain, D. M.** (2023). In Silico Analysis to Predict the Pathogenic Variants of CANT1 Gene Causing Desbuquios Dysplasia (DBQD) Type 1. *Current Trends in OMICS, 3*(1), 18-38. https://doi.org/10.32350/cto.31.02. Zainab Asif Mirza, Ayman Naeem, Aamna Syed, Rana Muhammad Mateen, Muhammad Irfan Fareed, and Mureed Hussain (Life Sciences/SSC) Date of Publication: June 2023 HJRS: Y (Null)

Desbuquois dysplasia (DBQD) is an autosomal recessive chondrodysplasia that belongs to the multiple dislocation group and causes parental and afterbirth growth retardation, hand and proximal femur abnormalities, joint laxity, and scoliosis. Several missense and splice site mutations in *CANT1* gene are linked with the development of DBQD. *In silico* approaches can predict the pathogenic variations causing hereditary diseases. Hence, in the current study, *in silico* analysis was used to forecast the variants of *CANT1* gene that harm the functionality of calcium-dependent nucleotidase. A total of 281 variants with uncertain significance, retrieved from the *gnomAD*, dbSNP, ClinVar, and Variation Viewer databases, were analyzed using CADD, Meta SNP, CAPiCE, and Condel to predict 61 highly pathogenic variants. Stability change predicting computational tools were applied to filter 19 highly pathogenic amino acid variants that impact protein dynamics via sample conformation or during vibrational entropy. UCSF Chimera was used for interactive visualization and analysis of unwanted interaction among 5 variants in the molecular structure of the protein. Ligand binding computational tools were used to interpret the protein-ligand interactions. A total of three (3) post-translational modification sites were also predictably disrupted by 16 variants. Spice and HSF 3.1 tools were applied to 95 variants to check their disease-causing potential. The variants of the gene were analyzed using computational tools based on different algorithms. The most damaging variants of *CANT1* gene that can affect the functionality and stability of the protein were predicted. It was determined that an extensive *in silico* analysis can determine the likely pathogenic variations for further *in vitro* experimental analysis.
https://journals.umt.edu.pk/index.php/CTO/article/view/3509

25. **Wahla, A. Q., Anwar, S., Fareed, M. I., Ikram, W., Ali, L., Alharby, H. F., ... & Ali, S. (2023). Immobilization of metribuzin-degrading bacteria on biochar: Enhanced soil remediation and bacterial community restoration.** *Frontiers in Microbiology, 13*, https://doi.org/10.3389/fmicb.2022.1027284 Muhammad Irfan Fareed, (Life Sciences\SSC) Date of Publication: February 2023 HJRS: W (Silver)

Metribuzin (MB), a triazinone herbicide is extensively sprayed for weed control in agriculture, has been reported to contaminate soil, groundwater, and surface waters. In soil, MB residues can negatively affect not only the germination of subsequent crops but also disturb soil bacterial communities. The present study describes the use of biochar as a carrier material to immobilize MB-degrading bacterial consortium, for remediation of MB-contaminated soil and restoration of soil bacterial community in soil microcosms. The bacterial consortium (MB3R) comprised four bacterial strains, i.e., *Rhodococcus rhodochrous* AQ1, *Bacillus tequilensis* AQ2, *Bacillus aryabhattai* AQ3, and *Bacillus safensis* AQ4. Significantly higher MB remediation was observed in soil augmented with bacterial consortium immobilized on biochar compared to the soil augmented with un-immobilized bacterial consortium. Immobilization of MB3R on biochar resulted in higher MB degradation rate (0.017 Kd−1) and reduced half-life (40days) compared to 0.010 Kd−1 degradation rate and 68day half-life in treatments where un-immobilized bacterial consortium was employed. It is worth mentioning that the MB degradation products metribuzin-desamino (DA), metribuzin-diketo (DK), and metribuzin desamino-diketo (DADK) were detected in the treatments where MB3R was inoculated either alone or in combination with biochar. MB contamination significantly altered the composition of soil bacteria. However, soil bacterial community was conserved in response to augmentation with MB3R immobilized on biochar. Immobilization of the bacterial consortium MB3R on biochar can potentially be exploited for remediation of MB-contaminated soil and protecting its microbiota.
https://www.frontiersin.org/articles/10.3389/fmicb.2022.1027284/full

26. **Syed, A., Mateen, R. M., Naeem, A., Mirza, Z. A., Ghani, M. U., & Hussain, M. (2023). In Silico Analysis of MARS1 Gene to Elucidate Low-Frequency Variants Associated with Interstitial Lung and Liver Disease.**

Lahore Garrison University Journal of Life Sciences, 7(01), 68-93. **https://doi.org/10.54692/lgujls.2023.0701240. Aamna Syed, Rana Muhammad Mateen, Ayman Naeem, Zainab Asif Mirza, Mureed Hussain (Life Sciences\SSC) Date of Publication: March 2023 HJRS: HJRS: Y (Null)**
Mutation in MARS1 gene is linked to the development of Interstitial lung and liver disease. The current study aimed in silico analysis to predict the most harmful missense and spliced variants of MARS1 that damage the functionality of Methionyl-tRNA synthetase 1 (MARS 1), catalyses the ligation of methionine to tRNA and is essential forprotein biosynthesis. A total of 492 variants were retrieved from the gnomAD database and analysed by CADD, 308 missense variants with PHRED score ≥ 20 were further analysed by CAPICE, META-SNP and CONDEL.85 SNPs detected with deleterious impact on protein structure by screening nsSNPs. Moreover, in-silico stability analysis was done by different tools like DynaMut, DUET, i-Stable2.0 and YASARA. MARS1 protein structure obtained from RCSB PDB (PDB ID: 5GL7) and UCSF Chimera was used for its visualisation. NetSurf-2.0 obtained the analysis of protein functioning by position of residue in the structure. Our results showed that the structure of proteins was significantly deleterious and protein motif and function were changed, we proceeded to use the PROSITE database to forecast the posttranslation modification sites and four significant nsSNPs with protein structure change effects. Splice analysis was conducted by SPiCE, Human Splice Finder. It concludes in silico analysis, genes can determine likely pathogenic variation for further in vitro experimental study.
https://lgujls.lgu.edu.pk/index.php/lgujls/article/view/240

27. **Amir, A., Azhar, N.,** Shahbaz, U., Ali, S. A., Ullah, H., Mushtaq, Q., ... **& Ameen, A. (2023). Prevalence of HBV, HCV, and its Co-Infection during Pregnancy in Lahore, Pakistan.** *Journal of Pharmaceutical Negative Results, 13*(9), 9003-9010. **DOI:10.47750/pnr.2022.13. S09.1051. Anam Amir, Nimra Azhar, Saulat Nawaz Shah, Muhammad Nouman Aziz, Mehreen Fatima (Life Sciences\SSC) Ayesha Ameen (ORIC) Date of Publication: January 2023 HJRS: Y (Null)**
Background: Hepatitis B and C infections are world issues that cause the major problem of financial burden in developing countries where direct exposure is so much high and remains increasing. In Pakistan, the scenario is worse than developed nations and up till now HBV and HCV infected approximately 12 million people. Objective: This study is used to investigate the major epidemiology and associated risks of hepatitis B and hepatitis C and their co-infection among 153 pregnant women in Jinnah, General, and Ganga Ram Hospital in LHR who have already somehow compromised immunity. Results: It is elaborated that 64.7%, of the HCV HBV and Co-infections, infected 25.5% and 9.8% of patients respectively. 98% of patients belong to a middle-class family having no proper diet and treatment. It does not completely belong to the ages of patients because most patients are 20-30 years of age in which some patients are infected before the pregnancy, some are infected in pregnancy but mostly recovered after pregnancy and in pregnancy. In chronic cases, childbirth diminished for disease treatment. Mostly attack of Hepatitis in the 3 rd trimester because 58.8% of patients diagnoses with the infection in the 3 rd trimester. It does not depend on the number of pregnancies that the mother already has and how many children because about 17% of patients are infected during the first pregnancy. It is not completely visualized whether cesarean does matter or not. Conclusion: It has been observed that hepatic patients in pregnancy have more possibilities of attaining hepatocellular diseases which cause to lead the maternal mortality rate.
https://www.pnrjournal.com/index.php/home/article/view/6403

28. **Mohsin, H., Shafique, M., Zaid, M., & Rehman, Y. (2023). Microbial biochemical pathways of arsenic biotransformation and their application for bioremediation.** *Folia Microbiologica, 68*, 507–535, **https://doi.org/10.1007/s12223-023-01068-6. Hareem Mohsin, Muhammad Zaid, Yasir Rehman (Life Sciences\SSC) Date of Publication: June 2023 HJRS: Y (Null)**
Arsenic is a ubiquitous toxic metalloid, the concentration of which is beyond WHO safe drinking water standards in many areas of the world, owing to many natural and anthropogenic activities. Long-term exposure to arsenic proves lethal for plants, humans, animals, and even microbial communities in the environment. Various sustainable strategies have been developed to mitigate the harmful effects of arsenic which include several chemical and physical methods, however, bioremediation has proved to be an eco-friendly and inexpensive technique with promising results. Many microbes and plant species are known for arsenic biotransformation and detoxification. Arsenic bioremediation involves different pathways such as uptake, accumulation, reduction, oxidation, methylation, and demethylation. Each of these pathways has a certain set of genes and proteins to carry out the mechanism of arsenic biotransformation. Based on these mechanisms, various studies have been conducted for arsenic detoxification and removal. Genes specific for these pathways have also been cloned in several microorganisms to enhance arsenic bioremediation. This review discusses different biochemical pathways and the associated genes which play important roles in arsenic redox reactions, resistance, methylation/demethylation, and accumulation. Based on these mechanisms, new methods can be developed for effective arsenic bioremediation.
https://link.springer.com/article/10.1007/s12223-023-01068-6

29. **Sadiq, R.,** Kanwal, N., & **Rehman, Y.** (2023). In Silico Comparative Metagenomic Analysis of Microbial Communities of Chromium Contaminated Sites. *Lahore Garrison University Journal of Life Sciences, 7*(02), 216-235, https://doi.org/10.54692/lgujls.2023.0702264 . **Rabia Sadiq, Yasir Rehman (Life Sciences\SSC) Date of Publication: June 2023** HJRS: Y (Null)

Chromium is one of the highly toxic and carcinogenic heavy metals. Due to increased anthropogenic activities, high concentration of chromium is found in many areas. Many microorganisms have the ability to detoxify chromium. Metagenomics allow us to comprehensively study microbial communities present at different sites without culturing them. The objective of this study was to analyze the abundance of microbial groups in different environments contaminated with chromium. For this purpose, chromium contaminated soil, anaerobic sludge and reactor samples were chosen. 16S rRNA data of these samples was retrieved from NCBI SRA database. The sequences were analyzed by Mothur software accessed via Galaxy server, and were classified using SILVA database. Venn diagram, phylogenetic tree, heatmap, relative abundance graphs and Krona pie charts were generated. Statistical analysis was also performed in the form of AMOVA and HOMOVA tests. According to results of our study, Proteobacteria, Leucobacter, Actinomycetales, Actinobacteria, Arthrobacter, Rhizobiales, Sphingomonas, Bradyrizobium and Nucardioidaceae were present in all the samples. Firmicutes, Planctomycetes, Verrucomicrobia and Bacteroidetes were more abundant in chromium contaminated samples as compared to control samples. The results were also found to be statistically significant. The above-mentioned bacteria can be targeted and studied to discover their roles in bioremediation of chromium contaminated sites.

https://lgujls.lgu.edu.pk/index.php/lgujls/article/view/264

30. **Nisar, H.,** Attique, S. A., Javaid, A., Ain, Q. U., **Butt, F., Zaid, M.,** ... & Sadaf, S. (2023). Comparative molecular docking analysis for analyzing the inhibitory effect of Anakinra and Ustekinumab against IL17F. *Journal of Biomolecular Structure and Dynamics,* 1-12, https://doi.org/10.1080/07391102.2023.2173299. **Haseeb Nisar, Fatima Butt, Muhammad Zaid, (Life Sciences\SSC) Date of Publication: January 2023** HJRS: X (Clay)

Interleukin 17 F is a member of IL-17 cytokine family with a 50% structural homology to IL-17A and plays a significant role either alone or in combination with IL-17A towards inflammation in Rheumatoid arthritis (RA). A growing number of drugs targeting IL-17 pathway are being tested against population specific disease markers. The major objective of this research was to investigate the anti-inflammatory effect of Anakinra (an IL-1 R1 inhibitor) and Ustekinumab (an IL-12 and IL-23 inhibitor) by targeting IL17F. The three dimensional structures of IL17F was taken from PDB while structures of drugs were taken from PubChem database. Docking was performed using MOE and Schrodinger ligand docking software and binding energies, including s-score using London-dG fitness function and glide score using glide internal energy function, between drug and targets were compared. Furthermore, Protein-Drug complex were subjected to 150 ns Molecular Dynamics (MD) Simulations using Schrodinger's Desmond Module. Docking and MD simulation results suggest anakinra as a more potent IL17F inhibitor and forming a more structurally stable complex.

https://www.tandfonline.com/doi/full/10.1080/07391102.2023.2173299

31. **Nadeem, F., Fatima, K., Wadood, H. Z., Batool, H., Zia, R.,** & **Zaid, M.** Synthesis of Polyhydroxyalkanoates (PHAs) Utilizing Molasses as Carbon Source by Proteus Mirabilis, *Journal of Xi'an Shiyou University,*66(4). **Doi: 10.17605/OSF.IO/6AMUQ, Fatima Nadeem, Kaneez Fatima, Hina Batool, Ramna Zia, Muhammad Zaid (Life Science/SSC) Date of Publication: April 2023** HJRS: X (Null)

Polyhydroxyalkanoates (PHAs) are produced by many bacteria & can be used as an alternative for the traditional petrochemical based plastics. The biodegradability & biocompatibility are the properties drawing attention towards use of PHA as bioplastics in the recent years. The aim of this study was to produce PHA by the novel bacterial strain isolated from the oil contaminated soil samples, the inexpensive carbon sources used were glucose & molasses. The bacteria were isolated, confirmed for positive PHA accumulation by Nile blue staining & Sudan Black B staining. The novel positive PHA producer Proteus mirabilis was emphasized in this study to check the growth pattern after 30 hours cultivation giving the maximum yield of 13.02% (using glucose as a carbon source) & 25.49% (using molasses as a carbon source) at optimum conditions pH 7.0 and a temperature of 35-37°C. The structure & functional groups of PHA granules extracted from Proteus mirabilis were analyzed using Fourier transform infrared spectroscopy (FTIR).Hence, Proteus mirabilis is the bacterial strain identified that can be used for the production of PHA giving lower to moderate quantities of PHA in this study.

https://xianshiyoudaxuexuebao.com/dashboard/uploads/7.6AMUQ.pdf

32. **Nadeem, M., Zia, R., Wadood, H. Z., Fatima, K., Ali, I.,** & **Zaid, M.** (2023). Classical and Newly Designed Anthropometric Parameters in Assessment of Obesity: A comparative review: Anthropometric Parameters in Assessment of Obesity. *Journal of Biological and Allied Health Sciences, 3.* https://doi.org/10.56536/jbahs.v3i.40. **Maira Nadeem, Ramna Zia, Kaneez Fatima, Iftikhar Ali, Muhammad Zaid (Life Science/SSC) Date of Publication: February 2023** HJRS: Y (Null)

The lethal nature of obesity is the leading cause of cardiovascular diseases, hypertension, diabetes, and dyslipidemia. Since 17th-century anthropometric parameters are known as a quantitative measure of obesity, how it detects changes in the body and its effects on health. In the beginning, the classical parameters were used i.e., BMI, waist to hip ratio, waist circumference, and waist to height ratio to determine obesity but due to different ethnic backgrounds and cut-off points, they lost their reliability. To overcome their limitations new parameters were introduced which were found to be better and independent of these factors.
http://jbahs.pk/index.php/JBAHS/article/view/40

33. **Bosch, E., Popp, B., Güse, E., Skinner, C., van der Sluijs, P. J., Maystadt, I., Umair, M, . . . Vasileiou, G. (2023). Elucidating the clinical and molecular spectrum of SMARCC2-associated NDD in a cohort of 65 affected individuals.** *Genetics in Medicine,* **25(11). doi: 10.1016/j.gim.2023.100950. Muhammad Umair (Life Science/SSC) Date of Publication: November 2023 HJRS: W (Platinum)**

Purpose: Coffin-Siris and Nicolaides-Baraitser syndromes are recognizable neurodevelopmental disorders caused by germline variants in BAF complex subunits. The SMARCC2 BAFopathy was recently reported. Herein, we present clinical and molecular data on a large cohort. Methods: Clinical symptoms for 41 novel and 24 previously published affected individuals were analyzed using the Human Phenotype Ontology. For genotype-phenotype correlations, molecular data were standardized and grouped into non-truncating and likely gene-disrupting (LGD) variants. Missense variant protein expression and BAF-subunit interactions were examined using 3D protein modeling, co-immunoprecipitation, and proximity-ligation assays. Results: Neurodevelopmental delay with intellectual disability, muscular hypotonia, and behavioral disorders were the major manifestations. Clinical hallmarks of BAFopathies were rare. Clinical presentation differed significantly, with LGD variants being predominantly inherited and associated with mildly reduced or normal cognitive development, whereas non-truncating variants were mostly de novo and presented with severe developmental delay. These distinct manifestations and non-truncating variant clustering in functional domains suggest different pathomechanisms. In vitro testing showed decreased protein expression for N-terminal missense variants similar to LGD. Conclusion: This study improved SMARCC2 variant classification and identified discernible SMARCC2-associated phenotypes for LGD and non-truncating variants, which were distinct from other BAFopathies. The pathomechanism of most non-truncating variants has yet to be investigated.
https://www.sciencedirect.com/science/article/pii/S1098360023009632

34. **Deng, R., Medico-Salsench, E., Nikoncuk, A., Ramakrishnan, R., Lanko, K., Kühn, N. A., Umair, M, . . . Barakat, T. S. (2023). AMFR dysfunction causes autosomal recessive spastic paraplegia in human that is amenable to statin treatment in a preclinical model.** *Acta Neuropathologica,* **146(2), 353-368. doi: 10.1007/s00401-023-02579-9. Muhammad Umair (Life Science/SSC) Date of Publication: August 2023 HJRS: W (Platinum)**

Hereditary spastic paraplegias (HSP) are rare, inherited neurodegenerative or neurodevelopmental disorders that mainly present with lower limb spasticity and muscle weakness due to motor neuron dysfunction. Whole genome sequencing identified bi-allelic truncating variants in AMFR, encoding a RING-H2 finger E3 ubiquitin ligase anchored at the membrane of the endoplasmic reticulum (ER), in two previously genetically unexplained HSP-affected siblings. Subsequently, international collaboration recognized additional HSP-affected individuals with similar bi-allelic truncating AMFR variants, resulting in a cohort of 20 individuals from 8 unrelated, consanguineous families. Variants segregated with a phenotype of mainly pure but also complex HSP consisting of global developmental delay, mild intellectual disability, motor dysfunction, and progressive spasticity. Patient-derived fibroblasts, neural stem cells (NSCs), and in vivo zebrafish modeling were used to investigate pathomechanisms, including initial preclinical therapy assessment. The absence of AMFR disturbs lipid homeostasis, causing lipid droplet accumulation in NSCs and patient-derived fibroblasts which is rescued upon AMFR re-expression. Electron microscopy indicates ER morphology alterations in the absence of AMFR. Similar findings are seen in amfra-/- zebrafish larvae, in addition to altered touch-evoked escape response and defects in motor neuron branching, phenocopying the HSP observed in patients. Interestingly, administration of FDA-approved statins improves touch-evoked escape response and motor neuron branching defects in amfra-/- zebrafish larvae, suggesting potential therapeutic implications. Our genetic and functional studies identify bi-allelic truncating variants in AMFR as a cause of a novel autosomal recessive HSP by altering lipid metabolism, which may potentially be therapeutically modulated using precision medicine with statins.
https://link.springer.com/article/10.1007/s00401-023-02579-9#Abs1

35. **Ajmal, A., Mahmood, A., Hayat, C., Hakami, M. A., Alotaibi, B. S., Umair, M., Hu, J. (2023). Computer-assisted drug repurposing for thymidylate kinase drug target in monkeypox virus.** *Frontiers in Cellular and Infection Microbiology,* **13. doi: 10.3389/fcimb.2023.1159389. Muhammad Umair (Life Science/SSC) Date of Publication: May 2023 HJRS: W (Gold)**

Introduction: Monkeypox is a zoonotic disease caused by brick-shaped enveloped monkeypox (Mpox) virus that belongs to the family of ancient viruses known as Poxviridae. Subsequently, the viruses have been reported in various countries. The virus is transmitted by respiratory droplets, skin lesions, and infected body

fluids. The infected patients experience fluid-filled blisters, maculopapular rash, myalgia, and fever. Due to the lack of effective drugs or vaccines, there is a need to identify the most potent and effective drugs to reduce the spread of monkeypox. The current study aimed to use computational methods to quickly identify potentially effective drugs against the Mpox virus. Methods: In our study, the Mpox protein thymidylate kinase (A48R) was targeted because it is a unique drug target. We screened a library of 9000 FDA-approved compounds of the DrugBank database by using various in silico approaches, such as molecular docking and molecular dynamic (MD) simulation. Results: Based on docking score and interaction analysis, compounds DB12380, DB13276, DB13276, DB11740, DB14675, DB11978, DB08526, DB06573, DB15796, DB08223, DB11736, DB16250, and DB16335 were predicted as the most potent. To examine the dynamic behavior and stability of the docked complexes, three compounds—DB16335, DB15796, and DB16250 —along with the Apo state were simulated for 300ns. The results revealed that compound DB16335 revealed the best docking score (-9.57 kcal/mol) against the Mpox protein thymidylate kinase. Discussion: Additionally, during the 300 ns MD simulation period, thymidylate kinase DB16335 showed great stability. Further, in vitro and in vivo study is recommended for the final predicted compounds. Copyright © 2023 Ajmal, Mahmood, Hayat, Hakami, Alotaibi, Umair, Abdalla, Li, He, Wadood and Hu. https://www.frontiersin.org/articles/10.3389/fcimb.2023.1159389/full?utm_source=dlvr.it&utm_medium=twitter

36. **Ali, A., Ali, M.,** Nisar, Z., Shah, S. M. A., Mustafa, I., Nisar, J., & Asif, R. (2023). Antibacterial Activity of Economically Important Medicinal Plants in Pakistan Against Different Bacterial Strains. *Bioinformatics and Biology Insights,* 17. doi: 10.1177/11779322231189374. **Adil Ali, Muhammad Ali (Life Science/SSC) Date of Publication: December 2023** HJRS: W (Bronze)
The emergence of medication resistance and unfavorable side effects from existing antibiotics has prompted the quest for novel antimicrobial agents over the last 2 decades. Plant extracts have been shown to have antibacterial effects in numerous studies. The objective of this study was the evaluation of the antibacterial effect of economically important medicinal plants found in Pakistan. Onosma bracteatum (flowers and leaves), Viola odorata (flowers and leaves), Cuscuta reflexa (whole plant), Swertia chirata (whole plant), and Fagonia arabica (whole plant) were used against Bacillus subtilis, Escherichia coli, and Pseudomonas aeruginosa. Water and ethanol extracts were obtained from different parts of the plants. To evaluate the antibacterial effect of these plants, qualitative assay agar well diffusion method was performed. The minimum inhibitory concentration (MIC) was determined by the broth micro dilution method. Results revealed that the highest inhibition zone (18 mm) was shown by ethanol extract of V odorata flower against P aeruginosa. Ethanol extract of C reflexa plants is best for all 3 tested microbes (P aeruginosa, B subtilis, and E coli). The results concluded that all these plants have abilities to fight against these tested bacteria. Ethanol extract of V odorata flower has the highest activity against P aeruginosa.
https://journals.sagepub.com/doi/full/10.1177/11779322231189374

37. **Khan, S., Umair, M.,** Abbas, S., Ali, U., Zaman, G., Ansar, M., . . . Gul, A. (2023). Overlapping neurological phenotypes in two extended consanguineous families with novel variants in the CNTNAP1 and ADGRG1 genes. *Journal of Gene Medicine,* 25(10). doi: 10.1002/jgm.3513. **Muhammad Umair (Life Science/SSC) Date of Publication: October 2023** HJRS: X (Honorable Mention)
Background: Population diversity is important and rare disease isolates can frequently reveal novel homozygous or biallelic mutations that lead to expanded clinical heterogeneity, with diverse clinical presentations. Methods: The present study describes two consanguineous families with a total of seven affected individuals suffering from a clinically similar severe syndromic neurological disorder, with abnormal development and central nervous system (CNS) and peripheral nervous system (PNS) abnormalities. Whole exome sequencing (WES) and Sanger sequencing followed by 3D protein modeling was performed to identify the disease-causing gene. RNA was extracted from the fresh blood of both families affected and healthy individuals. Results: The families were clinically assessed in the field in different regions of Khyber Pakhtunkhwa. Magnetic resonance imagining was obtained in the probands and blood was collected for DNA extraction and WES was performed. Sanger sequencing confirmed a homozygous, likely pathogenic mutation (GRCh38: chr17:42684199G>C; (NM_003632.3): c.333G>C);(NP_003623.1): p.(Trp111Cys) in the CNTNAP1 gene in family A, previously associated with Congenital Hypo myelinating Neuropathy 3 (CHN3; OMIM # 618186) and a novel nonsense variant in family B, (GRCh38: chr16: 57654086C>T; NC_000016.10 (NM_001370440.1): c.721C>T); (NP_001357369.1): p.(Gln241Ter) in the ADGRG1 gene previously associated with bilateral frontoparietal polymicrogyria (OMIM # 606854); both families have extended CNS and PNS clinical manifestations. In addition, 3D protein modeling was performed for the missense variant, p.(Trp111Cys), identified in the CNTNAP1, suggesting extensive secondary structure changes that might lead to improper function or downstream signaling. No RNA expression was observed in both families affected and healthy individuals hence showing that these genes are not expressed in blood. Conclusions: In the present study, two novel biallelic variants in the CNTNAP1 and ADGRG1 genes in two different consanguineous families with a clinical overlap in the phenotype were identified. Thus, the clinical and mutation spectrum is expanded

to provide further evidence that CNTNAP1 and ADGRG1 are very important for widespread neurological development.
https://onlinelibrary.wiley.com/doi/full/10.1002/jgm.3513

38. Azadnajafabad, S., Moghaddam, S. S., Mohammadi, E., Rezaei, N., Rashidi, M. M., Rezaei, N., . . . Collaborators, G. N. B. C., Afzal,S. (2023). Burden of breast cancer and attributable risk factors in the North Africa and Middle East region, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Frontiers in Oncology, 13.* doi: 10.3389/fonc.2023.1132816. Sohail Afzal (Life Science/SSC) Date of Publication: 2023 HJRS: W (Bronze)

Background: Breast cancer (BC) is the most common cancer in women globally. The North Africa and Middle East (NAME) region is coping hard with the burden of BC. We aimed to present the latest epidemiology of BC and its risk factors in this region. Methods: We retrieved the data on BC burden and risk factors from the Global Burden of Disease Study 2019 to describe BC status in the 21 countries of the NAME region from 1990 to 2019. We explored BC incidence, prevalence, deaths, disability-adjusted life years (DALYs), and attributable burden to seven risk factors of female BC, namely, alcohol use, diet high in red meat, low physical activity, smoking, secondhand smoke, high body mass index, and high fasting plasma glucose. Decomposition analysis on BC incidence trend was done to find out the contributing factors to this cancer's growth. Results: In 2019, there were 835,576 (95% uncertainty interval: 741,968 to 944,851) female and 10,938 (9,030 to 13,256) male prevalent cases of BC in the NAME region. This number leads to 35,405 (30,676 to 40,571) deaths among female patients and 809 (654 to 1,002) deaths in male patients this year. BC was responsible for 1,222,835 (1,053,073 to 1,411,009) DALYs among female patients in 2019, with a greater proportion (94.9%) of burden in years of life lost (YLLs). The major contributor to female BC incidence increase in the past three decades was found to be increase in age-specific incidence rates of BC (227.5%), compared to population growth (73.8%) and aging (81.8%). The behavioral risk factors were responsible for majority of attributable female BC burden (DALYs: 106,026 [66,614 to 144,247]). High fasting plasma glucose was found to be the risk factor with the largest effect (DALYs: 84,912 [17,377 to 192,838]) on female BC burden. Conclusion: The increasing incidence and burden of BC in the NAME region is remarkable, especially when considering limited resources in the developing countries of this region. Proper policies like expanding screening programs and careful resource management are needed to effectively manage BC burden.
https://pubmed.ncbi.nlm.nih.gov/37593096/

39. Mateen, R. M., Tariq, A., Afzal, M. S., Ali, M., Tipu, I., Hussain, M., . . . Naveed, M. (2023). TULP3 NLS inhibition: an in silico study to hamper cargo transport to nucleus. *Journal of Biomolecular Structure and Dynamics,* 41(10), 4641-4649. doi: 10.1080/07391102.2022.2070283. Rana Muhammad Mateen, Muhammad Sohail Afzal, Muhammad Ali, Imran Tipu, Mureed Hussain (Life Science/SSC) Date of Publication: July 2023 HJRS: W (Honorable Mention)

TULP3 is involved in cell regulation pathways including transcription and signal transduction. In some pathological states like in cancers, increased level of TULP3 has been observed so it can serve as a potential target to hamper the activation of those pathways. We propose a novel idea of inhibiting nuclear localization signal (NLS) to interrupt nuclear translocation of TULP3 so that the downstream activations of pathways are blocked. In current in silico study, 3D structure of TULP3 was modeled using 8 different tools including I-TASSER, CABS-FOLD, Phyre2, PSIPRED, RaptorX, Robetta, Rosetta and Prime by Schrödinger. Best structure was selected after quality evaluation by SAVES and implied for the investigation of NLS sequence. Mapped NLS sequence was further used to dock with natural ligand importin-α as control docking to validate the NLS sequence as binding site. After docking and molecular dynamics (MD) simulation validation, these residues were used as binding side for subsequent docking studies. 70 alkaloids were selected after intensive literature survey and were virtually docked with NLS sequence where natural ligand importin-α is supposed to be bound. This study demonstrates the virtual inhibition of NLS sequence so that it paves a way for future in-vivo studies to use NLS as a new drug target for cancer therapeutics.
https://www.tandfonline.com/doi/full/10.1080/07391102.2022.2070283

40. Matuozzo, D., Talouarn, E., Marchal, A., Zhang, P., Manry, J., Seeleuthner, Y., Tipu, I. . . . Group, N.-U. C. S. (2023). Rare predicted loss-of-function variants of type I IFN immunity genes are associated with life-threatening COVID-19. *Genome Medicine,* 15(1). doi: 10.1186/s13073-023-01173-8. Imran Tipu (Life Science/SSC) Date of Publication: April 2023 HJRS: W (Platinum)

We previously reported that impaired type I IFN activity, due to inborn errors of TLR3- and TLR7dependent type I interferon (IFN) immunity or to autoantibodies against type I IFN, account for 15–20% of cases of life-threatening COVID-19 in unvaccinated patients. Therefore, the determinants of life-threatening COVID-19 remain to be identifed in~80% of cases. We report here a genome-wide rare variant burden association analysis in 3269 unvaccinated patients with life-threatening COVID-19, and 1373 unvaccinated SARS-CoV-2-infected individuals without pneumonia. Among the 928 patients tested for autoantibodies against type I IFN, a quarter (234) were positive and were excluded. No gene reached genome-wide signifcance. Under a

recessive model, the most signifcant gene with at-risk variants was TLR7, with an OR of 27.68 (95%CI 1.5–528.7, P=1.1× 10−4) for biochemically loss-of-function (bLOF) variants. We replicated the enrichment in rare predicted LOF (pLOF) variants at 13 infuenza susceptibility loci involved in TLR3-dependent type I IFN immunity (OR=3.70[95%CI 1.3–8.2], P=2.1× 10−4). This enrichment was further strengthened by (1) adding the recently reported TYK2 and TLR7 COVID-19 loci, particularly under a recessive model (OR=19.65[95%CI 2.1–2635.4], P=3.4× 10−3), and (2) considering as pLOF branchpoint variants with potentially strong impacts on splicing among the 15 loci (OR=4.40[9%CI 2.3–8.4], P=7.7× 10−8). Finally, the patients with pLOF/ bLOF variants at these 15 loci were signifcantly younger (mean age [SD]=43.3 [20.3] years) than the other patients (56.0 [17.3] years; P=1.68× 10−5). Rare variants of TLR3- and TLR7-dependent type I IFN immunity genes can underlie life-threatening COVID-19, particularly with recessive inheritance, in patients under 60 years old.
https://link.springer.com/article/10.1186/s13073-023-01173-8#Abs1

41. **Mustafa, S., Abbas, S., Mahmood, A., Khan, A. Z., Zeb, S., Khan, A., & Umair, M. (2023). A novel de novo variant in the PHF21A causes craniofacial abnormalities, intellectual disability and skeletal manifestations.** *Clinical Genetics,* **104(1), 142-144. doi: 10.1111/cge.14317.** Muhammad Umair (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Silver)
IDDBCS is a heterogeneous genetic syndrome with diverse clinical features including Intellectual disability and epilepsy. Using WES, Sanger sequencing, we identified a novel nonsense variant in the PHF21A gene responsible for IDDBCS syndrome. The patient has diverse and overlapping clinical phenotypes. The identified variant leads to abnormal secondary and tertiary structure of the protein and, consequently, affects its function.
https://europepmc.org/article/med/36843358

42. **Naeem, I., Mateen, R. M., Sibtul Hassan, S., Tariq, A., Parveen, R., Saqib, M. A. N., Fareed, M.I., Hussain, M. Afzal, M.S,. . Afzal, M. S. (2023). In silico identification of potential drug-like molecules against G glycoprotein of Nipah virus by molecular docking, DFT studies, and molecular dynamic simulation.** *Journal of Biomolecular Structure and Dynamics,* **41(15), 7104-7118. doi: 10.1080/07391102.2022.2115557.** Iqra Naeema, Rana Muhammad Mateena, Syed Sibtul Hassan, Muhammad Irfan Fareeda, Mureed Hussaina, Muhammad Sohail Afzal (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Honorable Mention)
Nipah virus (NiV) is a novel zoonotic pathogen that belongs to theParamyxovirusfamily. The patho-gen has infected a number of people in countries like Bangladesh, India, Singapore, and Malaysia withhigh mortality rates. Although the NiV has been classified as a biosafety level four pathogen (BSL-4),there is no drug approved for treatment against it. In this study, the G glycoprotein of the NiV waschosen as an antiviral target. Based on ADMET criteria, BBB- and BBBþgroup compounds werescreened out of the Gold & platinum Asinex library containing 211620 compounds. After careful evalu-ation, the selected ligands were then virtually screened to identify the potential inhibitors against theG glycoprotein of the NiV through molecular docking, density functional theory (DFT), and moleculardynamic (MD) simulation studies. In our study we identified 5-(1,3-Benzodioxol-5-yl)-2-[(3-fluorobenzyl)-sulfanyl]-5,8-dihydropyrido[2,3-d]pyrimidine-4,7(1H,6H)-dione (from BBB- group) and 7,7-Dimethyl-1-(4-methylphenyl)-3-(4-morpholinylcarbonyl)-7,8-dihydro-2,5(1H,6H)-quinolinedione) (from BBBþgroup) aspotential compounds for the prevention and treatment of NiV related diseases.
https://www.tandfonline.com/doi/full/10.1080/07391102.2022.2115557

43. **Nawaz, H., Mujahid, Khan, S. A., Bibi, F., Waqas, A., Bari, A., . . . Umair, M. (2023). Biallelic Variants in Seven Different Genes Associated with Clinically Suspected Bardet–Biedl Syndrome.** *Genes,* **14(5). doi: 10.3390/genes14051113.** Muhammad Umair (Life Science/SSC) Date of Publication: May 2023 HJRS: W (Bronze)
Bardet–Biedl syndrome (BBS) is a rare clinically and genetically heterogeneous autosomal recessive multi-systemic disorder with 22 known genes. The primary clinical and diagnostic features include six different hallmarks, such as rod–cone dystrophy, learning difficulties, renal abnormalities, male hypogonadism, post-axial polydactyly, and obesity. Here, we report nine consanguineous families and a non-consanguineous family with several affected individuals presenting typical clinical features of BBS. In the present study, 10 BBS Pakistani families were subjected to whole exome sequencing (WES), which revealed novel/recurrent gene variants, including a homozygous nonsense mutation (c.94C>T; p.Gln32Ter) in the IFT27 (NM_006860.5) gene in family A, a homozygous nonsense mutation (c.160A>T; p.Lys54Ter) in the BBIP1 (NM_001195306.1) gene in family B, a homozygous nonsense variant (c.720C>A; p.Cys240Ter) in the WDPCP (NM_015910.7) in family C, a homozygous nonsense variant (c.505A>T; p.Lys169Ter) in the LZTFL1 (NM_020347.4) in family D, pathogenic homozygous 1 bp deletion (c.775delA; p.Thr259Leufs*21) in the MKKS/BBS5 (NM_170784.3) gene in family E, a pathogenic homozygous missense variant (c.1339G>A; p.Ala447Thr) in BBS1 (NM_024649.4) in families F and G, a pathogenic homozygous donor splice site variant (c.951+1G>A; p?) in BBS1 (NM_024649.4) in family H, a pathogenic bi-allelic nonsense variant in MKKS (NM_170784.3) (c.119C>G; p.Ser40*) in family I, and homozygous pathogenic frameshift variants (c.196delA; p.Arg66Glufs*12) in BBS5 (NM_152384.3) in family J.

Our findings extend the mutation and phenotypic spectrum of four different types of ciliopathies causing BBS and also support the importance of these genes in the development of multi-systemic human genetic disorders.

https://www.mdpi.com/2073-4425/14/5/1113

44. **Nisar, H.**, Wajid, B., Anwar, F., Ahmad, A., Javaid, A., Attique, S. A., . . . Sadaf, S. (2023). **Bioinformatics and systems biology analysis revealed PMID26394986-Compound-10 as potential repurposable drug against covid-19.** *Journal of Biomolecular Structure and Dynamics.* doi: 10.1080/07391102.2023.2242500. **Haseeb Nisar (Life Science/SSC) Date of Publication: Aug 2023 HJRS: W (Honorable Mention)**

The global health pandemic known as COVID-19, which stems from the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a significant concern worldwide. Several treatment methods exist for COVID-19; however, there is an urgent demand for previously established drugs and vaccines to effectively combat the disease. Since, discovering new drugs poses a significant challenge, making the repurposing of existing drugs can potentially reduce time and costs compared to developing entirely new drugs from scratch. The objective of this study is to identify hub genes and associated repurposed drugs targeting them. We analyzed differentially expressed genes (DEGs) by analyzing RNA-seq transcriptomic datasets and integrated with genes associated with COVID-19 present in different databases. We detected 173 Covid-19 associated genes for the construction of a protein-protein interaction (PPI) network which resulted in the identification of the top 10 hub genes/proteins (STAT1, IRF7, MX1, IRF9, ISG15, OAS3, OAS2, OAS1, IRF3, and IRF1). Hub genes were subjected to GO functional and KEGG pathway enrichment analyses, which indicated some key roles and signaling pathways that were strongly related to SARS-CoV-2 infections. We conducted drug repurposing analysis using CMap, TTD, and DrugBank databases with these 10 hub genes, leading to the identification of Piceatannol, CKD-712, and PMID26394986-Compound-10 as top-ranked candidate drugs. Finally, drug–gene interactions analysis through molecular docking and validated via molecular dynamic simulation for 80 ns suggests PMID26394986-Compound-10 as the only potential drug. Our research demonstrates how in silico analysis might produce repurposing candidates to help respond faster to new disease outbreaks.

https://www.tandfonline.com/doi/full/10.1080/07391102.2023.2242500

45. Pasha, U., Hanif, K., **Nisar, H.**, Abid, R., Mirza, M. U., Wajid, B., & Sadaf, S. (2023). **A novel missense compound heterozygous variant in TLR1 gene is associated with susceptibility to rheumatoid arthritis — structural perspective and functional annotations.** *Clinical Rheumatology, 42*(11), 3097-3111. doi: 10.1007/s10067-023-06702-9. **Haseeb Nisar (Life Science/SSC) Date of Publication: July 2023 HJRS: W (Bronze)**

Introduction Besides human leukocyte antigen (HLA-DRB1) locus, more than 100 loci across the genome have been identified and linked with the onset, expression and/or progression of rheumatoid arthritis (RA). However, there are still grey areas in our understanding of the key genetic contributors of the disease, particularly in familial cases. Methods In the present study, we have performed the whole exome sequencing (WES) of RA patients from two consanguineous families of Pakistan in a quest to identify novel, high-impact, RA-susceptibility genetic variants. Results Through stepwise fltering, around 17,000 variants (common in the affected members) were recognized, out of which 2651 were predicted to be deleterious. Of these, 196 had direct relevance to RA. When selected for homozygous recessive mode of inheritance, two novel pathogenic variants (c.1324T>C, p.Cys442→Arg442; c.2036T>C, p.Ile679→Thr679) in the TLR1 gene displayed the role of compound heterozygosity in modulating the phenotypic expression and penetrance of RA. The structural and functional consequences of the TLR1 missense single nucleotide mutations (Cys442→Arg442; Ile679→Thr679) were evaluated through molecular dynamic simulation (MDS) studies. Analysis showed domain's rigidifcation, conferring stability to mutant TLR1-TIR/TIRAP-TIR complex with concomitant increase in molecular interactions with pro-infammatory cytokines, compared to the wild-type conformation. Gene co-expression network analysis highlighted interlinked partnering genes along with interleukin-6 production of TLR1 (corrected p-value 2.98e-4) and acetylcholine receptor activity of CHRNG (corrected p-value 6.12e-2) as highly enriched associated functions.

https://link.springer.com/article/10.1007/s10067-023-06702-9#Abs1

46. **Rashid, I.**, Naqvi, S. N. H., **Mohsin, H.**, **Fatima, K.**, Afzal, M., Al-Misned, F., . . . Niazi, N. K. (2023). **The evaluation of bacterial-augmented floating treatment wetlands for concomitant removal of phenol and chromium from contaminated water.** *International Journal of Phytoremediation.* doi: 10.1080/15226514.2023.2240428. **Iffat Rashid, Hareem Mohsin, Kaneez Fatima (Life Science/SSC) Date of Publication: July 2023 HJRS: W (Bronze)**

Contamination of aquatic ecosystems with organic and inorganic contaminants is a global threat due to their hazardous effects on the environment and human health. Floating treatment wetland (FTW) technology is a cost-effective and sustainable alternative to existing treatment approaches. It consists of a buoyant mat in which wetland plants can grow and develop their roots in a suspended manner and can be implemented to

treat stormwater, municipal wastewater, and industrial effluents. Here we explored the potential of bacterial-augmented FTWs for the concurrent remediation of phenol and hexavalent chromium (Cr6+) contaminated water and evaluated treated water toxicity using Triticum aestivum L. (wheat) as a test plant. The FTWs carrying Phragmites australis L. (common reed) were inoculated with a consortium of four bacterial strains (Burkholderia phytofirmans PsJN, Acinetobacter lwofii ACRH76, Pseudomonas aeruginosa PJRS20, Bacillus sp. PJRS25) and evaluated for their potential to simultaneously remove phenol and chromium (Cr) from contaminated water. Results revealed that the FTWs efficiently improved water quality by removing phenol (86%) and Cr (80%), with combined use of P. australis and bacterial consortium after 50 days. The phytotoxicity assay demonstrated that the germination of wheat seed (96%) was significantly higher where bacterial-augmented FTWs treated water was used compared to untreated water. This pilot-scale study highlights that the combined application of wetland plants and bacterial consortium in FTWs is a promising approach for concomitant abatement of phenol and Cr from contaminated water, especially for developing countries like Pakistan where the application of advanced and expensive technologies is limited.
https://www.tandfonline.com/doi/full/10.1080/15226514.2023.2240428

47. **Riaz, H. A., Nishwa, D. E., Fatima, A., Wahid, B., Ali, A., Kumari, B., & Idrees, M. (2023). Risk of adverse outcomes following treatment with direct acting antiviral drugs in HCV infected patients with liver cirrhosis.** *Heliyon,* **9(5). doi: 10.1016/j.heliyon.2023.e16169.** Hafiza Arooba Riaz, Dur E. Nishwa, Braira Wahid (Life Science/SSC) Date of Publication: May 2023 HJRS: W (Silver)
Introduction: Hepatitis C virus (HCV) is the second major cause of death in Pakistan. Previously, interferon-based regimens were considered highly recommended therapy for HCV patients. Since 2015, interferon-based therapy has been replaced with interferon-free therapy also known as Direct Acting Antiviral (DAA) drugs. The treatment response of interferon-free regimens has been reported as highly effective treatment option with more than 90% sustained virological response (SVR) in chronic HCV infected patients in western countries of the world. Objective: This study aims to analyze the treatment response of DAA drugs in HCV-infected Pakistani population with liver cirrhosis. Methodology: We collected the total 94 sample of the HCV infected patients, from June 2020 to September 2020. Forty-six (46) patients were cirrhotic, and forty-eight (48) patients were noncirrhotic. Data was analyzed using IBM SPSS version 21 software. Conclusion: The findings of our study suggest that the response rate was 82.60% in HCV cirrhotic patients and 68.75% in HCV non-cirrhotic patients. Our study showed that overall treatment response was independent of age and gender. We also observed some adverse effects such as hepatocellular carcinoma, portosystemic encephalopathy (PSE), spontaneous bacterial peritonitis (SBP), hepatorenal syndrome (HRS), upper gastrointestinal bleeding (UGIB), ascites, among patients following treatment with interferon-free regimens.
https://pubmed.ncbi.nlm.nih.gov/37234654/

48. **Sib Tul Hassan Shah, S., & Naeem, I. (2023). In-silico targeting TMPK from monkey pox virus: Molecular docking analysis, density functional theory studies and molecular dynamic simulation analysis.** *Journal of Biomolecular Structure and Dynamics.* **doi: 10.1080/07391102.2023.2193998.** Syed Sib Tul Hassan Shah, Iqra Naeem (Life Science/SSC) Date of Publication: December 2023 HJRS: W (Honorable Mention)
The World Health Organization (WHO) proclaimed the monkeypox epidemic a "public health emergency of worldwide significance" recently. The monkeypox virus is a member of the same Orthopoxvirus genus as the smallpox virus. Although smallpox medications are advised against monkeypox, no monkeypox-specific drugs are currently available. In the event of such an outbreak, in-silico medication identification is a practical and efficient strategy. As a result, we report a computational drug repurposing analysis to discover medicines that may be potential inhibitors of thymidylate kinase, a critical monkeypox viral enzyme. The target protein structure of the monkeypox virus was modeled using the vaccinia virus's homologous protein structure. Using molecular docking and density functional theory, we found 11 possible inhibitors of the monkeypox virus from an Asinex library of 261120 chemicals. The primary purpose of this in silico work is to find possible inhibitors of monkeypox viral proteins that can then be experimentally tested in order to develop innovative therapeutic medicines for monkeypox infection.
https://www.tandfonline.com/doi/full/10.1080/07391102.2023.2193998

49. **Tanvir, R., Sajid, I., Rehman, Y., & Hasnain, S. (2023). Fatty acid based antimicrobials from Streptomyces sp. SORS-24, an endophyte isolated from Sonchus oleraceus.** *Letters in applied microbiology,* **76(8). doi: 10.1093/lambio/ovad080.** Yasir Rehman (Life Science/SSC) Date of Publication: July 2023 HJRS: X (Clay)
Due to the rise in bacterial resistance towards various therapeutic agents, interest is now developing towards fatty acid based antimicrobials because of their non-specific mode of action. A strain SORS 24 isolated from Sonchus oleraceus (Sow thistle) showed significant activity against Escherichia coli ATCC 25922 (25 mm), Chlorella vulgaris (20 mm), Bacillus subtilis DSM 10 (ATCC 6051) and Pseudomonas sp. (15 mm). It displayed an LC50 value of 10 µg/ml against Artemia salina (Brine shrimp) nauplii and an EC50 value of 0.8 µg/ml in the (DPPH) diphenylpicrylhydrazyl antioxidant assay. The strain also displayed genotoxicity against a PolA deficient strain, E. coli K-12 AB 3027 (15 mm). Mass spectrometry (HPLC-MS) showed that the strain produced oleamide

(9-Octadecenamide) and erucamide (13-Docosenamide). Both of the purified fatty acid amides showed prominent activity against B. subtilis DSM 10 (ATCC 6051) (20 mm) and E. coli ATCC 25922 (15 mm). Significant genotoxicity was observed against E. coli K-12 AB 3027 (15 mm). The 16S gene sequencing revealed that the strain belonged to species, Streptomyces tanashiensis. As far as our understanding, this is the first report of this species producing these fatty acid based antimicrobials.
https://academic.oup.com/lambio/article-abstract/76/8/ovad080/7226193

50. **Umair, M.** (2023). Rare genetic disorders: Beyond whole-exome sequencing. *Journal of Gene Medicine,* 25(10). doi: 10.1002/jgm.3503. **Muhammad Umair** (Life Science/SSC) Date of Publication: October 2023 HJRS: X (Clay)
Whole exome sequencing is commonly used as clinical exome in almost every hospital to diagnose rare and complex genetic disorders. Still, there are a lot of undiagnosed patients that require correct molecular diagnosis for treatment strategies. Different techniques such as structural variants, STRs, long read sequencing, pan genomics, proteomics, transcriptomics etc could be employed to check the undiagnosed/negative cases.
https://pubmed.ncbi.nlm.nih.gov/36987553/

51. **Umair, M.,** Bilal, M., Shah, K., Said, G., & Ahmad, F. (2023). Homozygous Missense Variant in the Solute Carrier Organic Anion Transporter 2A1 (SLCO2A1) Gene Underlies Isolated Nail Clubbing. *Genes,* 14(2). doi: 10.3390/genes14020430. **Muhammad Umair** (Life Science/SSC) Date of Publication: February 2023 HJRS: W (Bronze)
Background: Inherited isolated nail clubbing is a very rare Mendelian condition in humans, characterized by enlargement of the terminal segments of fingers and toes with thickened nails. Mutations in two genes have been reported to cause isolated nail clubbing in humans, which are the *SLCO2A1* gene and the *HPGD* gene. Objectives: An extended Pakistani family having two affected siblings born of unaffected consanguineous union was included in the study. Predominant isolated congenital nail clubbing (ICNC) without any other systemic abnormalities was observed, which we aimed to characterize at clinico-genetic level. Methods: Whole exome coupled with Sanger sequencing were employed to uncover the sequence variant as a cause of the disease. Furthermore, protein modeling was carried out to reveal the predicted possible effect of the mutation at the protein level. Results: Whole exome sequencing data analysis revealed a novel biallelic sequence variant (c.155T>A; p.Phe52Tyr) in the *SLCO2A1* gene. Further, Sanger sequencing analysis validated and confirmed the segregation of the novel variant in the entire family. Subsequently, protein modeling of the wild-type and mutated SLCO2A1 revealed broad-scale change, which might compromise the proteins' secondary structure and function. Conclusion: The present study adds another mutation to the *SLCO2A1*-related pathophysiology. The involvement of *SLCO2A1* in the pathogenesis of ICNC may open exciting perceptions of this gene in nail development/morphogenesis.
https://www.mdpi.com/2073-4425/14/2/430

52. Waqas, A., Liaqat, R., Shaheen, S., Khan, A. Z., Mujahid, Habib, A. H., **Umair, M.,** . . . Abbas, S. (2023). **A novel homozygous truncating variant in PPFIBP1 further delineates PPFIBP1-associated neurodevelopmental disorder.** *International Journal of Developmental Neuroscience,* 83(2), 191-200. doi: 10.1002/jdn.10247. **Muhammad Umair** (Life Science/SSC) Date of Publication: April 2023 HJRS: X (Clay)
Neurodevelopmental disorders (NDDs) are classified as a group of disorders affecting function and development of the brain and having wide clinical variability. Herein, we describe two affected individuals segregating a recessive NDD. The affected individuals exhibited phenotypes such as global developmental delay (GDD), intellectual disability (ID), microcephaly and speech delay. Whole-exome sequencing (WES) followed by bidirectional Sanger sequencing techniques identified a homozygous nonsense variant (c.466C > T; p.Gln156*) in the PPFIBP1 gene (NM_003622.4) that segregated with the disease phenotype. Further, to elucidate the effect of the variant on protein structure, 3D protein modelling was performed for the mutant and normal protein that suggested substantial reduction of the mutant protein.Our data support the evidence that PPFIBP1 has a pivotal role in neurodevelopment in humans, and loss-of-function variants cause clinically variable neurodevelopmental phenotypes.
https://onlinelibrary.wiley.com/doi/full/10.1002/jdn.10247

53. Younus, M., Rasheed, M., Lin, Z., Asiri, S. A., Almazni, I. A., Alshehri, M. A., **Umair, M.,** . . . Waqas, A. (2023). **Homozygous Missense Variant in the N-Terminal Region of ANK3 Gene Is Associated with Developmental Delay, Seizures, Speech Abnormality, and Aggressive Behavior.** *Molecular Syndromology,* 14(1), 11-20. doi: 10.1159/000526381. **Muhammad Umair** (Life Science/SSC) Date of Publication: February 2023 HJRS: X (Clay)
Intellectual disability (ID) is a lifelong disability that affects an individual's learning capacity and adaptive behavior. Such individuals depend on their families for day-to-day survival and pose a significant challenge to the healthcare system, especially in developing countries. ID is a heterogeneous condition, and genetic studies are essential to unravel the underlying cellular pathway for brain development and

functioning. Methods: Here we studied a female index patient, born to a consanguineous Pakistani couple, showing clinical symptoms of ID, ataxia, hypotonia, developmental delay, seizures, speech abnormality, and aggressive behavior. Whole exome sequencing (WES) coupled with Sanger sequencing was performed for molecular diagnosis. Further, 3D protein modeling was performed to see the effect of variant on protein structure. Results: WES identified a novel homozygous missense variant (c.178T>C; p.Tyr60His) in the *ANK3* gene. In silico analysis and 3-dimensional (3D) protein modeling supports the deleterious impact of this variant on the encoding protein, which compromises the protein's overall structure and function.
https://karger.com/msy/article/14/1/11/840180

54. **Yousaf, H., Khan, M. I. U., Ali, I., Munir, M. U., & Lee, K. Y. (2023). Emerging role of macrophages in non-infectious diseases: An update.** *Biomedicine and Pharmacotherapy,* **161. doi: 10.1016/j.biopha.2023.114426. Iftikhar Ali (Life Science/SSC) Date of Publication: May 2023 HJRS: W (Gold)**
In the past three decades, a huge body of evidence through various research studies conducted on animal models, has demonstrated that the macrophages are centralized of all the leukocytes involved in diseases and, particularly, their role in non-infectious diseases has been studied extensively for which they have also been referred to as the "double-edged swords". The most versatile of all immunocytes, macrophages play a key role in health and diseases. Various experimental models have demonstrated the conventional paradigms such as the M1/M2 dichotomy, which is not as obvious and presents a complex characterization of the macrophages in the disease immunology. In human diseases, this M1-M2 continuum shows a complex web of mechanisms, which are majorly divided into the pro-inflammatory roles (derived mainly by the cytokines: IL-1, IL-6, IL-12, IL-23, and tumor necrosis factor) and anti-inflammatory roles (CCl-17, CCl-22, CCL-2, transforming growth factor (TGF), and interleukin-10), which are involved in the wound healing and pathogen-suppression. The conventional division of these macrophages as M1 and M2 is derived from the opposing functions of these macrophages; where M1 is involved in the tissue damage and pro-inflammatory roles and M2 promotes cell proliferation and the resolution of inflammation. Both these pathways down-regulate each other in diseases through a plethora of enzymatic and cytokine mediators.
https://www.sciencedirect.com/science/article/pii/S0753332223002147

55. **Zaman, Q., Iftikhar, A., Rehman, G., Khan, Q., Najumuddin, Jan, A., Umair, M., . . . Jelani, M. (2023). Two novel homozygous variants of ATP6V0A2 and ALDH18A1 lead to autosomal recessive cutis laxa type 2 and 3 in two Pakistani families.** *Journal of Gene Medicine,* **25(10). doi: 10.1002/jgm.3522. Muhammad Umair (Life Science/SSC) Date of Publication: February 2023 HJRS: X (Honorable Mention)**
Background:Autosomal recessive cutis laxa type 2A (ARCL2A; OMIM: 219200) ischaracterized by neurovegetative, developmental and progeroid elastic skin anoma-lies. It is caused by biallelic variation in ATPase, H+transporting V0 subunit A2(ATP6V0A2; OMIM: 611716) located on chromosome 12q24.31. Autosomal recessivecutis laxa type 3A (ARCL3A; OMIM: 219150) is another subclinical type characterizedby short stature, ophthalmological abnormalities and a progeria-like appearance. TheARCL3A is caused by loss of function alterations in the aldehyde dehydrogenase18 family member A1 (ALDH18A1; OMIM: 138250) gene located at chromosome10q24.1.Methods:Whole-exome sequencing (WES), and Sanger sequencing were performedfor molecular diagnosis. 3D protein modeling was performed to investigate the dele-terious effect of the variant on protein structure.
https://onlinelibrary.wiley.com/doi/full/10.1002/jgm.3522

56. **Zeb, S., Yang, Z., Hu, R., Umair, M., Naz, S., Cui, Y., . . . Jiang, X. (2023). Electronic structure and oxygen vacancy tuning of Co & Ni co-doped W18O49 nanourchins for efficient TEA gas sensing.** *Chemical Engineering Journal,* **465. doi: 10.1016/j.cej.2023.142815. Muhammad Umair (Life Science/SSC) Date of Publication: June 2023 HJRS: W (Platinum)**
Inducing oxygen vacancies in metal oxides by dual doping metal ions is the key to modulating their electronic structure and designing highly sensitive noble metal-free materials for detecting hazardous toxic gases. This study reports nickel (Ni) and cobalt (Co) co-doping in W18O49 crystal lattices leads to electronic structure modulation and generates oxygen vacancies to highly activate the redox capability and catalytic efficacy of the urchin-like W18O49 sensor toward triethylamine (TEA) gas species. The electronic structure modulations and physisorption interactions between TEA molecules and W18O49 and/or Co&Ni co-doped W18O49 nanourchins were calculated by density functional theory (DFT). The experimental results and DFT calculations confirmed more significant charge transfers due to bandgap excitation and reactivity of TEA with Co&Ni co-doped W18O49 verifying their strong binding interactions. Electrons move from lattice oxygen to surface O2 molecules through co-doped cations-induced oxygen vacancies, which provide active sites and form surface superoxide and peroxide species incorporated into the sensing materials surface. Benefiting from the high specific surface area, abundant active sites, and faster electron/charge transport capability, the optimized 2 %Ni-doped W18O49, and 1 %Co&2%Ni co-doped W18O49 nanourchins exhibited excellent sensitivity towards TEA gas molecules. The sensing response of Co&Ni-W18O49 (Ra/Rg = 156) is higher than Ni-W18O49 (Ra/Rg = 114) and W18O49 (Ra/Rg = 76) at 250 °C, fast response/recovery (16/13), and superior selectivity.

The XRD and XPS results combining the DFT calculations verify the improved sensitivity due to the synergistic modulation of electronic structure, which paws a friendly strategy for enriching the free electronics to design cost-effective gas sensors.
https://www.sciencedirect.com/science/article/abs/pii/S1385894723015462

Department of Physics

1. **Azam, S., Imran, M., Rahman, A. U., Nadeem, A., & Neffati, R. (2023). Electronic and optical properties of quaternary selenides for optoelectronic applications: Insights from DFT+ U-computations.** *International Journal of Quantum Chemistry,* **123(3). e27025. doi: 10.1002/qua.27025. Asif Nadeem (Physics/SSC) Date of Publications: February 5 2023 HJRS: X (Clay)**

   The optical properties, electronic charge density, electronic structure of the new layered selenides materials, BaGdCuSe3, CsUCuSe3, CsZrCuSe3, and CsGdZnSe3 compounds have been calculated by using the full potential and linear augmented plane wave (FP-LAPW) methods as applied in the WIEN2k package, which is based on the density functional theory. The ALnMSe3 compound's structure of these was (A = Cs, Ba; Ln = Zr, Gd, U; M = Cu, Zn) is composed of (n = 1, 2) layers, which might be separated by A atoms. It is to be observed that there is strong hybridization between the s, p, and d states of Zr, Gd, and Cu atoms. Around the gadolinium atom, the charge density contours are completely circular, but the Gadolinium "Gd" atom shows an ionic nature. To calculate the refractive index, we used Kramer's Kronig correlations with the imaginary part dielectric function. The decrease in the refractive index is due to the lack of probability for direct excitation of the electrons, resulting in a loss of energy. The value of the static refractive index for all reference compounds is about 1.75–2.25, which is indication that the material used in optoelectronic devices.
   https://onlinelibrary.wiley.com/doi/full/10.1002/qua.27025

2. **Sadaqat, A., Ali, G., ul Hasan, M., Iftikhar, F. J., Khalid, S., Khalique, U., & Karamat, S. (2023). Laminar-protuberant like p-FeS2 rooted in mesoporous carbon sheets as high capacity anode for Na-ion batteries.** *Electrochimica Acta*, *439*, **141650.doi: 10.1016/j.electacta.2022.141650. Sidra Khalid (Physics/SSC) Date of Publication: 20 January 2023 HJRS: W (Gold)**

   Iron sulfide (FeS2) serves as tempting anode material for sodium-ion batteries (SIBs) owing to their higher theoretical specific capacity and truncated cost. However, the huge volume expansion during electrochemical cycling lowers the electro-conductivity and restricts their practical usage. In this study, a FeS2/carbon hybrid composite has been prepared through hydrothermal reaction and tested as a negative electrode for SIBs. The morphological analysis presents void betwixt p-FeS2 particles, ensuring structural reliability. X-ray photoelectron spectroscopy and X-ray absorption spectroscopy techniques are executed to examine the chemical environment and oxidation states for discharged/charged FeS2/C. When tested as an anode, the initial sodiation/desodiation capacity was recorded as 679/562 mAh g−1 at a rate of 0.05 C (where 1 C = 447 mA g−1). The rate performance of FeS2/C was evaluated in a range of 0.05–10.0 C where the material delivers a capacity of 319 mAh g−1 at 10.0 C. The FeS2/C composite exhibited an excellent Na storage capacity of 402 mAh g−1 after 200 cycles at 0.05 C with capacity retention and coulombic efficiency of 72% and 99.5%, respectively. The improved adsorption of Na-ions, good rate capacity and cycling stability is promoted from the synergistic interaction among FeS2 particles sited on the conductive sheets of mesoporous carbon matrix. Moreover, mesoporous carbon matrix is deemed responsible for better charge transfer and suppressing volume expansion during insertion/extraction cycles.
   https://www.sciencedirect.com/science/article/pii/S0013468622018060

3. **Kanwal, S., Jamil, M. I., Tariq Mirza, M. S., Ahmed, A., & Alrashdi, A. O. (2023). Elucidating the Effect of Pressure on Structural, Electronic, Magnetic, Mechanical and Thermal Properties of Mn2ZrZ (Z= Ge and Si): DFT Overview.** *ECS Journal of Solid State Science and Technology.* **12(1).doi: 10.1149/2162-8777/acaf18. Shamsha Kanwal, Muhammad Imran Jamil (Physics/SSC) Date of publication: January 2023 HJRS: X (Clay)**

   In this work, structural, electronic, magnetic, thermal and mechanical properties of Mn2ZrZ (Z=Ge and Si) under pressure up to 50 GPa is studied using state of the art density functional theory. In structural properties, under pressure ground state optimizations are performed to check the thermodynamic stability of studied alloys. Furthermore, enthalpy of formation and elastic stability criteria affirms the thermodynamic stability in studied alloys. Pugh ratio suggests that Mn2ZrGe and Mn2ZrSi remain ductile and brittle in nature, respectively throughout pressure up to 50 GPa. Moreover, large elastic anisotropic response is observed for both alloys. In electronic properties density of states and band gaps are discussed in detail which affirms the ferromagnetic half metallic nature of alloys. Our computed results, such as optimized ground state lattice constant, band-gap and magnetic moment are consistent and have matched excellently with available literature at ambient conditions. In mechanical properties, Debye temperature factor, minimum thermal conductivity and melting temperature is observed to increase with pressure while, Grüneisen anharmonicity factor decreases. However, to date, there are no reports available in literature with under pressure results up to 50 GPa. Therefore, this work illustrates new findings of Mn2ZrZ under pressure for potential applications in thermal actuators and

spintronic devices. © 2023 The Electrochemical Society ("ECS").
https://iopscience.iop.org/article/10.1149/2162-8777/acaf18/meta

4. **Ain, Q., Ullah, H., & Munir, J. (2023). Structural, optoelectronic and thermal response of new stable MgBe2X2 (X= As, P) Zintl phases: First-principles calculation.** *Materials Science and Engineering: B*, *287*, **116136.doi: 10.1016/j.mseb.2022.116136.** Qurat ul Ain (Physics/SSC) Date of publication: January 2023 HJRS: W (Honorable Mention)

Highly-accurate computational predictions of suitable thermoelectric materials have sparked interest in discovering new Zintl phases. We report a detailed first-principles study to investigate the ground-state structural, electronic, optical and thermoelectric properties of MgBe2X2 (X = As, P) Zintl phases. Both compounds' optimized energy-volume curves, negative formation energies and phonon dispersion curves confirm their stability. A semiconductor nature is observed with bandgap values of 1.04 eV and 1.20 eV for MgBe2As2 and MgBe2P2, respectively. The optical response of the studied phases shows their potential to use in optoelectronic devices. Semi-classical Boltzmann theory is implemented through BoltzTraP code to calculate the thermal response. High Seebeck values are achieved at room temperature as well as at high temperatures. The power factor also shows an increase with the temperature increase. Furthermore, the figure of merit (ZT) shows good value of 0.74 for MgBe2As2 and 0.75 for MgBe2P2. A good optical and thermoelectric response of the studied phases opens the opportunity to use them in optoelectronic and thermoelectric applications.
https://www.sciencedirect.com/science/article/pii/S0921510722005244

5. **Ain, Q., Jbara, A. S., Haider Rizvi, S. Z., Shaheen, M., & Munir, J. (2023). Electromagnetic, optical and thermoelectric response of full-Heusler Co2VGe alloy for spintronic and thermoelectric applications: DFT+SOC study.** *Physica B: Condensed Matter,* **657. doi: 10.1016/j.physb.2023.414820.** Qurat ul Ain (Physics/SSC) Date of publication: May 2023 HJRS: X (Honorable Mention)

Heusler alloys exhibit diverse functional properties originating from magneto-elastic coupling and attracted significant interest in spintronic applications. We use the full-potential linearized augmented plane wave method: to study the electromagnetic, structural, optical and thermoelectric properties of full Heusler Co2VGe alloy. The spin-polarized calculations and the spin-orbit coupling effect (SOC) are carried out to study the properties. The optimization is done in both ferromagnetic and non-magnetic states. The electronic structure shows the fullpolarization at the Fermi level and confirms the half-metallic nature of Co2VGe. A band-gap of 0.89eV is achieved in spin-dn states with mBJ and it decreases with SOC up to 0.82eV. The Cobalt-atoms show major contribution to the overall magnetic behavior of the alloy. The optical and the thermoelectric response of Co2VGe are also calculated. In spin-dn states, a high value of Figure of merit i.e. 0.86 is obtained with mBJ and 0.77 with SOC effect at 800 K.
https://www.sciencedirect.com/science/article/pii/S0921452623001874

6. **Ain, Q., Shaheen, M., Rizvi, S. Z. H., Din, M. U., Murtaza, H., Saeed, M. A., & Munir, J. (2023). First-principles analysis of the physical properties of XAcTe2 (X = Li, Na) Heusler alloys for optoelectronic and thermoelectric devices.** *Computational Materials Science,* **224. doi: 10.1016/j.commatsci.2023.112156.** Qurat ul Ain, Hudabia Murtaza (Physics/SSC) Date of publication: May 2023 HJRS: W (Bronze)

Materials with diverse properties are in high demand due to their utilization in multipurpose devices. The current work presents the systematical analysis of electronic structure, mechanical, optoelectronic and transport properties of new Heusler XAcTe2 (X = Li, Na) alloys. Density functional theory (DFT) based calculations are carried out first time to compute the physical properties of the alloys. The exchange–correlation potential is solved with modified Becke-Johnson (mBJ) approximation. Structural stability is obtained with ground state optimized lattice parameters, negative formation energy values, and phonon dispersion curves. A brittle nature with an anisotropic character is observed for both alloys. The band structures show a direct bandgap for both alloys, which is also reflected in the density of states. The evaluated optoelectronic response shows the high absorption in the ultraviolet region, confirming their ability to use them in optoelectronic devices. The analysis of thermoelectric parameters shows the high electrical and minimum thermal conductivities for both alloys. The electronic and lattice vibrations dependent high ZT values are achieved for LiAcTe2 and NaAcTe2 alloys. The optoelectronic and thermoelectric responses of the alloys show that they could be promising candidates for use in optoelectronic and renewable energy applications.
https://www.sciencedirect.com/science/article/pii/S0927025623001507

7. **10. Akram, R., Fatima, A., Almohaimeed, Z. M., Farooq, Z., Qadir, K. W., & Zafar, Q. (2023). Photocatalytic Degradation of Methyl Green Dye Mediated by Pure and Mn-Doped Zinc Oxide Nanoparticles under Solar Light Irradiation.** *Adsorption Science and Technology,* **doi: 10.1155/2023/5069872.** Adeena Fatima, Qayyum Zafar (Physics/SSC) Date of publication: April 2023 HJRS: X (Honorable Mention)

Herein this study, pure and manganese- (Mn-) doped ZnO (2 wt. %) nanoparticles have been synthesized using the chemical precipitation method and characterized for the photodegradation of methyl green (MG) pollutant dye under natural sunlight. The structural analysis via XRD patterns has revealed that both intrinsic and Mn-

doped ZnO (2 wt. %) samples have hexagonal wurtzite structures with appropriate phase purity, clearly indicating the absence of any external impurity. The incorporation of Mn in the host ZnO lattice has decreased the crystallite size (21.10 → 18.76 nm), and nanoparticle-type surface features with sizes in the 50–100 nm range have been observed through FESEM-based surface morphological studies. Both aforementioned observations have merit in providing more active area and a high surface area to volume ratio for photocatalytic reaction. The investigation of photophysical properties indicates that in Mn-doped ZnO nanoparticles, the absorption peak is blue-shifted by 5 nm (365 → 360 nm), due to the widening of the bandgap. The degradation kinetics of MG dye follow the pseudo-second-order kinetics, and the degradation efficiency has been observed to be 62.78% mediated by pure ZnO and 66.44% by Mn-doped ZnO (2 wt. %) photocatalyst under 60 minutes of sunlight irradiation. Specifically, the rate of photocatalytic reaction (K) ~0.01792 min-1 and ~0.97992 has been achieved for pure ZnO, whereas slightly higher (K) ~0.02072 min-1 and ~0.97299 have been observed for Mn-doped ZnO, respectively. Conclusively, the synergistic interactions with multiple charge transfer pathways, improvement of e–/h+ pair charge separation, improved surface area, and efficient generation of hydroxyl radicals are supposed to be responsible for the highly efficient photocatalytic activity of the Mn–doped ZnO photocatalyst for MG dye.
https://www.hindawi.com/journals/ast/2023/5069872/

8. **Azam, S., Imran, M., Rahman, A. U., Nadeem, A., & Neffati, R. (2023). Electronic and optical properties of quaternary selenides for optoelectronic applications: Insights from DFT+U-computations.** *International Journal of Quantum Chemistry, 123*(3). doi: 10.1002/qua.27025. **Asif Nadeem (Physics/SSC) Date of publication: February 2023 HJRS: X (Clay)**
The optical properties, electronic charge density, electronic structure of the new layered selenides materials, $BaGdCuSe_3$, $CsUCuSe_3$, $CsZrCuSe_3$, and $CsGdZnSe_3$ compounds have been calculated by using the full potential and linear augmented plane wave (FP-LAPW) methods as applied in the WIEN2k package, which is based on the density functional theory. The $ALnMSe3$ compound's structure of these was (A = Cs, Ba; Ln = Zr, Gd, U; M = Cu, Zn) is composed of (n = 1, 2) layers, which might be separated by A atoms. It is to be observed that there is strong hybridization between the s, p, and d states of Zr, Gd, and Cu atoms. Around the gadolinium atom, the charge density contours are completely circular, but the Gadolinium "Gd" atom shows an ionic nature. To calculate the refractive index, we used Kramer's Kronig correlations with the imaginary part dielectric function. The decrease in the refractive index is due to the lack of probability for direct excitation of the electrons, resulting in a loss of energy. The value of the static refractive index for all reference compounds is about 1.75–2.25, which is indication that the material used in optoelectronic devices.
https://onlinelibrary.wiley.com/doi/full/10.1002/qua.27025

9. **Din, M. U., Munir, J., Alshahrani, T., Elsaeedy, H. I., & Ain, Q. (2023). Scrutinized the spin-orbit coupling effect on the elastically and thermodynamically stable Rb2BCl6 (B = Pb, Ti) double perovskites for photocatalytic, optoelectronic and renewable energy applications.** *Materials Science in Semiconductor Processing, 163*. doi: 10.1016/j.mssp.2023.107569. **Qurat ul Ain (Physics/SSC) Date of publication: August 2023 HJRS: W (Bronze)**
In this report, the electronic structure, mechanical stability, optoelectronic, thermoelectric and photocatalytic response of inorganic halide perovskites Rb_2BCl_6 (B= Pb, Ti) have been simulated first time by using density functional theory (DFT). Modified Becke-Johnson (mBJ) potential along with spin-orbit coupling (SOC) effect is applied for accurate calculations. The calculated ground-state lattice parameters, negative formation energy values and positive phonon frequencies endorse the stability of both compounds. The band structure plots display the semiconductor character of both perovskites. The mechanical stability has been determined with the Bulk and Young modulus, Poisson ratio, along with the calculation of elastic constants. The calculated optical response reveals a high dielectric constant and absorption coefficient with low reflectivity. These compounds are revealed to have a higher figure of merit (ZT) than the typical metal halide perovskites with the values of 0.732 and 0.72 for Rb_2PbCl_6 and 0.724 and 0.71 for Rb_2TiCl_6 at 800K with mBJ and mBJ+SOC, respectively. The Seebeck coefficient and figure of merit present good values at high temperatures. The photocatalytic activity has shown the water-splitting ability of Rb_2TiCl_6. The overall analysis of the calculated properties shows that the studied halide perovskites are suitable for optoelectronic, thermoelectric and photocatalytic applications.
https://www.sciencedirect.com/science/article/pii/S1369800123002627

10. **Khalid, S., Riaz, S., Akbar, A., Shah, Z. H., Kayani, Z. N., & Naseem, S. (2023). Magneto-transport and magneto-dielectric anomalies in Co doped iron oxide thin films – Microwave assisted sol-gel route.** *Journal of Saudi Chemical Society, 27*(2). doi: 10.1016/j.jscs.2022.101595. **Sidra Khalid, Zaheer Hussain Shah (Physics/SSC) Date of publication: March 2023 HJRS: W (Honorable Mention)**
Use of microwave (MW) energy as an alternate to high temperature treatment during material synthesis is gaining much attention as it offers the advantages of being faster and economical than other heating methods. A comprehensive study of structure, magnetization, and polarization behaviour of Cobalt (Co) doped Fe_3O_4 thin films, prepared by means of microwave assisted sol–gel method is performed. Co doped (0-10 wt%) sols are

prepared after irradiating them at MW power of 1000 W. Phase analysis is confirmed using XRD where Fe_3O_4 phase persisted with Co concentrations of 0-6 wt%. Higher concentration results in the appearance of cobalt oxide phase. Magnetic and transport properties are strongly affected by the presence of Co ions. Co doped Fe_3O_4 films show anisotropic behaviour with high saturation magnetization obtained for 6 wt% Co doped Fe_3O_4 thin films, i.e. ~ 125 emu/g. Verwey transition is observed for thin films with low dopant concentration while no sharp transition in magnetization behaviour is observed for higher dopant concentration. High frequency anomaly in dielectric analysis is observed at high frequencies for Co doped Fe_3O_4 thin films. Negative values of magneto-dielectric coefficient show coupling of magnetic and dielectric behaviour at room temperature.
https://www.sciencedirect.com/science/article/pii/S1319610322001776

11. **Nadeem, A.,** Bashir, A. I., Azam, S., Rahman, A. U., & **Iqbal, M. A.** (2023). **Cd-doping-assisted tuning of transparency and conductivity of MnIn2O4 by density functional quantum theoretical approach.** *European Physical Journal Plus, 138*(4). doi: 10.1140/epjp/s13360-023-03911-8. Asif Nadeem, Muhammad Azhar Iqbal (Physics/SSC) Date of publication: April 2023 HJRS: W (Bronze)

Spinel oxides have attracted huge attention from researchers owing to their fundamental potential and applied prospects. In particular, it is highly desirable to enhance simultaneously the transparent and conducting nature of spinel oxides for many device applications such as display screens. To achieve the task, we report a comparative analysis on the spin-polarized electronic and optical properties of manganese-indium-dioxide ($MnIn_2O_4$) spinel and its Cd-doped counterparts $MnIn_{2-x}Cd_xO_4$ ($x = 0.25$, 0.50, 0.75, 1). For the quantum-computation analysis of the required properties, we apply density functional theory within Tran-Blaha Modified Becke–Johnson functional to account for electronic exchange correlation. The calculated energy bandgap of $MnIn_2O_4$ is 0.8 eV for majority spin and 1.2 eV for minority spin. We observe a considerable modification in bandgap of $MnIn_2O_4$ with Cd-doping concentration along with the enhancement of intensity of DOS (density of states) near EF◆◆ level. The maximum bandgap of 1.8 eV and 2.1 eV is predicted for majority and minority spin for the compound $MnInCdO_4$. The Cd doping-assisted enhancement of bandgap and DOS near EF◆◆, significantly modified the transparency and conductivity in $MnInCdO_4$ at specific energy.
https://link.springer.com/article/10.1140/epjp/s13360-023-03911-8#Sec11

12. **Hashim, H. A., Ali Qazi, S. N.,** Anwar, M. S., & **Zafar, Q.** (2023). **Evaluation of Coefficients of Friction for Cylinders, Rolling Down an Inclined Plane, by a Facile Video Analysis Technique.** *The Physics Educator, 5*(02). https://doi.org/10.1142/S2661339523500051. Hafiz Arslan Hashim, Syed Nasrullah Ali Qazi, Qayyum Zafar (Physics/SSC) Date of publication: April 2023 HJRS: W (Bronze)

Recently, the use of video analysis technique has emerged as an effective and facile learning tool, due to the richness of spatial and temporal data useful to investigate the complex physical phenomena related to kinematics. In this study, we have investigated the motion of solid and annular cylinders rolling down an inclined wooden plane at different angles. The linear accelerations of the cylinders for the case of rolling (with and without slipping) have been derived theoretically and have been compared with their experimental counterparts. Specifically, the experimental values have been determined by performing a series of experiments, wherein the motion of the cylinders has been captured via a digital camera (recording at 240 frames s) and later analyzed frame by frame utilizing in-house developed GUI-based "Phystrack" video tracking library. We have measured the transition angles corresponding to the transition of motion (a) from rest to rolling, and (b) from pure rolling to a combination of rolling and slipping mode of motion, for the case of two distinct cylinders. This has eventually allowed us to compute the coefficient of static, kinetic and rolling friction for the aforementioned cylinders. In general, the coefficient of kinetic friction is regarded as an intrinsic material-dependent constant and considered as independent of the geometry of the object. However, in the case of rolling motion, the coefficients of friction are strongly dependent upon the geometrical parameters of the rolling object. The study emphasizes on developing the conceptual understanding ability of physics students pertaining to the friction coefficient of rolling objects.
https://www.worldscientific.com/doi/abs/10.1142/S2661339523500051

13. **Munir, J., Iftikhar, M. K., Jamil, M. I.,** Din, M. U., Alshahrani, T., Elsaeedy, H. I., & **Ain, Q.** (2023). **Physical properties of elastically and thermodynamically stable magnetic AcXO3 (X= Cr, Fe) perovskite oxides: a DFT investigation.** *Physica Scripta, 98*(6), https://doi.org/10.1088/1402-4896/accf4a. M Khuram Iftikhar, M Imran Jamil, Quratul Ain (Physics/SSC) Date of publication: April 2023 HJRS: W (Honorable Mention)

Spin-polarized calculations of mechanical, electronic structure, phonon, optical and magnetic properties of AcXO 3 (X= Cr, Fe) perovskite oxides (POs) has been computed using the full-potential linearized augmented plane wave method. The modified Becke Johnson (mBJ) approximation has been utilized for exchange-correlation potential and implemented in the WIEN2k code. The negative values of formation energy and the positive fRequencies of the phonon modes show the stability of studied perovskite oxides. The mechanical stability is confirmed through the elastic parameters such as shear modulus (G), Bulk modulus (B), Poisson ratio (v) and Cauchy pressure. The semiconductor nature with an indirect bandgap is observed for both

compounds in both spin channels. The computed electron density contour plot describes the bonding nature of both compounds. The magnetic moments are calculated, which show the major involvement of Fe and Cr atoms in the overall magnetism of studied compounds. The optical response is also evaluated, showing the maximum absorption in the ultraviolet region. The overall analysis of the calculated properties shows that the studied oxide perovskites are suitable for spintronic and optoelectronic applications.
https://iopscience.iop.org/article/10.1088/1402-4896/accf4a

14. **Jamil, M. I.,** Ghani, M. U., Ahmad, A., & Tariq, S. (2023). Electron Affinity Measurement of Hydrogen Negative Ion. *Pakistan Journal of Emerging Science and Technologies (PJEST), 4*(2), 1-8. **https://doi.org/10.58619/pjest.v4i2.101** . **Muhammad Imran Jamil** (Physics/SSC) Date of publication: May 2023 **HJRS: Y (Null)**

The Photodetachment Microscopy experiment was first carried out in the presence of an electric field by Blondel et al in 1996 for Bromine negative ion. It measures the spatial distribution of ejected electrons on the detector screen which is a direct view of the spatial structure of the wave function of an atomic electron in the form of a ring pattern. From a semi-classical point of view, this ring pattern is formed because of the interference between two electron waves; one is direct while the other is reflected from an electric field. Following Blondel's photodetachment microscopy experiment, a formula that displays the Newton Rings is derived using a theoretical imaging technique or hydrogen negative ion near a plane interface. The interface means an elastic plane in the vicinity of the source of photoelectrons. The direct and reflected electron waves in this formula generate quantum interference in the form of Newton Rings. It is found that the number of rings increases as we increase the photon energy of the laser light. This finding is in accordance with the very well-known Einstein photoelectric effect which finally provides help to find the electron affinity of the hydrogen negative ion very accurately.
https://www.pjest.net/index.php/pjest/article/view/101

15. **Khalid, S.,** Shamaila, S., **Raza, M., Ashraf, S., & Toheed, A.** (2023). GROWTH AND CHARACTERIZATION OF POLYMERIC MEMBRANE MODIFIED BY MAGNETIC NANOPARTICLES. *Surface Review and Letters,* 2350043. **https://doi.org/10.1142/S0218625X23500439.** **Sidra Khalid, Mohsin Raza, Sidra Ashraf, Anas Toheed** (Physics/SSC) Date of publication: May 2023 **HJRS: X (Clay)**

In this study, we aimed to modify polymeric membranes by incorporating magnetic nanoparticles (NPs) to enhance their properties. The structural and chemical properties of magnetic NPs of iron oxide were prepared via a wet chemical method. Iron oxide nanoparticles (IONPs) were used as the core and were coated with polymers polyvinyle alcohol (PVA) and polyvinylpyrrolidone (PVP). The prepared samples were cast on a glass substrate using a casting knife. The aim of this study is the use of a specific type of magnetic NPs, coated with a polymer, and their application in membrane modification. We employed a facile synthesis method to coat the IONPs with the polymer and characterized the resulting material using various techniques, including X-ray Diffraction (XRD), scanning electron microscope (SEM), Fourier Transform Infrared (FTIR) Spectroscopy, and UV/Visible (UV–Vis) Spectroscopy for structural, morphological, chemical bonding, and optical properties studies. Our results show that the modified polymeric membranes exhibited improved properties, such as increased permeability and selectivity. We also observed that the magnetic NPs helped in the easy recovery of the modified membranes using an external magnetic field. Some agglomeration of IONPs was also observed, and the polymer membrane caused a decrease in crystallinity of IONPs. Overall, this study presents a promising approach for enhancing the properties of polymeric membranes using magnetic NPs and can potentially have practical applications in various fields, such as water treatment, food processing, and biotechnology.
https://www.worldscientific.com/doi/10.1142/S0218625X23500439

16. **Munir, J.,** Jamil, M., Jbara, A. S., Ullah, H., **Murtaza, H.,** Ali, H. E., & **Ain, Q.** (2023). Electronic structure and optical and thermoelectric response of lead-free double perovskite BaMgLaBiO6: a first-principles study. *Journal of Computational Electronics*, 1-13. **https://doi.org/10.1007/s10825-023-02073-1. Hudabia Murtaza, Qurat-ul-Ain** (Physics/SSC) Date of publication: July 2023 **HJRS: X (Clay)**

The electronic structure and optical and transport properties of double perovskite $BaMgLaBiO_6$ have been investigated theoretically with density functional theory implemented in WIEN2k code. The structure is optimized to achieve minimum energy at the ground state and optimized lattice parameters. The calculated formation energy shows the stability of the compound, which confirms the possibility of synthesis. A bandgap of 2.7 eV is calculated with the generalized gradient approximation, and further improvement, i.e., 3.8 eV, is achieved with the modified Becke–Johnson (mBJ) exchange potential. The electron density plots show both the covalent and ionic bonding between the atoms. The calculated total density of states shows good agreement with the band structure. The optical parameters are also calculated and good optical conductivity is achieved in the selected energy range. The figure of merit is achieved up to 0.71 with mBJ, which shows the suitability of the studied material for alternative energy devices. The overall response of the compound makes it a potential candidate for LEDs, lasers, power switching and thermoelectric applications.
https://link.springer.com/article/10.1007/s10825-023-02073-1#citeas

17. Batool, T., **Shah, Z. H.**, Ashraf, H., Ali, D., Shamaila, S., Anjum, T., . . . Riaz, S. (2023). **Solar energy driven photo catalytic action and antimicrobial activities of Iron oxide nanoparticles.** *Journal of Sol-Gel Science and Technology,* **108(3), 655-671. doi: 10.1007/s10971-023-06210-x. Zaheer H. Shah (Physics/SSC) Date of publication: December 2023 HJRS: X (Clay)**

Every year loss of crop yield (at least 20–40%) occurs by pathogenic infections that leads to loss of billions of dollars worldwide. Usage of antibiotics are limited in numerous countries for controlling bacterial diseases / infections in agricultural field. Therefore, alternative protocol is necessary to combat with microbial pathogens and to overcome the requirement to suppress use of conventional antibiotics in plant production. Nanoparticles (NPs) having antimicrobial properties can have potential to combat the bacteria and can protect the plant / crop production. Moreover, such NPs may also have potential to suppress the plant pathogens. Sol-gel method is used for synthesis of iron oxide NPs with variation in pH (1, 2, 3, 4, 5, 6, 7, 8 and 9). Magnetic field annealing (MFA) of NPs at different temperatures (200 and 300 °C) is done. 300 °C MFA samples show efficient results. X-ray Diffraction (XRD) results show magnetite phase (at pH 1, 2 and 6), mixed phases (i.e. hematite and maghemite) at pH 3–5, maghemite phase (at pH 7-8) and hematite phase (at pH 9) of iron oxide. Scanning Electron Microscopy (SEM) analysis shows particle size of ~50 nm for MFA iron oxide NPs (at pH 6). Raman spectroscopy results show the formation of iron oxide NPs. Furthermore, 300 °C MFA magnetite nanoparticles (at pH 6) proved to be potential candidate against bacteria (E. coli with inhibition zone ~31 mm) and against methylene blue with enhanced photo catalytic action. In-vitro activity of magnetite NPs expressively inhibited the growth of Fusarium oxysporum after 3rd and 7th day of incubation in a dose-dependent way. In-vivo studies also exhibited improved plant growth parameters after treatment with different concentrations of magnetite NPs. This work suggests that iron oxide NPs can be used in agricultural sector for protection of plant.

https://link.springer.com/article/10.1007/s10971-023-06210-x#Abs1

18. Firdous, F., **Ain, Q.**, Qaid, S. M. H., Yousaf, M., Ghaithan, H. M., Ahmed, A. A. A., & Munir, J. (2023). **Half-metallicity, magnetic and optical attributes of mechanically stable half-Heusler VSnX (X = Pt, Pd) alloys for spintronics: a DFT study.** *European Physical Journal Plus,* **138(8). doi: 10.1140/epjp/s13360-023-04315-4. Qurat ul Ain (Physics/SSC) Date of publication: August 2023 HJRS: W (Bronze)**

Recent developments in spintronics reveal the significance of half-Heusler alloys due to their high spin polarization. Using Wien2k package, half-Heusler VSnX (X = Pt, Pd) alloys have been investigated. The structures are predicted to have most stable in magnetic phases. Furthermore, formation energies and mechanical parameters justify the stability conditions. The bonding nature is determined through Pugh ratio, while the brittle behavior is achieved through Poisson ratio. A half metallic character with indirect band gap (Spin-dn) is achieved for VSnPt and VSnPd alloys. The spin polarization in both alloys is demonstrated through DOS and integer values of magnetic moments. The optical attributes are evaluated through several optical parameters showing absorption in visible and UV regions. The half-metallic response and the optical characteristics reveal that VSnX (X = Pt, Pd) exhibit interesting features for spintronic and optoelectronic technologies

https://link.springer.com/article/10.1007/s10971-023-06210-x#Abs1

19. H. Qaid, S. M., Murtaza, H., **Ain, Q. U.**, Ghaithan, H. M., Ali Ahmed, A. A., Alkadi, M., & Munir, J. (2023). **A computational approach to correlate the physical attributes of lead-free Rb2XRhF6 (X= Li, Ag) double perovskite halides for optoelectronics and renewable energy applications.** *Physica B: Condensed Matter,* **671. doi: 10.1016/j.physb.2023.415416. Qurat ul Ain (Physics/SSC) Date of publication: December 2023 HJRS: X (Honorable Mention)**

The potential of perovskite halides revolutionized the field of optoelectronics and energy conversion. In the present work, the physical characteristics of Rb2XRhF6 (X = Li, Ag) have been theoretically studied using FP-LAPW method based on DFT. Exchange correlation effects of modified Becke Johnson (mBJ) have also been applied to compute the respective physical characteristics. The stability of both perovskites is justified by volume optimization curves and associated formation energies along with the tolerance factor calculations. A direct band-gap of 3.44eV is noted in Rb2LiRhF6 and an indirect band-gap of 2.69eV is achieved in Rb2AgRhF6. A brittle character for Rb2LiRhF6 and ductile nature for Rb2AgRhF6 is obtained. Maximum absorption for both halides in the UV range reveals their potential for laser and UV-protecting devices. High values of electrical conductivity and ZT values for both halides open the possibility to utilize them in thermoelectric devices.

https://www.sciencedirect.com/science/article/abs/pii/S0921452623007834

20. **Khalid, S.**, Imran, M., **Shah, Z. H.**, Kayani, Z. N., Sadiq, I., Naseem, S., & Riaz, S. (2023). **Effect of microwave irradiations on exchange bias and spin reorientation in cr doped iron oxide thin films – Sol-Gel approach.** *Journal of Sol-Gel Science and Technology,* **107(3), 794-809. doi: 10.1007/s10971-023-06151-5. Sidra Khalid, Zaheer H. Shah (Physics/SSC) Date of publication: September 2023 HJRS: X (Clay)**

Microwave-assisted sol-gel method has proven to be a better alternate to conventional chemical approaches. In the present research work, chromium (Cr) doped thin films of iron oxide are prepared by modified sol-gel method, i.e. by using microwaves. Samples are prepared with microwave power of 720 W, whereas doping is varied in the range of 0 to 14 wt%. Maghemite phase (γ-Fe2O3) is observed for undoped sample, whereas hematite (α-Fe2O3) is observed for the samples prepared with 2–4 wt% Cr doping. Magnetite (Fe3O4) phase of iron oxide is observed at relatively higher doping concentrations, i.e. 6–10 wt%. Ferromagnetic behaviour along with high saturation magnetization is observed with the increase in Cr doping concentration. Increased value of squareness is observed at higher Cr concentration, i.e. 6–14 wt%. Higher value of saturation magnetization (Ms) is observed with 10 wt% Cr doping i.e. ~83 emu/g, whereas decrease in Ms is witnessed with further increase in dopant concentration to 12–14 wt%. Impedance measurements show that transport mechanism in Cr doped Fe3O4 is governed by tunnelling across the grain boundaries. Room temperature coupling of magnetic and dielectric behavior is observed under the effect of different frequency values.
https://link.springer.com/article/10.1007/s10971-023-06151-5#Abs1

21. **Ain, Q. U., Qaid, S. M. H., Yousaf, M., Alkadi, M., Iqbal, A. B., Ahmed, A. A. A., & Munir, J. (2023). A promising optoelectronic and thermoelectric response of full Heusler Na2TlX (X = Bi, Sb) alloys: a DFT approach.** *Physica Scripta,* **98(11). doi: 10.1088/1402-4896/acfdd7. Qurat-ul-Ain (Physics/SSC) Date of publication: November 2023 HJRS: X (Honorable Mention)**

The energy conversion efficiency is one of the attributes that make Heusler alloys an extraordinary candidate for thermoelectric applications. In this paper, we have examined the electronic structure, elastic, optical and transport characteristics of full Heusler Na2TlX (X = Bi, Sb) alloys using DFT. The electronic properties are analyzed by utilizing modified Becke Johnson (mBJ) potential. The negative formation energies and optimization results reveal the stable phases of both alloys. The electronic properties exposed the semiconductor nature of both alloys. The elastic stability is obtained from various elastic parameters. The optical response of these alloys has been studied in depth by evaluating the real and imaginary dielectric functions, optical loss, refractive index and absorption coefficient. Furthermore, the thermoelectric properties are computed, which demonstrate the high electrical conductivity, Seebeck and ZT values for both alloys. The above computed attributes favor the use of studied alloys in green energy and optoelectronic applications.
https://iopscience.iop.org/article/10.1088/1402-4896/acfdd7/meta

22. **Munir, J., Mursaleen, I., Ghaithan, H. M., ul Ain, Q., Ahmed Ali Ahmed, A., & Qaid, S. M. H. (2023). First-principles investigations of the mechanically and thermodynamically stable potassium-based double perovskites K2TlAsX6 (X = Cl, Br) for optoelectronic and renewable applications.** *Materials Science and Engineering: B,* **298. doi: 10.1016/j.mseb.2023.116830. Qurat-ul-Ain (Physics/SSC) Date of publication: December 2023 HJRS: W (Bronze)**

Double perovskites with their significance properties are considered to be promising candidates for an extensive range of applications. Current research work includes the theoretical analysis of the physical characteristics of K_2TlAsX_6 (X = Cl, Br) double perovskites under the framework of DFT. The precise band structure calculations have been done using modified Becke-Johnson (mBJ) with the inclusion of spin–orbit coupling (SOC) effect. Negative formation energies, structural optimization, positive phonon frequencies and tolerance and octahedral factors support the stability of the perovskites. Elastic parameters, including anisotropic factor, Pugh's and Poisson's ratios, and Cauchy pressure, are calculated to quantify mechanical characteristics. A direct band gap is obtained in both perovskites possessing the values of 2.22 eV and 1.59 eV for $K_2TlAsCl_6$ and 1.97 eV and 1.51 eV for $K_2TlAsBr_6$ with mBJ and mBJ + SOC, respectively. The compound's optical response is scrutinized, showing the absorption in visible and UV regions. The transport characteristics are also evaluated, showing their high electrical conductivity and ZT values and simultaneously small thermal conductivity values for both perovskites. The optical and transport properties reveal the capacity of $K_2TlAsCl_6$ and $K_2TlAsBr_6$ to be used in optoelectronic and green energy applications.
https://www.sciencedirect.com/science/article/abs/pii/S092151072300572X

23. **Munir, J., Qaid, S. M. H., Aslam, A. A., Ud Din, M., Ghaithan, H. M., Ali Ahmed, A. A., . . . Ain, Q. (2023). A computational insight into the Zintl SZr2N2 and BaAg2S2 phases for optoelectronic thermoelectric applications.** *Physica B: Condensed Matter,* **671. doi: 10.1016/j.physb.2023.415403. Qurat-ul-Ain (Physics/SSC) Date of publication: December 2023 HJRS: X (Honorable Mention)**

The physical characteristics of SZr2N2 and BaAg2S2 Zintl phases have been explored by utilizing the full-potential augmented plane wave (FP-LAPW) method with the combination of modified Becke-Johnson (mBJ) approximation. The negative formation energies and phonon modes with positive frequencies endorsed the stability of both compounds. The electronic band profile reveals a bandgap of 1.18 eV for SZr2N2 and 2.15 eV for BaAg2S2. The optical characteristics are also calculated. The absorption of light for the studied compounds falls in the ultra-violet region, which shows their possibility to be employed as UV-rays absorbers. A large optical conductivity and low energy loss is also seen for both materials on UV region. The efficiency of temperature-dependent thermoelectric properties increases with the temperature rise, as calculated with the

BoltzTraP code. The high electrical with low thermal conductivities and maximum Seebeck coefficient is witnessed for both materials. The large ZT values of 0.75 and 0.80 are achieved for SZr2N2 and BaAg2S2, respectively. All calculated transport parameters indicate the opportunity of using the studied compounds for thermoelectric applications.

https://www.sciencedirect.com/science/article/abs/pii/S0921452623007706

24. **Qaid, S. M. H., Jamil, M., Munir, J., Ghaithan, H. M., Ahmed, A. A. A., & Ain, Q. U. (2023). A computational insight into Rb2ASbX6 (A=Tl, Cu & X=I, Cl) double perovskites for energy storage and optoelectronic applications. Physica Scripta, 98(10). doi: 10.1088/1402-4896/acf3a9. Qurat-ul-Ain (Physics/SSC) Date of Publication: September 2023 HJRS: X (Honorable Mention)**

Double perovskites are considered to be outstanding materials for encountering the energy crises faced by the world community. This article comprehensively addresses the electronic structure, mechanical, optical and transport attributes of Rb2ASbX6 (A=Tl, Cu & X=I, Cl) double perovskites by using the DFT approach. The structural and thermodynamic stability is confirmed with negative formation energy and tolerance factor. An indirect bandgap of 1.06 eV for Rb2CuSbCl6 and a direct bandgap of 1.12 eV for Rb2TlSbI6 have been found. Mechanical properties are analyzed through elastic parameters. The absorption is found in visible as well as in ultraviolet regions with the minimum energy loss suggesting their possible use in optoelectronic applications. The thermoelectric ability is judged through the computation of transport parameters. The ZT values of 0.79 for ${{\rm{Rb}}}_{2}{{\rm{CuSbCl}}}_{6}$ and 0.75 for ${{\rm{Rb}}}_{2}{{\rm{TlSbI}}}_{6}$ endorsed their potential for renewable devices.

https://iopscience.iop.org/article/10.1088/1402-4896/acf3a9/meta

25. **Ramzan, B., Mir, Z., Rasheed, A., & Jamil, M. (2023). Transonic plasma winds with cosmic-rays and waves. Physica Scripta, 98(12). doi: 10.1088/1402-4896/ad07bf. Bilal Ramzan (Physics/SSC) Date of Publication: November 2023 HJRS: W (Honorable Mention)**

Transonic plasma winds are studied under the influence of gravitational potential well in the presence of cosmic rays and self excited Alfvén waves. We present interesting features of transonic winds originating from the gravitational potential well for a three-fluid system. The model is comprising of thermal plasma, cosmic rays and Alfvén waves. The analysis is carried out on the hydro-dynamical basis with a particular emphasis on cosmic-ray streaming instability and damping mechanism. Boundary conditions on the base of the gravitational potential well will help to explore steady-state transonic wind solutions. A critical analysis on various mass outflow rate is also presented which is applicable to know the behaviour of normal and star-burst galaxies. The dependence of the critical or sonic point is studied for different sets of physical parameters. For the graphical interpretation of the numerical results different contour plots presented to analyze impacts of different mass flow rates. We find that transonic solutions exist for a wide range of parameters. We examine the case very close to the base of the gravitational potential well and the effect of the cosmic ray diffusion is neglected in current study.

https://iopscience.iop.org/article/10.1088/1402-4896/ad07bf/meta

26. **Rasheed, A., Nazir, A., Fatima, A., Ramzan, B., Kiran, Z., & Jamil, M. (2023). Kelvin-Helmholtz instability in magnetically quantized dense plasmas. Zeitschrift fur Naturforschung - Section A Journal of Physical Sciences. doi: 10.1515/zna-2023-0123. Bilal Ramzan (Physics/SSC) Date of Publication: October 2023 HJRS:X (Clay)**

This study deals with the instability of shear waves, also known as Kelvin–Helmholtz instability, propagating with a complex frequency "ω" in magnetically quantized dense gyro-viscous plasmas. The instability arises from the transverse spatial shear of the streaming velocity, which evolves from the DC electric and magnetic fields. In dense plasmas, quantum effects contribute through magnetically quantized statistical Fermi pressure, tunnelling potential and exchange-correlation potential. The contribution of the shear profile, the drift velocity, the number density of medium species, the dc magnetic field and the propagation angle ϑ of the wavevector on the instability is pointed out analytically as well as graphically. By varying the angle, shear size and density of plasma particles, the growth rate is enhanced. It does not, however, change as the streaming speed increases. This work seeks applications to study the characteristics of complex media like astrophysical and semiconductor plasmas [R. P. Drake, "Hydrodynamic instabilities in astrophysics and in laboratory high-energy–density systems," *Plasma Phys. Control. Fusion*, vol. 47, p. B419, 2005].

https://www.degruyter.com/document/doi/10.1515/zna-2023-0123/html

27. **Riffat, M., Ali, H., Qayyum, H. A., Bilal, M., & Hussain, T. (2023). Enhanced solar-driven water splitting by ZnO/CdTe heterostructure thin films-based photocatalysts. International Journal of Hydrogen Energy, 48(58), 22069-22078. doi: 10.1016/j.ijhydene.2023.03.068. Mamoona Riffat, M. Bilal, Tanvir Hussain (Physics/SSC) Date of Publication: July 2023 HJRS: W (Platinum)**

Solar-driven hydrogen production by water splitting using a photocatalyst is considered the most effective approach to produce hydrogen. Hydrogen is the most suitable renewable energy source. The efficiency of

hydrogen production is still low. The efficiency of hydrogen production through photocatalysis can be enhanced by preparing a suitable and efficient photocatalyst. In this work, ZnO thin films were deposited on CdTe thin films at 600 °C, 650 °C, and 700 °C temperatures to form ZnO/CdTe heterostructure thin films by chemical vapor deposition (CVD) as photoelectrodes for water splitting. The photoelectrochemical properties showed that ZnO/CdTe heterostructure thin films have better photocurrent response compared to pristine ZnO and CdTe thin films. EIS results showed that the charge transfer at the electrode-electrolyte interface for ZnO/CdTe heterostructure thin films is much better than that of the pristine ZnO film. The ZnO/CdTe-700 °C heterostructure thin film has a 112-fold higher rate of photocatalytic hydrogen generation than pure ZnO.
https://www.sciencedirect.com/science/article/abs/pii/S0360319923010820

28. **Shafiq, F.,** Qadir, R. W., Qadir, K. W., & **Zafar, Q.** (2023). Development of highly sensitive relative humidity sensor based on nanoporous PCPDTBT thin film. *Synthetic Metals,* 298. doi: 10.1016/j.synthmet.2023.117429. **Foqia Shafiq, Qayyum Zafar** (Physics/SSC) Date of Publication: October 2023 HJRS: W (Bronze)

A novel type of capacitive humidity sensor with surface-type electrode geometry is presented in the present study. The high sensitivity and significantly high bandwidth associated with this planar-type humidity sensor (Al/PCPDTBT/Al) allow the facile and reliable estimation of ambient humidity. The use of a polymer sensing material Poly[2,6-(4,4-bis-(2-ethylhexyl)– 4 H-cyclopenta[2,1-b;3,4-b´]dithiophene)-alt-4,7(2,1,3-benzothiadiazole)] (PCPDTBT) with hierarchical nanoporous surface morphology and large surface/volume ratio ensures the sensor's stable performance coupled with swift response to ambient humidity changes. Specifically, at a relatively lower frequency bias signal (i.e., 1 kHz), a fairly higher order of humidity sensitivity has been observed, i.e., 415.07 pF/%RH. While, sensitivities at significantly higher AC signal frequencies (i.e., 10 and 100 kHz) have been experimentally determined to be 345.18 pF/%RH and 154.72 pF/%RH, respectively. Likewise, the resistive sensitivity of the humidity sensor has been estimated to be − 3624.88 kΩ/%RH, − 2381.11 kΩ/%RH and − 1338.14 kΩ/%RH, at 1, 10 and 100 kHz test frequencies, respectively. The operating mechanism of the capacitive humidity sensor relies on an increase in the dielectric constant of the PCPDTBT active sensing layer accompanied by the rise in the ambient humidity levels. In addition to enhanced bandwidth and improved capacitive and resistive sensitivity, the mean response & recovery time of the fabricated device have been recorded to be ∼ 4 min, 17 s and ∼8 min, 43 s, respectively.
https://www.sciencedirect.com/science/article/abs/pii/S0379677923001510

29. **Sheikh, A. N., Jamil, M. I.,** Afaq, A., & Bakar, A. (2023). DFT study of Ru2FeZ(Z= Si, Ge, Sn) for opto-electronic response calculations. *MRS Communications,* 13(6), 1180-1186. doi: 10.1557/s43579-023-00426-2. **Asim Nisar Sheikh & M. Imran Jamil** (Physics/SSC) Date of Publication: September 2023 HJRS: X (Clay)

The opto-electronic properties of Ru2FeZ(Z = Si, Ge, Sn) full Heusler alloys are explored by using frst-principles calculations. The wien2k package with Full potential-linearized augmented plane wave (FP+LAPW) method is used and the exchange–correlation functional is dealt within the framework of Generalized Gradient Approximation amended by Perdew–Burke–Ernzerhof. Electronic band structure and density of states in both spin channels show the overlapping of some valence and conduction bands, which confrms their metallic nature. Optical properties over a wide range of incident photon energy revealed their effectiveness in photo sensors.
https://link.springer.com/article/10.1557/s43579-023-00426-2

30. **Waqas, M., Niaz, S., Batoo, K. M., Khalid, S.,** Atiq, S., Xu, Y. B., . . . Riaz, S. (2023). Robust ferromagnetism and magneto-dielectric anomalies in (Al, Cr) co-doped iron oxide thin films-microwave mediated sol–gel approach. *Journal of Materials Research and Technology,* 26, 6636-6651. doi: 10.1016/j.jmrt.2023.08.263. **Sidra Khalid** (Physics/SSC) Date of Publication: October 2023 HJRS: W (Gold)

Research on thin films of iron oxide has gained interest in recent years because of its application in advanced spintronic and electronic devices. Technologically important iron oxide phases can be achieved by adopting novel methodologies and/or selecting suitable dopants. A cost-effective microwave assisted sol–gel approach is adopted in this work to prepare thin films of iron oxide. Undoped and doped sols (2–10 wt% of dopant concentration) are irradiated with MW power of 720 W. Maghemite phase (γ-Fe_2O_3) is observed to be stable up to a co-dopant concentration of 6 wt%. Further increase in dopant content leads to a phase transition to mixed (γ-Fe_2O_3+Al_2O_3) crystal phases. Values of dielectric constant (DC) and loss tangent exhibit normal dispersion response with high DC value (log f 5.5 = ∼92) observed for undoped sample. Cole–Cole plots indicate the effective grain boundary contribution for low dopant concentrations, whereas contributions from grains is observed at higher dopant concentrations. M–H curves show ferromagnetic response with high value of saturation magnetization (M_s) of ∼450 emu/cm^3 witnessed at 6 wt%. (Al, Cr) co-doping results in tuning of magnetic response/parameters. MD coupling of (Al, Cr) co-doped thin films of iron oxide makes this material suitable for advanced spintronic and energy storage devices.
https://www.sciencedirect.com/science/article/pii/S2238785423020756

Dr. Hasan Murad School of Management (HSM)
Department of Banking and Finance

1. **Naeem, M. A., Yousaf, I., Karim, S., Tiwari, A. K., & Farid, S. (2023). Comparing asymmetric price efficiency in regional ESG markets before and during COVID-19.** *Economic Modelling*, **118**, 106095.doi: 10.1016/j.econmod.2022.106095. **Saqib Farid (Banking and Finance/HSM) Date of Publication: January 2023 HJRS: W (Silver)**

   The ever-emerging environmental, social, and governance (ESG) concerns have received significant attention of policymakers, governments, regulation bodies, and investors. Considering the markets volatilities due to economic and financial uncertainties that can drive the informational price inefficiencies across the markets, this study compares the asymmetric price efficiency of regional ESG markets by using an asymmetric multifractal detrended fluctuation analysis before and during COVID-19 crisis. We then examine whether global factors influence the asymmetric efficiency of regional ESG markets. Our findings reveal that COVID-19 outbreak reduced the efficiency of regional ESG markets, except for Europe, which sustained its efficiency even during the pandemic. Moreover, global factors drive the efficiency of regional ESG markets significantly before and during COVID-19. A major implication of our findings stems from the fact that a contagion reduces the efficiency of the markets while stable economic conditions make those markets informationally efficient.
   https://www.sciencedirect.com/science/article/pii/S0264999322003327

2. **Tu, C. A., Farid, S., Abubakr Naeem, M., Younas, K., & Taghizadeh-Hesary, F. (2023). Causal links between hot money and investment markets: evidence from small-scale economy. Economic research-Ekonomska istraživanja, 36(2). https://doi.org/10.1080/1331677X.2022.2123021. Saqib Farid, Kinza Younus (Banking and Finance/HSM) Date of Publication: March 2023 HJRS: W (Honorable Mentioned)**

   Hot money is generally associated with economic and financial turmoil in emerging economies. In this backdrop, a number of studies document the causal links between hot money and financial markets. Accordingly, the study examines the causal relationship among hot money, equities, and real estate assets in the small-scale economy of Pakistan. For this purpose, we employ various time series techniques such as the JJ Co-integration test, Granger causality tests, Impulse Response Functions (IRF), and Variance Decomposition Analysis (VDC). The findings validate the long-term association between speculative funds and underlying investment markets. The results uncover unidirectional causality from investment markets to hot money in Pakistan. However, the lack of a bi-directional relationship among the underlying variables indicates that hot money is not a major driver of soaring prices in equities and real estate assets. Alternatively, developing the underlying markets attracts speculative cash inflows into the economy. The findings of the study highlight some useful implications for investors and regulators. For instance, the studyLs findings present valuable insights for international investors seeking diversification opportunities in small-scale economies such as Pakistan. Also, the regulators in the underlying economy can utilize the study findings to formulate an optimal model to manage international capital flows.
   https://hrcak.srce.hr/file/442707

3. **Arshed, N., Sohail, H., & Gulzar, M. (2023). Investigating the Institutional Quality Integration with Islamic Banking Development in Promoting Entrepreneurship.** *Journal of Entrepreneurship and Business Venturing,* **3**(1), 16-36 doi: https://doi.org/10.56536/jebv.v3i1.25. **Hadia Sohail (Banking & Finance/HSM) Muhammad Gulzar (SCA) Date of Publication: February 2023 HJRS: Y (Null)**

   Empirically, conventional finance has proven insufficient while providing the required finance for startups and entrepreneurs. While handling the risks, entrepreneurs tend to avoid the high-cost nature of the debt, which limits their true potential leading to sub-optimal resource utilization. For this, Islamic finance provides a participative and equitable alternative for new ventures with proven merits, but a lack of supporting regulation hinders its penetration among entrepreneurial aspirants. Islamic banks face high compliance costs to the current institutional requirements while designing the products for new ventures. This study investigates how Islamic finance assists entrepreneurial decisions and the role of institutional quality in aligning Islamic law with commercial law requirements. This study selected the unbalanced panel data of 37 countries between 2011 and 2020 and used panel quantile regression to estimate the quadratic Islamic financial development effects and the moderation of institutional quality. The results showed that generally, Islamic financial development has a U shaped relation with entrepreneurship, but with the improvement in institutions, the U shape is flipped to inverted-U shape. This study points toward the potential of Islamic financing when coupled with better regulations for the economies which are developing the nascent Islamic financing system.
   http://jebv.pk/index.php/JEBV/article/view/25

4. **Anwer, Z., Azmi, W., & Mohamad, S. (2023). Shariah screening and corporate governance: The case of constituent stocks of Dow Jones US Indices.** *International Review of Economics and Finance, 86*, 976-1002. doi: 10.1016/j.iref.2020.12.013. **Zaheer Anwer (Banking & Finance/HSM) Date of Publication: July 2023 HJRS: W (Bronze)**

Shariah screening discards the firms that belong to impermissible business sectors (or sin industries) and follow capital structure with high debt and current assets. This study tests whether the firms passing *Shariah* screening have better (or worse) governance quality as compared to firms not subjected to Islamic screening. The screened firms may have lesser governance quality as they cannot use debt to discipline managers or achieve optimal capital structure. On the contrary, they may be better governed as these firms get higher presence of institutional investors and better analyst coverage. This paper provides comparison of governance quality of *Shariah* compliant (SC) firms in United States by using proprietary dataset of Dow Jones US Indices. The screened firms offer ground for a natural experiment as they pass negative ethical screening and meet financial criteria for the inclusion in the index. The findings suggest that the SC firms have lesser governance quality than *Shariah* Non-Compliant firms. The lower level of governance can be attributed to lower Size, lower Profitability, higher Dividend Payout, higher Total Risk and lower Free Cash Flow. Various robustness tests are performed to validate the findings and the results remained robust. These findings provide useful insights about the governance mechanism of SC firms that are emerging as an important alternative investment class in the last two decades.

https://www.sciencedirect.com/science/article/pii/S1059056020302999

5. Anwer, Z., **Farid, S.,** Khan, A., & Benlagha, N. (2023). Cryptocurrencies versus environmentally sustainable assets: Does a perfect hedge exist? *International Review of Economics and Finance, 85*, 418-431. doi: 10.1016/j.iref.2023.02.005. **Saqib Farid** (Banking and Finance/HSM) **Date of Publication: May 2023 HJRS: W (Bronze)**

In the wake of proliferation of cryptocurrencies and growing concerns regarding their environmental impact, we investigate the dynamic co-movement of digital assets and environmentally sustainable assets. We use daily data of five global indices from 01 March 2017 to 15 May 2022. The results suggest that environmentally sustainable indices and cryptocurrency indices demonstrate co-movements during pandemic. However, in the normal times, they mostly remain detached from each other. Therefore, it can be argued that both the asset classes can serve as hedge against each other. The findings carry important implications for the investment industry and regulators.

https://www.sciencedirect.com/science/article/pii/S1059056023000436

6. **Farid, S.,** Karim, S., Naeem, M. A., Nepal, R., & Jamasb, T. (2023). Co-movement between dirty and clean energy: A time-frequency perspective. *Energy Economics, 119*. doi: 10.1016/j.eneco.2023.106565. **Saqib Farid** (Banking and Finance/HSM) **Date of Publication: March 2023 HJRS: W (Platinum)**

In the backdrop of the recent covid-19 pandemic there is a renewed interest to understand the interlinkages between dirty and clean energies. In this regard, the study examines the co-movement structure between clean energy stocks and dirty energies before and during the covid-19 outbreak. The study analyses the interlinkages between the underlying markets by utilizing a vast sample of dirty energies namely crude oil, heating oil, gas oil, gasoline and natural gas, whereas clean energy sector is proxied by S&P Global clean energy index and Wilder Hill clean energy index. We make use of rolling window wavelet approach and wavelet coherence analysis to identify interdependencies between the clean energy stocks and dirty energies. The results exhibit weak linkages between clean energy equities and dirty energies in the short-run, while; we also record few occasions of high co-movements among dirty and clean energy markets in the long-run. Noticeably, a distinct decoupling effect persisted between dirty and clean energy markets. In addition, the findings also illustrate that clean energy market is relatively isolated from dirty energies during the recent pandemic crisis, amplifying portfolio diversification benefits across clean and dirty energy markets. The findings of the study hold meaningful insights for investors, policy makers and other market participants in energy financial markets.

https://www.sciencedirect.com/science/article/pii/S0140988323000634

7. **Farid, S.,** Tashfeen, R., **Mohsan, T.,** & Burhan, A. (2023). Forecasting stock prices using a data mining method: Evidence from emerging market. *International Journal of Finance and Economics, 28*(2), 1911-1917. doi: 10.1002/ijfe.2516. **Saqib Farid, Tahseen Mohsan, Arsal Burhan** (Banking and Finance/HSM) **Date of Publication: April 2023 HJRS: X (Honorable Mention)**

Stock price forecasting is considered a challenging task because of the various characteristics of financial time series. In this study, we attempt to predict stock prices using data mining techniques in an emerging market. The study uses decision tree model, CRISP-DM (Cross-Industry Standard Process for data mining) for analysis by employing WEKA software. The study sample consists of ten firms of five different sectors listed on Pakistan Stock Exchange (PSX). The findings show accuracy ratios range between 50% and 60%. The findings imply that market participants can disclose higher returns by considering information embedded in previous stock prices. In addition, investors can take more prudent buy-sell decisions in view of our findings.

https://onlinelibrary.wiley.com/doi/full/10.1002/ijfe.2516

8. **Naeem, M. A., Farid, S., Arif, M., Paltrinieri, A., & Alharthi, M. (2023). COVID-19 and connectedness between Sustainable and Islamic equity markets.** *Borsa Istanbul Review, 23*(1), 1-21. doi: 10.1016/j.bir.2022.06.001. **Saqib Farid (Banking and Finance/HSM) Date of Publication: January 2023 HJRS: W (Bronze)**

    Because of the increasing importance of and demand for ethical investment, this paper investigates the dynamics of connectedness between sustainable and Islamic investment in nineteen countries that represent developed and emerging financial markets worldwide. To this end, we apply models proposed by Diebold and Yilmaz and Barunik and Krehlik to explore the overall and frequency-based connectedness between selected ethical investments. Our results reveal evidence of a moderate to strong intra country-level connectedness between sustainable and Islamic investment and limited cross-country connectedness between ethical investments. The time-varying connectedness analysis suggests enhanced connectedness during periods of market-wide turmoil, such as the European debt crisis, the Chinese financial crisis, and the COVID-19 pandemic. Moreover, the COVID-19 subsample analysis shows an enhanced and idiosyncratic country-level and cross-country connectedness structure between ethical investments, indicating the evolving nature of the relationship between sustainable and Islamic investment.

    https://www.sciencedirect.com/science/article/pii/S2214845022000278

9. **Mateen, Amat-ul. N., Ayaz. M., Ashraf, M. A. (2023). Impact of Social Performance of Islamic Microfinance Institutions on their Operational and Financial Self-Sufficiency.** *COMSATS Journal of Islamic Finance, 8*(1). **DOI: 10.26652/cjif.7202214. Amat-ul Mateen Noor, Mohammad Ayaz, Muhammad Ather Ashraf (Banking and Finance/HSM) Date of Publication: June 2023 HJRS: Y (Null)**

    Microfinance organizations must prioritize both social and financial performance. Therefore, it is critical to determine how they affect one another. The purpose of this research is to examine the impact of social performance (SP) of global Islamic Microfinance Institutions (IMFIs) on their operational and financial self-sufficiency. Further, the study also checks the moderating role of institution size in this relationship. This research is based on unbalanced micro panel data. The Random Effect model is applied using Hausman test for the period 2015-2021 with 50 IMFIs sample. SP was measured through Number of Active Borrowers (NABO), Percentage of Female Borrowers (PFEB), and Gross Loan Portfolio (GLPF) as independent variables while Operational Self-sufficiency (OSS) and Financial Self-sufficiency (FSS) were the dependent variables. Other variables, Gross Domestic Product per Capita (GDPC), Consumer Price Index (CPIN) and Regulatory Quality (REQ) were used as control variables while Institution Size (IZ) was used as moderator. Results indicated that GLPF and PFEB have positive relationship with OSS while NABO has negative relationship with OSS. IZ has a negative relationship with OSS and it positively strengthens the relationship of PFEB and GLPF with OSS and negatively strengthens the relationship between NABO and OSS. GLPF has a positive relationship with FSS while NABO and PFEB have negative relationship with FSS. IZ has a positive relationship with FSS and it negatively strengthens the relationship between PFEB and GLPF and positively strengthens the relationship between NABO and OSS.

    https://lahore.comsats.edu.pk/CIF/Journal/Vo8-1/DOI10.26652.cjif.8202313.pdf

10. **Ali, M. A., & Hussain, T. (2023). Apprehensions and Reservations of Stakeholders Regarding Islamic Banking in Pakistan.** *Journal of Contemporary Business and Islamic Finance (JCBIF), 3*(1), 196–210. **Muhammad Aqib Ali, Talat Hussain (Banking and Finance/HSM) Date of Publication: June 2023 HJRS: Y (Null)**

    Islamic banking has gradually and steadily progressed in Pakistan over the last two decades but the stakeholders including customers, bankers and general public have their doubts and misgivings about various Islamic banking aspects. The paper assesses the apprehensions of stakeholders about Islamic banking in Pakistan. The study evaluates the reservations of four important stakeholder groups including Islamic banking customers, conventional banking customers, Islamic bankers and conventional bankers. The study is based on a survey conducted using a structured questionnaire for data collection from the research participants. In the past, much research has been done on the aspect of Islamic banking perceptions but there is a scarcity of studies analyzing the apprehensions of masses regarding Islamic banking. This paper attempts to address this gap by specifically analyzing the Islamic banking apprehensions and reservations of stakeholders. The research findings and the results of the study reflect that although there is generally a favorable stance of respondents towards Islamic banking but they have their doubts and suspicions regarding Islamic banking being truly Shariah-compliant in letter and spirit; the respondents also perceived that Islamic banking offerings are somewhat an imitation of conventional banking products. Therefore, there is a greater need to enhance the levels of understanding and awareness among the stakeholders regarding Islamic banking in order to dispel the suspicions and apprehensions regarding Islamic banking products and practices.

    https://journals.iub.edu.pk/index.php/jcbif/article/view/1594

11. **Mushtaq, A., Hussain T., Khan, M. M. S. (2023). Viability of Employability Skills for Islamic Banking and Finance Graduates Employment; Case of Islamic Banks of Pakistan .** *Global Economics Review, 8*(2), 32-48. **Doi: 10.31703/ger.2023(VIII-II).04. Afia Mushtaq, Talat Hussain, Muhammad Mahmood Shah Khan (Banking and Finance/HSM) Date of Publication: June 2023 HJRS: Y (Null)**

The Islamic finance human capital demand is accelerating with a rapidly growing Islamic banking and finance (IBF) industry. In Pakistan, the IBF industry moves forward to be more competitive and sophisticated. Therefore, there is a need to explore the employability skills, which the IBF employers mainly require from the new Islamic finance graduates. This study examines the viability of employability skills for the employment of Islamic bank graduates in Pakistan. A quantitative method was adopted to collect data from 120 respondents using a self-administered questionnaire. The findings of the factor analysis suggested five variables deemed to be relevant in IBF graduates' employability skills for Islamic banks which are communication, interpersonal, technical, social, and subject knowledge skills. This study attempts to obtain the employer's perspective that will be used to refine and strengthen the existing skills, knowledge, and course structure in academia. https://www.scilit.net/publications/92a6b41862b6040277540c1ebd25b47f

12. **Khan, M. M. S., Zafar, Q., & Ashraf, K.** (2023). An Impact of DOL and DFL on Firm Performance of Bata Pakistan Limited: An Empirical Study. *Journal of Policy Research, 9*(1), 555-563. Muhammad Mahmood Shah Khan, Qurrat ul Ain (Banking and Finance/HSM) Kinza Ashraf (SCA) Date of Publication: March 2023 HJRS: Y (Null)

Liquidity has a key importance in the financial management of the firm. This study checks the impact of leverage on firm performance. To check this the Bata Pakistan Limited has taken as case study. In this present research study, an attempt is made to study the relationship between leverage and profitability in Bata Pakistan Limited. The secondary data is collected to check the relation between the 2 variables. The financial statements of Bata Pakistan Limited have been collected over a period of 7 years (2012-13 to 2020-21). The data collected is analyzed by the percentages, averages, ratios and correlation analysis tools reveals that the research evidence of the study indicates that, that degree of operating leverage is statistically significant positive correlation with the ROA. It is observed that degree of financial leverage is positively correlated with the ROA. It means that degree of financial leverage of Bata Pakistan was not at optimum level. It is suggested to Bata to revise its capital structure which should include the optimum blend of equity and borrowed funds so that it has positive impact on Return on Assets. More over degree of combined leverage is positively correlated with ROA of Bata Pakistan. The financial performance of the Bata Pakistan is satisfactory. The Bata Pakistan is employing less debt funds so it can't get the financial leverage benefits. Therefore, the Bata Pakistan has to revise its capital structure so that financial leverage will help to maximize the shareholders wealth. https://jprpk.com/index.php/jpr/article/view/361

13. **Chen, Z., Gao, W., Zafar, Q., & Dördüncü, H. (2023). Natural resources extraction and geopolitical risk: Examining oil resources extraction in China.** *Resources Policy,* **85. doi: 10.1016/j.resourpol.2023.103811.** Quratulain Zafar (Banking and Finance/HSM) Date of Publication: August 2023 HJRS: W (Gold)

This study examines the disaggregated impact of natural resource rents, including natural gas, forest, and oil rents, on China's economic performance. Additionally, we investigate the interactive relationship between geopolitical risk and research and development expenditure. Our econometric analyses, including unit root tests, cointegration analysis using the Bayer-Hanck model, and robustness tests, suggest that oil rents negatively impact China's economic performance, while forest and natural gas rents enhance it. Moreover, we observe that geopolitical risk negatively influences economic performance, while research and development expenditure has a positive effect. Increasing research and development, spending can promote efficient resource utilization and support China's economic growth. Our study's robustness and validity were confirmed through various tests, and we recommend that policymakers and scholars take measures to minimize geopolitical risk while evaluating the relationship between resource rents and economic performance. Overall, our research provides valuable insights into the challenges associated with natural resources and their impact on economic development, contributing to ongoing efforts to promote sustainable economic growth in China. https://www.sciencedirect.com/science/article/abs/pii/S0301420723005226

14. **Ali, M. K., Zahoor, M. K., Saeed, A., Nosheen, S., & Thanakijsombat, T. (2023a). Impact of Vertical Integration Strategies on Environmental, Social, and Governance Sustainability: Policy Implication for Oil and Gas Energy Sector.** *Process Integration and Optimization for Sustainability.* **doi: 10.1007/s41660-023-00375-2.** Safia Nosheen (Banking and Finance/HSM) Date of Publication: October 2023 HJRS: X (Clay)

This research study examines the impact of vertical integration on sustainability in the oil and gas industry. We have analyzed a sample dataset about oil and gas companies from the top ten oil-producing countries spanned over 10 years (2011–2020). Using the panel data regression technique, the results confirm that vertical integration helps improve sustainability and its three components, i.e., environmental, social, and governance, in the oil and gas sector. We have identified that firm's size, age, and gross domestic production (GDP) positively related to oil and gas industry sustainability. At the same time, oil prices, firm risk, energy transition, and geopolitical risk negatively affect sustainability. The policy implications are essential for oil and gas firms' management and oil-producing and oil-exporting countries' policymakers and regulatory authorities. https://link.springer.com/article/10.1007/s41660-023-00375-2#article-info

15. **Ali, M. K., Zahoor, M. K., Saeed, A., Nosheen, S., & Thanakijsombat, T. (2023b). Institutional and country level determinants of vertical integration: New evidence from the oil and gas industry.** *Resources Policy,* **84. doi: 10.1016/j.resourpol.2023.103777. Safia Nosheen (Banking and Finance/HSM) Date of Publication: July 2023 HJRS: W (Gold)**

The aim of this study is to identify the determinants of vertical integration in the oil and gas industry at the firm and country level. A sample dataset of oil and gas companies in the top ten oil-producing countries spanning 10 years (2011–2020) is analysed. Using pool-fixed regression techniques, a firm's size, firm's age, and reserves replacement ratio create incentives for vertical integration in the oil and gas industry at firm-level have been identified. While country-level factors such as oil price and oil demand are negatively correlated with vertical integration, drilling productivity is positively correlated with vertical integration. The findings are important not only for the managers of oil and gas firms but also for the policymakers and regulatory authorities of oil-producing and exporting countries.
https://www.sciencedirect.com/science/article/abs/pii/S0301420723004889

16. **Mahmood, T., & Arshed, N. (2023). On improving the adoption of Bai' Salam by Islamic banks of Pakistan: an interpretive phenomenological analysis.** *Journal of Islamic Accounting and Business Research.* **doi: 10.1108/JIABR-10-2022-0261. Tahir Mahmood (Banking and Finance/HSM) Date of Publication: June 2023 HJRS: X (Null)**

Purpose: The ailing agriculture sector in Pakistan demands a supportive financial sector. The low adoption of Salam financing by Islamic banks does not match the potential demand. Empirical studies identified demand-led issues that led to a low proportion of Salam financing, but the exploration of supply-side constraints is overlooked. Design/methodology/approach: This study has applied Interpretive Phenomenological Analyses on 20 interviews with the experts in the Islamic banking industry who play a role in decisions on Salam financing to the agriculture sector. The purpose of the study is to explore the determinants of low adoption of Salam financing by Islamic banks. Findings: The experiences led to the major reasons for the low adoption of Salam financing categorized as intentions, attitudes and behavior control which corresponds to the theory of planned behavior. Originality/value: This study is instrumental in exploring the supply-side constraints to Salam financing and helps find aligning theory to intervene via Islamic banking regulations.
https://www.emerald.com/insight/content/doi/10.1108/JIABR-10-2022-0261/full/html

17. **Naeem, M. A., Farid, S., Qureshi, F., & Taghizadeh-Hesary, F. (2023). Global factors and the transmission between United States and emerging stock markets.** *International Journal of Finance and Economics,* **28(4), 3488-3510. doi: 10.1002/ijfe.2604. Saqib Farid (Banking and Finance/HSM) Date of Publication: June 2023 HJRS: W (Honorable Mention)**

In this study, we examine the influence of global factors in driving connectedness among Unite States and emerging stock markets. For this purpose, we employ widely recognized approaches of and Barunik and Krehlik to estimate connectedness among the underlying markets in time-frequency domains. Also, we use the tests proposed by Péguin-Feissolle and Teräsvirta to examine the impact of global factors on the transmission relationship between United States and emerging stock markets utilizing the non-linear causality tests. The findings validate the influential role of global factors in channeling overall total spillovers between United States and emerging stock markets. However, the results for individual emerging markets show some degree of heterogeneous impact of global factors in driving connectedness across different emerging stock markets. Our robustness results also confirm the main findings. Important implications of findings are discussed for portfolio managers and policymakers.
https://onlinelibrary.wiley.com/doi/full/10.1002/ijfe.2604

18. **Naeem, M. A., Farid, S., Yousaf, I., & Kang, S. H. (2023). Asymmetric efficiency in petroleum markets before and during COVID-19.** *Resources Policy,* **86. doi: 10.1016/j.resourpol.2023.104194. Saqib Farid (Banking and Finance/HSM) Date of Publication: October 2023 HJRS: W (Gold)**

Petroleum markets encountered exceptional challenges during the outbreak period. In this backdrop, the price dynamics in petroleum markets were also significantly influenced by fearsome environment and unprecedented risk experienced during the pandemic. In this direction, the study attempts to investigate the efficiency dynamics of the petroleum markets before and during the COVID-19 pandemic. The study utilizes high frequency data of four major petroleum markets namely, crude oil, Brent oil, diesel and natural gas. In order to unveil asymmetric multifractal scaling behavior of petroleum markets we employ a widely recognized approach known as asymmetric multifractal detrended fluctuation analysis (A-MF-DFA). The results confirm the presence of prevailing market inefficiencies in petroleum markets. In fact, the findings suggest that asymmetric multifractality is more pronounced during the downward trends. Also, the findings stress that market efficiency dynamics in the petroleum sector are dependent upon investment horizon, market conditions and investor behavior. More importantly, the sub-period analysis of COVID-19 era uncovers deteriorating market efficiencies in petroleum markets. Furthermore, the natural gas market emerges as the most efficient market before and during the COVID-19 time period.

https://www.sciencedirect.com/science/article/abs/pii/S0301420723009054

19. **Naeem, M. A., Gul, R., Farid, S., Karim, S., & Lucey, B. M. (2023). Assessing linkages between alternative energy markets and cryptocurrencies.** *Journal of Economic Behavior and Organization,* **211, 513-529. doi: 10.1016/j.jebo.2023.04.035. Saqib Farid (Banking and Finance/HSM) Date of Publication: July 2023 HJRS: W (Silver)**

Surmounted environmental concerns and energy challenges have created an augmented awareness among the public and policymakers about alternate energy resources. Using a network approach, this paper aims to investigate the dependence between cryptocurrencies and the alternative energy market using data from January 1, 2018, to December 23, 2021. For this investigation, first, we build a static dependency network for a given set of variables using partial correlations. Then, we demonstrate within-system connections in a minimum spanning tree (MST) to assess the centrality of all variables. Finally, rolling-window estimations are made to exhibit time variations in both dependency and centrality networks. We find that clean alternative markets (SPGCE, ELEVHC & WILCE) and ETH are net risk transmitters to other markets and system-wide net contributors. We also demonstrate how SPGCE is essential for tying together the various parts of the networks and provide convincing evidence of time-varying within-system dependency. Our thorough examination of the dependency analysis offers significant insights to macroprudential regulators, policymakers, and portfolio managers, enabling them to safeguard the most vulnerable markets and choose the best legislative and policy measures to protect investors' interests in the face of unforeseen financial and economic conditions.
https://www.sciencedirect.com/science/article/pii/S0167268123001452

20. **Sheikh, R., Ayaz, M., & Siddique, M. A. (2023). Sharī'ah Governance and Sharī'ah Non-Compliance Risk Management: A Maqāsid Sharī'ah Based Appraisal.** *Journal of Islamic Thought and Civilization,* **13(1), 270-291. doi: 10.32350/jitc.131.19. Mohammad Ayaz (Banking and Finance/HSM) Date of Publication: September 2023 HJRS: Y (Null)**

The current study aims to explore the Sharl'ah Governance (SG) and the management of Sharl'ah Non-Compliance Risk (SNCR) in Islamic Banks (IBs) of Pakistan through the lens of Maqasid Sharl'ah. For this purpose, the content analysis method was employed on the Sharl'ah Governance Framework (SGF) issued by the State Bank of Pakistan (SBP), by concerning the related literature. Content analysis revealed that SGF explicitly defined the roles and responsibilities of various organs of SG of IBs towards sharl'ah compliance. Moreover, the study also revealed that IBs were exposed to SNCR whenever they failed to comply with Sharl'ah and consequently, SNCR lead to such a situation that threatened the stability and viability of IBs. The findings of this paper suggested that the viability and stability of IBs, as one of Maqasid Khassah of the Islamic financial system, is being fully realized through different SG mechanisms provided in SGF, which strengthened the overall sharl'ah compliance environment of IBs in Pakistan. It was also confirmed that different Maqasid Sharl'ah , such as transparency, protection and growth of wealth, equity and justice in return distribution, and two dimensions of the well-being of society from the perspective of Maqasid Sharl'ah , namely, safeguarding religiosity and safeguarding wealthwere being realized through SG mechanisms of IBs in Pakistan.
https://journals.umt.edu.pk/index.php/JITC/article/view/3003

21. **Khalid, Z., Ali, M. K., Yasser, F. (2023). Role of Financial Inclusion in Promoting Financial Performance: Evidence from Microfinance Institutions of Pakistan. https://doi.org/10.52461/jbse.v2i2.2762.** *Journal of Banking and Social Equity,* **2(2), 77-90. Zunera Khalid, Farah Yasser (Banking and Finance/HSM) Date of Publication: December 2023 HJRS: Y (Null)**

This study examines the role of financial inclusion (FI) to encourage financial performance (FP) of microfinance institutions (MIs). This study investigates the role of FI considering number of branches and average loan balance per borrower as major determinants to promote FP of MIs. This study used quantile panel data regression analysis to analyze the collected data from the sample of 17 MIs of Pakistan during 2014 to 2019. The findings of this research analysis suggest that number of branches as determinants of FI have significant and positive influence on FP of the MIs. As the number of branches of MIs increases, MIs tend to have a higher level of FP. On the other hand, this study finds a significant but negative relationship between average loan balances per borrower to GNI per capita (ALB) with the FP of MIs. It is normal practice of MIs that they target a few high-profile clients to attain their financial sustainability as low income and poor customers are unable to pay the market competitive price against financial services and products. Continuous increasing focus on profitability results into having very few numbers of poor and low-income customers in Pakistan. The findings of this study are helpful for the policy makers and regulators to design and implement the policies related to FI along with financial growth of MIs.
https://journals.iub.edu.pk/index.php/jbse/article/view/2762

22. **Sadiq, R., Qayyum, A., & Yasser, F. (2023). On the Intersection of Expropriation, Compensation, and Ownership Structures in a Developing Economy.** *Qlantic Journal of Social Sciences and Humanities, 4* **(4), 45-**

57. https://doi.org/10.55737/qjssh.369212295. Ramla Sadiq, Aysha Qayyum, Farah Yasser (Banking and Finance/HSM) Date of Publication: December 2023 HJRS: Y (Null)

This research aims to investigate the impact of related party transactions, executive compensation & ownership structure on firm performance and value. The research includes all registered firms in the KSE 100 index. The time frame of this study is 7 years (2016-2022). Through empirical findings, it is proved that the related party transactions, executive compensation & structure of ownership have a significant influence on the performance and value of the firm. The study finds a positive impact of financial RPTs and related party purchases on both the profitability and value of firms. Lastly, the study indicates that ownership of banks, financial institutions, and associated companies has a positive influence on performance as well as on the value of firms. The theoretical implications of this study are two-fold. Firstly, this study represents a unique perspective on a comprehensive analysis of sub-categories of related party transactions, which allows for specific identification of types of related party transactions that have an impact on either profitability or value. Secondly, the three-pronged approach is unique to this study- it allows an opportunity to determine which other factors within the environment affect value and profitability at the same time.
https://submissions.qlantic.com/index.php/qjssh/article/view/122

23. Yasser, F., Daniyal, M., & Iftikhar, H. A. (2023). Unleashing the power of economic forces: exploring the relationship between macroeconomic factors and unemployment in Norway and uk using ARDL approach. *Journal on Innovation and Sustainability RISUS,* 14(3), 4-20. Farah Yasser, Muhammad Daniyal, Ayesha Iftikhar (Banking and Finance/HSM) Date of Publication: September 2023 HJRS: Y (Null)

The problem of unemployment is a global issue and it is vital to carry out detailed examination of this issue. We need to identify and analyze several factors affecting unemployment in a country. The aim of this research is to determine how various macroeconomic factors and unemployment interact with each other. This includes trade, oil consumption, domestic credit to private sector, gross capital formation and inflation in context of Norway and UK. The basic purpose of this study is to analyze whether the effect of these macroeconomic factors on unemployment is significant or insignificant. In order to conduct this study, period of 1979-2021 is used. In order To find out the impact of independent variables on unemployment, this study executes the KPSS and NG- Perron test to determine whether a variable is stationary or not, and then apply ARDL in order to test the long run and short run Co-integration between unemployment and independent variables. According to our findings, there is a significant long run Cointegration present between Unemployment and trade, domestic bank lending to the private sector, gross capital formation, Oil consumption and show insignificant relation with inflation in case of Norway. If we talk about UK all these factor are significantly Co-integrated with unemployment in long run. Diagnostic tests are also considered in this study which include Serial correlation, Heteroscedasticity, normality, functional form, CUSUM and CUSUM square. The results provide a non-significant probability value higher than 0.1 which implies that the error term has no serial correlation issue and variance of error is homoscedastic along with well-defined functional forms and errors exhibit characteristics of a normal distribution. CUSUM and CUSUM SQUARE for both countries show stability of mean of error term and variance of error term.
https://revistas.pucsp.br/risus/article/view/62332

24. Arshed, N., Yasser, F., Abdulghafor, S., & Aziz, O. (2023). Contribution of banking and stock market development on the prospects of new business. *Journal on Innovation and Sustainability RISUS,* 14(2), 88-105. Farah Yasser (Banking and Finance/HSM) Date of Publication: June 2023 HJRS: Y (Null)

The relationship between entrepreneurship and financial development is essential for economic growth and stability of a country. The success of entrepreneurship is heavily influenced by the financial sector development as the financial sector provides a platform for companies to raise capital and obtain funding for expansion and progress. Therefore, the main objective of the current study is to explore the effects of financial sector development on the entrepreneurship progress. The data is collected from minimum 53 countries based on available data and analyzed by using Panel Feasible Generalized Least Squares (FGLS) regression method. The results show a positive association between entrepreneurial intentions and entrepreneurship development in the presence of banking sector progress. Whereas, perceived opportunities have negative association with the entrepreneurship development with the growth of banking sector, stock market and financial market. Results also indicate a positive association between opportunity entrepreneurship and entrepreneurship development. These findings have implication for policy makers to promote a well-developed financial sector in order to encourage new business entrants.
https://revistas.pucsp.br/risus/article/view/61008

Book Chapter

1. **Abdullahi, S. I., Shuaibu, M., Yusufu, M., Shehu, K. K., & Rafay, A. (2023). Economic growth, financial development and bank failure: The case of corruption in Nigeria** *Concepts, Cases, and Regulations in Financial Fraud and Corruption* **(pp. 144-163). Abdul Rafay (Banking and Finance/HSM) Date of Publication:2023**
Corruption is one of the main causes of inefficiency and poor productivity. This chapter looks at the relationship between banking failure, corruption, financial development, and economic growth in Nigeria during the period from 1989 to 2019. The work uses the autoregressive distributed lag (ARDL) cointegration and error correction model and the Granger causality test for the analysis of data. The results of the empirical analyses show a negative relationship between corruption and both financial development and economic growth. This shows that corruption is bad for both the financial sector and the economy. The result also shows that corruption is a good reason for causing bank failures in Nigeria. Hence, for financial development and economic growth, corruption must be reduced as much as possible if not eliminated. It is recommended to put the fight against all forms of corruption in Nigeria in top gear.
https://www.igi-global.com/chapter/economic-growth-financial-development-and-bank-failure/320020

2. **Ahmad, A., Naseer, Z., & Zakariyah, H. (2023) Impact of Electronic Service Quality on Customer Satisfaction of Islamic Banks in Pakistan.** *Vol. Part F1204. Contributions to Management Science* **(pp. 435-443). Zishan Naseer (Banking and Finance/HSM) Date of Publication: July 2023**
Islamic banking experienced a remarkable development and increasingly challenging pace over the past decade. The concept of digital banking channel has been gaining increasing popularity not only in Pakistan but all over the world in recent years due to the nature of these channels for providing faster banking services delivery to a wide range of customers. The study was conducted to investigate the influence of electronic service quality on the satisfaction level of Islamic banks customers within Pakistan. The study also figured out what are the factors customers believe are hurdle in usage of digital channels offered by different banks to their customers. The study made use of a questionnaire, filled from 152 customers of Islamic banks who are using banks digital channels by random sampling. Descriptive statistics, correlation analysis, and multiple regression model were employed to achieve the objectives of the study. The study found that all five electronic service quality dimensions found to have positive and statistically significantly influence on the level of satisfaction of the Islamic banking customers. The results provide Islamic banking industry regulators, central bank, academicians, and practitioners useful guides in their efforts to formulate adequate electron service quality mechanism to attract and retain more customers and to promote digital banking channels.
https://link.springer.com/chapter/10.1007/978-3-031-27860-0_39

3. **Beebeejaun, A., Gunputh, R. P., & Rafay, A. (2023). Base Erosion and Profit Shifting (BEPS) in international taxation system: The case of mauritius in the light of OECD/G20 initiatives** *Concepts, Cases, and Regulations in Financial Fraud and Corruption* **(pp. 259-277). Abdul Rafay (Banking and Finance/HSM) Date of Publication: 2023**
The aftermath of the 2008 global financial crisis has led to the emergence of the OECD/G20 Base Erosion and Profit Shifting (BEPS) initiative developed in 2013. This project provides several actions plans to establish coherence and transparency and also to prevent malpractices in the international taxation system. Being a member of the OECD, Mauritius joined the inclusive framework on BEPS in 2016. This research assesses the adoption of the BEPS standards by Mauritius on Controlled Foreign Corporations (CFCs), transfer pricing, and on country-by-country (CbC) reporting. The purpose of this study is to identify any convergence and divergence between BEPS standards and the corresponding implementation measures in Mauritius. To achieve this research objective, the study has adopted the black letter approach by analyzing existing laws. A critical analysis is conducted about the implementation measures by Mauritius and assessing their implications on the domestic and the international taxation systems.
https://www.igi-global.com/chapter/base-erosion-and-profit-shifting-beps-in-international-taxation-system/320026

4. **Jayasekara, S. G. S. D., & Rafay, A. (2023). AML/CFT regulations and informai remittance services: The case of Hawala** *Concepts and Cases of Illicit Finance* **(pp. 20-36). Abdul Rafay (Banking and Finance/HSM) Date of Publication: August 2023**
Informal remittance channels operate in varions jurisdictions to promote illegal activities which are detrimental to the global efforts of combating money laundering. Here, in this chapter, Hawala is con- sidered the main informal remittance channel. The economic and social implications of Hawala are very significant when it comes to a weak regime of AML/CFT. Therefore, the focus of this chapter is on weak AML/CFT regimes even though the discussed practices take place across the globe. A global initiative to limit or control informal remittance channels may support the global initiatives of anti-money launder- ing. However, it has also to bear in mind that

informal remittance services are used globally as a very efficient and low-cost remittance channel despite the allegations of using them by criminals. Therefore, it is very important to implement proper systems and controls to regulate informal remittance channels while making them available for all segments of society.
https://www.igi-global.com/chapter/amlcft-regulations-and-informal-remittance-services/328615

5. **King, M., & Rafay, A. (2023). Corruption and the resource curse: The case of timor-leste Theory and Practice of Illegitimate Finance (pp. 246-265). Abdul Rafay (Banking and Finance/HSM) Date of Publication: September 2023**
In Timor-Leste, one of the newest nations in the world, a case of corruption is explored in this chapter, which is associated with the resource curse of official corruption. The case involves an expatriate tax lawyer who worked for the Ministry of Finance and orchestrated a 'taxation miracle' for 'his' adopted country. He was charged for a $3.51 million wire-fraud by the United States Department of Justice and subsequently sentenced to six years of imprisonment. However, the case was found to be more complex than simple fraud and official corruption. The findings indicate that the key elements that led to the fraud were a series of misadventures arising from issues of hiring, management, cybercrime, and weak internal controls. It has also been suggested that the fraud was allowed to perpetuate due to the collusion of several multinational resource companies, costing the Timor-Leste taxpayers as much as $176 million.
https://www.igi-global.com/chapter/corruption-and-the-resource-curse/330636

6. **Polat, A., Ajmal, M. M., & Rafay, A. (2023). Mortgage financing frauds in the US: An analysis of CFPB complaint database *Concepts, Cases, and Regulations in Financial Fraud and Corruption* (pp. 1-27). Muhammad Mobeen Ajmal, Abdul Rafay (Banking and Finance/HSM) Date of Publication: 2023**
In the US, the Consumer Financial Protection Bureau (CFPB) monitors the financial institutions which sell financial products and services to consumers. CFPB ensures that the consumers of financial products receive transparent and competitive services from financial institutions. The chapter contributes to the literature on state-run consumer protection organizations. The CFPB complaint database is used to analyze the performance of CFPB and to find some real-world behaviors of financial institutions from the perceptions of financial consumers. The weaknesses of CFPB are discussed in light of the current social, political, and economic changes happening in the USA. Results show that predatory behaviour is more dominant in non-banking credit and lending institutions. During COVID-19, the people took benefit of others' misery by engaging in manipulative fraud-for-profit schemes. Overall, despite creating awareness, CFPB was not so successful in getting relief for the customer.
https://www.igi-global.com/chapter/mortgage-financing-frauds-in-the-us/320015

7. **Rafay, A. (2023a). Concepts and cases of illicit finance. IGI Global. Abdul Rafay (Banking and Finance/HSM) Date of Publication: 2023**
https://www.igi-global.com/book/concepts-cases-illicit-finance/314583

8. **Rafay, A. (2023b). Concepts, cases, and regulations in financial fraud and corruption. Pakistan: IGI Global.. Abdul Rafay (Banking and Finance/HSM) Date of Publication: 2023**
https://www.igi-global.com/book/concepts-cases-regulations-financial-fraud/293207

9. **Shah, S., & Rafay, A. (2023). Regulatory ambiguity in India: A breeding ground for crypto criminals *Concepts and Cases of Illicit Finance* (pp. 51-60). Abdul Rafay (Banking and Finance/HSM) Date of Publication: 2023**
Cryptocurrencies have sparked global transformations in digital technology and financial services, leading to deliberations on regulatory frameworks. India is cautiously working towards regulatory clarity and legalizing Cryptocurrency usage, as it becomes the country with the most cryptocurrency users. The Indian regulatory body is vigilant, monitoring progress and warning the public about associated risks. Despite regulatory efforts, India has seen a worrisome rise in cyber-frauds, cryptocurrency crimes, and money laundering involving digital currencies. This chapter focuses on the regulatory ambiguity in India, which inadvertently fosters an environment for crypto criminals. Through case studies, it highlights the gravity of the situation and the urgent need for legislative action to combat scams and money laundering. The author concludes optimistically, expecting India to establish robust crypto regulations to effectively address these challenges
https://www.igi-global.com/chapter/regulatory-ambiguity-in-india/328617

10. **Yong, H. N. A., Kuah, Y. C., Wei, C. Y., & Rafay, A. (2023). Consumer risk perception towards cybercrimes and e-commerce: The case of Malaysia Theory and Practice of Illegitimate Finance (pp. 184-202). Abdul Rafay (Banking and Finance/HSM) Date of Publication: 2023**
The concept of this chapter is to review the literature for a research gap on risk perception among online consumers and the intention for online purchases in Malaysia. Online platforms and digital payments make online shopping easier. During the year 2020 - 2021, online shopping had become increasingly active with the spike of the novel coronavirus pandemic. Online users who share their personal information online are most

likely getting into the scammer's trap. Malaysia executed the national cyber security policy to defend the country's critical national information infrastructure. Financial awareness among online users plays a crucial role in fighting cybercrime. Digital guardianship should exist to prevent irresponsible parties from taking advantage. The routine activity theory has been proposed to explain the phenomenon whereby the offender makes the selection to commit a crime based on an online shopper as his target and the guardianship.
https://www.igi-global.com/chapter/consumer-risk-perception-towards-cybercrimes-and-e-commerce/330632

11. **Rafay, A. (2023).** *Theory and Practice of Illegitimate Finance* **(pp.389). Abdul Rafay (Banking and Finance/HSM) Date of Publication: 2023**
While high-level corruption is undeniably a significant reason for illegitimate finance, the primary factor often attributed to the challenges faced by developing countries is the fragmented nature of their state institutions. This problem arises particularly in regions where the legitimacy of the state and its institutions is under question. Corruption, by itself, does not directly cause poverty. Rather, its impact lies in its consequences on economic and governance factors, which act as intermediaries in generating poverty. Powerful elites exploit this fragmentation to their advantage, seeking rent-seeking opportunities at various levels of interaction with citizens. In some cases, this phenomenon has been labeled as "State Capture" in South Africa, "Family Fiefdom" in countries like Angola and Guinea Equatorial, or the "Oligarch" model in Russia and former Soviet states. Similarly, conflict of interest is a multifaceted social phenomenon that emerges in both the public and private sectors. In the context of the public sector, it represents a misuse of power and corrupt practice. This insidious issue poses a significant threat to the core principles on which modern democratic states rest, including legal equality, the separation of powers, and the rule of law.
https://www.igi-global.com/gateway/book/326931

Department of Economics and Statistics

1. **Saleem, A., Sial, M. H., & Cheema, A. R. (2023). Does an asymmetric nexus exist between exports and economic growth in Pakistan? Recent evidence from a nonlinear ARDL approach.** *Economic Change and Restructuring*, **56(1), 297-326. doi: 10.1007/s10644-022-09426-z. Maqbool Hussain Sial (Economics & Statistics/HSM) Date of Publication: February 2023 HJRS: X (Honorable Mention)**
A fundamental economic question is how nations can achieve long-term economic growth. One of the responses to this question is the export-led growth (ELG) hypothesis, which claims that rising exports are a key predictor of economic growth. In response, this study empirically investigates the asymmetric (nonlinear) and causal relationship between exports and economic growth using annual data from 1973 to 2020 in Pakistan. The asymmetric cointegration among variables is confirmed by the non-linear autoregressive distributed lag approach with a structural break. Long-term estimates conform to theoretical expectations, except for imports which are found to influence growth negatively. Further, human and physical capital both are positively contributing to economic growth. The major finding is that the effects of exports on economic growth are asymmetric, and economic growth in Pakistan reacts positively to the rise and fall of exports. The causality analysis supports the above findings and confirms a long-run asymmetric unidirectional causality from exports (with positive/negative change) to economic growth in Pakistan, clearly demonstrating the ELG hypothesis. From a policy perspective, the findings suggest that Pakistan should adopt and implement an export growth strategy to achieve economic prosperity as part of its development policy.
https://link.springer.com/article/10.1007/s10644-022-09426-z

2. **Sardar, M. S., Asghar, N., Munir, M., Alhajj, R., & Rehman, H. U. (2023). Moderation of Services' EKC through Transportation Competitiveness: PQR Model in Global Prospective.** *International Journal of Environmental Research and Public Health*, **20(1), 293.doi: 10.3390/ijerph20010293. Muhammad Shahzad Sardar, Mubbashir Munir, Hafeez-ur-Rehman (Economics & Statistics/HSM) Date of Publication: January 2023 HJRS: W (Gold)**
The continuously increasing GHG emissions have created environmental pollution and several challenges to ecosystems and biodiversity. The challenges of climate change are multipronged, resulting in melting glaciers, flash floods, and severe heat waves. In this regard, the adaptive and mitigation strategies to manage the consequences of climate change are highly important. The transport sector creates a quarter of carbon emissions, and this share is continuously increasing. Accordingly, this research study uses transport competitiveness to determine carbon emissions of the transport sector for 121 countries covering the time period from 2008 to 2018. The Panel Quantile Regression (PQR) technique is engaged to analyze the study results. The findings highlight that transport competitiveness tends to increase carbon emissions of the transport sector across quantile groups 1 and 3, while it reduces carbon emissions in quantile group 2. The U-shaped services' EKC is validated in quantile groups 2 and 4. The moderation engaged, i.e., transportation competitiveness, changes the turning point of the services' EKC across quantile groups 2 and 4. However, in the

high-CO_2 quantile group, the moderation impact of transport competitiveness is strongest as it reduces the sensitivity by flattening the services' EKC. Furthermore, the planned expansion of the population and improved institutional quality tend to mitigate carbon emissions across different quantile groups. The policy relevance/implications that are based on the study results/findings are made part of the research paper.
https://www.mdpi.com/1660-4601/20/1/293

3. **Gao, J., Hassan, M. S., Kalim, R., Sharif, A., Alkhateeb, T. T. Y., & Mahmood, H. (2023). The role of clean and unclean energy resources in inspecting N-shaped impact of industrial production on environmental quality: A case of high polluting economies.** *Resources Policy*, **80**, 103217.doi: 10.1016/j.resourpol.2022.103217. **Muhammad Shahid Hassan, Rukhsana Kalim (Economics & Statistics/HSM) Date of Publication: January 2023 HJRS: W (Gold)**

This study is designed to probe the N-shaped consequence of industrial production on environmental quality from both traveling and production for the selected high-polluting country groups. The strength of this impact will be tested by considering renewable and polluting energy sources as controlled inputs in the proposed functional forms. The study utilizes a panel over an annual data series from 1990 to 2021 and uncovers the evidence of the N-formed influence of industrial production on carbon emission from traveling and production in long run. A similar is true for the short run but the coefficients are witnessed as insignificant. The study also reports the optimal level of industrial production where carbon emission from traveling and production turns out to be minimum in the selected country groups. For instance, at the values of industrial production such as 3.37 percent, 2.64 percent, and 3.31 percent, carbon emission from traveling turns out to be minimum while at the values of industrial production like 10.49 percent, 1.80 percent, and 3.34 percent, carbon emission from production becomes minimum. Beyond these optimal levels of output from industry, it will not remain environmentally friendly anymore. The findings further expose that renewable energy significantly improves environmental quality based on traveling and production in the long and short run while nonrenewable energy significantly deteriorates environmental quality based on traveling and production in long run but in the short run it only hurts environmental quality from production. According to the causality test, production from industry and environmental quality from traveling and production significantly cause each other while a feedback effect is witnessed between renewable energy and environmental quality from traveling and production, and similar results are found between fossil-based energy and environmental quality from traveling and production. Based on these findings, this research proposes that industrial output should not be stimulated beyond minimum threshold points as it will become harmful to the environment in the selected high-polluting economies. More investments in renewable energy-related activities will be expanded for improving environmental quality in the selected high-polluting country groups.
https://www.sciencedirect.com/science/article/pii/S0301420722006602

4. **Ain, Q. U., Mahmood, M. A., Raza, S. M. M., & Zakir, A. (2023). An Acoustic Investigation of Primary and Secondary Lexical Stress of Urdu.** *GEMA Online Journal of Language Studies,* **23(1), 74-92. doi: http://doi.org/10.17576/gema-2023-2301-05. Syed Muhammad Muslim Raza (Economics & Statistics/HSM) Date of Publication: February 2023 HJRS: W (Bronze)**

This paper investigated acoustic correlates of primary and secondary stress in Urdu language. Urdu is not a sufficiently researched language in the context of lexical stress. A few researches (Mehrotra, 1965; Hussain, 1997; Nair, 1999; Mumtaz, 2014, and Qurrat-Ul-Ain & Mahmood (2017) discussed stress in Urdu/Hindi language. Perhaps, Qurrat-Ul-Ain & Mahmood (2017) study is the first to phonetically document the presence of secondary stress in Urdu using the cue of duration. The present study focused on the four popular acoustic cues of lexical stress to see how Urdu lexical stress (primary as well as secondary) behaves against these cues. The stimuli of the study consist of six tri-syllabic words (embedded with low-back-long vowel /a:/ in all syllables) uttered by nine female Urdu speakers from Lahore. Four popular stress cues (duration, vowel quality, pitch, and intensity) have been analyzed to see their correlation with Urdu lexical stress. The analysis reveals three levels of lexical stress: primary, secondary, and unstressed. Vowel duration is the strongest cue to correlate with the levels of stress in Urdu while stressed segments prone to have higher values of intensity. Overall, a trend of lower F0 and higher formant values could be seen against stressed syllables. The study, however, needs to be expanded further by using words having other vowel sounds. Moreover, the phenomenon of word final lengthening can be taken into account in the potential researches.
https://ejournal.ukm.my/gema/article/view/57128

5. **Asghar, N., Amjad, M. A., & Rehman, H. (2023). Analyzing the impact of access to electricity and biomass energy consumption on infant mortality rate: a global perspective.** *Environmental Science and Pollution Research,* **30(11), 29550-29565. doi: 10.1007/s11356-022-24144-93. Muhammad Asif Amjad, Hafeez-ur-Rehman (Economics & Statistics/HSM) Date of Publication: March 2023 HJRS: W (Silver)**

Conserving the lives of newborns has been a long-standing issue around the world, where 2.4 million babies die in the first month of the life. The literature indicates that the important challenges of social development goals around the globe include affordable and easy access to electricity, promotion of sustainable economic

development, and provision of better social services and creation of job opportunities which help in reducing infant mortality rate. This calls for the need to probe into this matter minutely and brings up the ways for reducing the infant mortality rate. The present study is an attempt to analyze the impact of rural and urban electrification and biomass energy consumption on infant mortality rate for the period 1990–2020 using the Panel Quantile Regression (PQR) approach. The results of the study show that in both developed and developing countries, biomass energy consumption has positive impact on infant mortality rate, while rural and urban electrification has proposed the inverted U-shaped relationship with infant mortality in different quantile groups. It is also concluded that few developing countries are failed to achieve the maturity of the inverted U-shaped curve while all developed countries have achieved at the maturity stage. This study recommended that for reducing the infant mortality rate, the world should discourage the use of biomass energy and promote the affordable and easy access to electricity on priority basis.
https://link.springer.com/article/10.1007/s11356-022-24144-9

6. **Asghar, N., Amjad, M. A., Rehman, H. U., Munir, M., & Alhajj, R. (2023). Causes of Higher Ecological Footprint in Pakistan: Does Energy Consumption Contribute? Evidence from the Non-Linear ARDL Model.** *Sustainability (Switzerland), 15*(4). doi: 10.3390/su15043013. **Muhammad Asif Amjad, Hafeez-ur-Rehman, Mubbasher Munir (Economics & Statistics/HSM) Date of Publication: February 2023 HJRS: W (Silver)**
The impact of human activities on environmental degradation has been increasing over time, and ecological footprint measures the impact of human activities on the environment. An increase in ecological footprint has created alarming situations around the globe. This study explores the causes of Pakistan's high ecological footprint (EFP). The asymmetric analysis of fossil fuels and renewable energy consumption on EFP has been carried out from 1990 to 2020. The results obtained from the NARDL approach revealed that the positive shocks of fossil fuel consumption increase EFP, but its negative shocks decline EFP. Meanwhile, both positive and negative shocks of renewable energy consumption decline EFP in Pakistan. This study suggests that renewable energy consumption can play a significant role in reducing the EFP in Pakistan.
https://www.mdpi.com/2071-1050/15/4/3013

7. **Chen, S., Hassan, M. S., Latif, A., Rafay, A., Mahmood, H., & Xu, X. (2023). Investigating resource curse/blessing hypothesis: An empirical insights from Luxembourg, the Netherlands, and Portugal economies.** *Resources Policy, 83.* doi: 10.1016/j.resourpol.2023.103647. **Muhammad Shahid Hassan (Economics & Statistics/HSM) Ayesha Latif, Abdul Rafay (Banking and Finance/HSM) Date of Publication: June 2023 HJRS: W (Gold)**
This study inquiries the effect of natural resource rents on economic growth to test the resource curse/blessing hypothesis in Luxembourg, the Netherlands, and Portugal from 1980 to 2021 by using bound testing techniques. Natural resource rents may facilitate us to test the resource curse/blessing hypothesis. Moreover, we cannot ignore labor and capital in the growth equation as per both classical and modern production functions. Besides this, energy use, trade liberalization, and financial development are important determinants of economic growth and are considered in the production function. The estimated results disclose that natural resource rents significantly hamper economic performance in the Netherlands and improve economic performance in Portugal. Hence, the results validate the resource-curse hypothesis in the Netherlands and the resource-blessing hypothesis in Portugal. Moreover, the energy consumption-led growth and trade-led growth hypotheses are validated in all three economies. In addition, financial liberalization triggers economic performance in Luxemburg and the Netherlands. Lastly, capital accumulation is also stimulating economic growth in all three selected European capital-rich economies.
https://www.sciencedirect.com/science/article/pii/S0301420723003586

8. **Hassan, M. S., Mahmood, H., & Yousaf, S. (2023). Energy-growth hypothesis: testing non-linearity by considering production function approach for Spanish economy.** *Environmental Science and Pollution Research, 30*(6), 16321-16332. doi: 10.1007/s11356-022-23307-y. **Muhammad Shahid Hassan (Economics & Statistics/HSM) Saba Yousaf (Banking and Finance/HSM) Date of Publication: February 2023 HJRS: W (Silver)**
Targeting output growth is among one of the prime concerns of any economy in both the developing and developed world. Energy utilization and exports are important drivers that would help in boosting production activities in any economy. Therefore, beyond labor force and capital formation, exports and energy utilization can be among the important inputs for accelerating economic growth in any economy. This research is conducted to investigate the linear impact of exports and the non-linear efect of energy consumption on economic growth considering the production function approach in the Spanish economy. After considering the bounds test for a period from 1980 to 2019, the study provides evidence of the invertedU-shaped efect of energy consumption on economic growth. The fndings also expose that exports, labor force and capital formation signifcantly accelerate economic growth in Spain. These fndings are consistent with the diagnostics applied in the study. This research proposes that energy consumption should not be increased beyond a certain threshold for reaping the positive fruits of economic growth. Beyond that cutof, it will become harmful to

economic growth. Policy advisors may consider exports to target economic growth in Spain as it helps in expanding production activities in the Spanish economy.
https://link.springer.com/article/10.1007/s11356-022-23307-y

9. Huang, X., Khan, Y. A., Arshed, N., Salem, S., Shabeer, M. G., & Hanif, U. (2023). Increasing social resilience against climate change risks: a case of extreme climate affected countries. *International Journal of Climate Change Strategies and Management, 15*(3), 412-431. doi: 10.1108/IJCCSM-04-2022-0051. Muhammad Ghulam Shabeer (Economics & Statistics/HSM) Date of Publication: April 2023 HJRS: W (Bronze)

Purpose: Social development is the ultimate goal of every nation, and climate change is a major stumbling block. Climate Risk Index has documented several climate change events with their devastations in terms of lives lost and economic cost. This study aims to link the climate change and renewable energy with the social progress of extreme climate affected countries. Design/methodology/approach: This research used the top 50 most climate-affected countries of the decade and estimated the impact of climate risk on social progress with moderation effects of renewable energy and technology. Several competing panel data models such as quantile regression, bootstrap quantile regression and feasible generalized least square are used to generate robust estimates. Findings: The results confirm that climate hazards obstruct socioeconomic progress, but renewable energy and technology can help to mitigate the repercussion. Moreover, improved institutions enhance the social progress of nations. Research limitations/implications: Government should improve the institutional quality that enhances their performance in terms of Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption to increase social progress. In addition, society should use renewable energy instead of fossil fuels to avoid environmental degradation and health hazards. Innovation and technology also play an important role in social progress and living standards, so there should be free hand to private business research and development, encouraging research institutes and universities to come forward for innovation and research. Practical implications: The ultimate goal of all human struggle is to have progress that facilitates human beings to uplift their living standard. One of the best measures that can tell us about a nation's progress is Social Progress Index (SPI), and one of many factors that can abruptly change it is the climate; so this study is an attempt to link the relationship among these variables and also discuss the situation where the impact of climate can be reduced. Social implications: Although social progress is an important concept of today's economics discussion, relatively few studies are using the SPI to measure social well-being. Similarly, there is consensus about the impact of climate on people, government and crops but relatively less study about its overall impact on social progress, so this study attempts to fill the gap about the relationship between social progress and climate change. Originality/value: The main contribution of this study is the solution for the impact of climate risk. Climate risk is not in human control, and we cannot eliminate it, but we can reduce the negative impacts of climate change. Moderator impact of renewable energy decreases the negative impact of climate change, so there is a need to use more renewable energy to mitigate the bad consequences of climate on social progress. Another moderator is technology; using technology will also mitigate the negative consequences of the climate, so there is a need to facilitate technological advancement.
https://www.emerald.com/insight/content/doi/10.1108/IJCCSM-04-2022-0051/full/html

10. Mahmood, H., Furqan, M., Hassan, M. S., & Rej, S. (2023). The Environmental Kuznets Curve (EKC) Hypothesis in China: A Review. *Sustainability (Switzerland), 15*(7). doi: 10.3390/su15076110. Muhammad Shahid Hassan (Economics & Statistics/HSM) Date of Publication: April 2023 HJRS: W (Silver)

China is the largest total pollution emitter country on the globe and a vast literature has investigated the environmental Kuznets curve (EKC) hypothesis in China. Thus, we aim to review empirical studies on the testing of the EKC hypothesis using different pollution proxies and area samples in China. The EKC hypothesis can be validated by establishing an inverted U-shaped or an N-shaped relationship between pollution and economic growth. In this review of the Chinese literature, the validity of the EKC hypothesis is found more often than its absence. In comparison, a higher proportion of the studies validated the EKC hypothesis using global pollution proxies compared with local pollution proxies. Moreover, a greater percentage of the studies substantiated the EKC hypothesis using Chinese provincial and city-level data compared with aggregate national data. To validate these findings, we applied logistic regression, and the chance of the validity of the EKC hypothesis was found to be 5.08 times higher than the absence of the EKC if a study used a global pollution proxy. Moreover, the chance of the existence of the EKC hypothesis was found to be 4.46 times higher than the nonexistence of the EKC if a study used Chinese provincial, city, sectoral, or industrial data.
https://www.mdpi.com/2071-1050/15/7/6110

11. Munir, M., Zakaria, Z. A., Nisar, H., Ahmed, Z., Korma, S. A., & Esatbeyoglu, T. (2023). Global human obesity and global social index: Relationship and clustering. *Frontiers in Nutrition, 10*. doi: 10.3389/fnut.2023.1150403. Mubbasher Munir (Economics & Statistics/HSM) Haseeb Nisar (Life Science/SSC) Zahoor Ahmed (SFAS) Date of Publication: March 2023 HJRS: W (Gold)

Introduction: Obesity, a complex, multifactorial disease, is considered a global disease burden widely affecting the quality of life across different populations. Factors involved in obesity involve genetics, behavior and socioeconomic and environmental origins, each contributing to the risk of debilitating morbidity and mortality. However, the trends across the world vary due to various globalization parameters. Methods: This article tends to identify the global social indicators, compiled into a global index, and develop a correlation between the global social index created by using the human development index, social and political globalization, the global happiness index, and the quality of infrastructure, institutions, and individuals using the internet factors and its effect on global obesity. Results: and Discussion: Our results identified a positive correlation between medium human development levels with obesity compared to low and very high human development levels. Economic stability due to rapid industrialization has increased the buying capacity and changed the global food system, which seems to be the major driver of the rise of global obesity. Conclusion: The results decipher that global social indicators and overall social index have positively affected global obesity, which will help policymakers and governmental organizations monitor the obesity patterns across their regions by a significant contribution from globally influenced social factors.

https://www.frontiersin.org/articles/10.3389/fnut.2023.1150403/full

12. **Qaiser, H., Rehman, H. U., & Arshed, N. (2023). Role of institutional quality on women's empowerment—A case of highly gender unequal Asian countries.** *Poverty and Public Policy, 15*(1), 48-75. doi: **10.1002/pop4.363.** Hafsa Qaiser, Hafeez-ur-Rehman (Economics & Statistics/HSM) Date of Publication: March 2023 HJRS: X (Clay)

Equal access to rights and opportunities for women and men is one of the indicators of women's empowerment. Classical economic growth models ignored gender differences in the labor force, but the literature now acknowledges the merits of equal participation of both genders in economic activities. This study investigates the determinants of gender equality as an instrument of women's empowerment. This study focused on Asian countries with a high gender gap in several domains. This lag in women's empowerment is hypothesized to be due to low-quality institutions. The data for this investigation is compiled from World Development Indicators, Global Gender Gap reports, the Polity IV project, World Governance Indicators, and Human Development Reports. The Panel Feasible Generalized Least Squares results show that female unemployment and good governance tend to increase the gender gap in Asian countries, while Human Development Index, trade openness and democracy reduce the gender gap. This quantitative assessment is instrumental for policymakers in socially empowering women on equal terms with men in Asia.

https://onlinelibrary.wiley.com/doi/full/10.1002/pop4.363

13. **Stylianou, T., Nasir, R., & Waqas, M. (2023). Inclusive Human Development and Governance Nexus: Causality Analysis of Selected Asian Countries.** *Economies, 11*(3). doi: 10.3390/economies11030097. Rakia Nasir (Economics & Statistics/HSM) Date of Publication: March 2023 HJRS: X (Clay)

This study investigates the role of governance in inclusive human development in the case of twenty-four selected Asian countries, using panel data for the time period from 2010 to 2017. The inequality-adjusted human development index, developed by the United Nation Development Program, has been used as a proxy for inclusive human development. In addition, six indicators of governance have been used as independent variables in a regression model, along with three control variables. We have tested the stationarity of our data using panel unit root tests such as Leviv-Lin-Chu and Augmented Dickey Fuller. The Pearson correlation matrix helps us find out the correlation among variables. The findings show a mixed level of correlation among the variables (i.e., high, low, and moderate). Furthermore, our results show that a strong causal relationship among the variables exists. One of the most important findings is that there is bi-directional causality between the inclusive human development index (IHDI) and development expenditure. The IHDI causes more government investment in development projects, whereas more development expenditure in the country achieves a higher IHDI. Trade openness and development expenditure have a bi-directional causal relationship. Finally, economic governance causes political governance in the case of our selected Asian countries.

https://www.mdpi.com/2227-7099/11/3/97

14. **Riaz, M., Hussain Sial, M., Sharif, S., & Mehmood, Q. (2023). Epidemiological Forecasting Models Using ARIMA, SARIMA, and Holt–Winter Multiplicative Approach for Pakistan.** *Journal of Environmental and Public Health, 2023*. https://doi.org/10.1155/2023/8907610. Muhammad Riaz, Maqbool Hussain Sial, Saira Sharif, Qaisar Mehmood (Economics & Statistics/HSM) Date of Publication: May 2023 HJRS: W (Bronze)

Background of the Study. Statistical models have been extensively used in modeling and forecasting the different fields of agriculture, economics, social sciences, and medical sciences. The transmission of some diseases is a serious life threat around the globe; therefore, proper assessment and modeling need time. Malaria is one of the major life-threatening diseases in Pakistan, and some death cases due to this disease have been reported during the last decade. *Methodology.* The data have been collected from the Ministry of Health, Rahim Yar Khan, Pakistan, from January 2011 to March 2022. Data were analyzed by applying time series models for prediction purposes. Diagnostic measures such as RMSE, MAE, and MAPE were used to

choose the best forecasting model. *Results and Discussion*. This study aims to forecast malaria cases by choosing the best forecast model. After comparison, it was concluded that the Holt–Winter multiplicative model outperformed the ARIMA and SARIMA models, with the lowest RMSE, MAPE, and MAE compared to other models. Malaria cases in the district Rahim Yar Khan were forecasted by the Holt–Winter multiplicative model, for the month of April 2022 to January 2023. From the forecasting results, the minimum number of cases was found to be 586.75 in June 2022 and the maximum number of cases was found to be 1281.93 in October 2022 among the next ten months. Based on the results, it is paramount for the GOP (Govt. of Pakistan) to enhance the vaccination policy to erase the impacts of malaria cases to flatten the curve.
https://www.hindawi.com/journals/jeph/2023/8907610/

15. **Mehmood, Q., Sial, M. H., Sharif, S., & Riaz, M.** (2023). Development of Statistical, Artificial Neural Network ANd Hybrid Models, Forecasting Wheat Area and Production in Pakistan. *International Journal of Agricultural & Statistical Sciences, 19*(1). Qaisar Mehmood, Maqbool Hussain Sial, Saira Sharif, Muhammad Riaz (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: X (Null)
Agriculture plays a vital role in the economic development of Pakistan, as it is the main largest source of economy to achieve the targets of economic growth. The objective of this research was to forecast the area and production of wheat crop taking historical data from 1947 to 2021 for Economic Survey, Ministry of Finance, Government of Pakistan. Initially a linear model ARIMA, through Box-Jenkin's (1976) methodology was applied to forecast the wheat area and production. Then we compare it with ETS, TBATS, Artificial Neural Network (ANN), and ARIMA-ETS, ARIMA-TBATS, and ARIMA-ANN hybrid models. It was observed that the ARIMA-ANN model show the lowest values for RMSE (214.2673, 921.9103) and MAE (175.470, 710.7325) for both wheat area and production. Forecasting of wheat area and production has been performed till 2030. Ten year average forecast for wheat area under the ARIMA-ANN was 9058.10 and yearly expected wheat area was increased by 2.87 percent each year. Change was computed and revealed that the area of the wheat crop is expected to increase by about 2.87 percent. The average wheat production for the ten-year forecast from the ARIMA-ANN model was 25878.03 and the yearly expected percentage change in the production of wheat was about 2.34 percent to increase. These forecast estimates for wheat crop will be important for the Government in formulating their policies to fulfil the food necessities of the nation, trade, support prices and planning the industrial sector.
https://connectjournals.com/toc2.php?abstract=3716501H_151-160a.pdf&&bookmark=CJ-033252&&issue_id=01&&yaer=2023

16. **Aslam, M., Saleem, S., Yasin, S., Nazir, S., & Chaudhary, S. W. (2023). Determinants of Stunting among Children Under Five Years of Age: Evidence from Pakistan Demographic and Health Survey.** *Pakistan Journal of Medical & Health Sciences, 17*(03), 175-175. https://doi.org/10.53350/pjmhs2023173175 Seyab Yasin (Economics & Statistics/HSM) Date of Publication: March 2023 HJRS: Y (Null)
Aim: To determine the factors that influence the stunting level of children under the age of five years in Pakistan. Methods: This study was conducted using Pakistan Demographic and Health Survey (PDHS) 2017-2018 during 2020-2021. The response variable comprised two categories: stunted and not stunted. In this study the demographic and socioeconomic factors affecting stunting are region, birthplace, preceding birth interval, women's education level, husband\partners education level, women's age, breast feeding, size of child at birth, total child ever born, type of place of residence, frequency of listening to the radio, sources of drinking facilities, and antenatal visits. A binary logistic regression model was applied to access the relationship between stunting with potential demographic and socioeconomic factors. Results: The binary logistic regression model identified that the significant factors for stunting of children in the regions of Pakistan are: Punjab (OR=. 311, CI; 0.104, 0.934), KPK (OR= 0.278, CI; 0.091, 0.853), mother education (secondary OR= 2.671, CI; 1.025, 6.959), father education (Secondary OR= 0.370, CI; 0.146, 0.938), breastfeeding (1-year OR= 0.197, CI; 0.056, 0.689), child size (larger than average OR= 0.113, CI; 0.020, 0.646) and (average OR= 0.212, CI; 0.047, 0.962).Practical implication: Identifying the determinants of stunting can lead to improved health outcomes for children, including reduced mortality rates, better cognitive development, and improved physical growth. Conclusion: This study discovered that stunting in Pakistan can be reduced by improving the education level of parents, proper breastfeeding, and proper diet during pregnancy duration.
https://pjmhsonline.com/index.php/pjmhs/article/view/4320

17. **Saleem, S., Nazir, S., Yasin, S., Kamal, A., & Aslam, M. (2023). Clinical Risk Factors affecting the Pregnancy Outcome using Pakistan Maternal Mortality Survey (PMMS) 2019.** *Pakistan Journal of Medical & Health Sciences, 17*(03), 168-168. https://doi.org/10.53350/pjmhs2023173168. Seyab Yasin (Economics & Statistics/HSM) Date of Publication: March 2023 HJRS: Y (Null)
Background: South Asia is the world's most populous region, and it also has the highest rate of pregnancy loss. It is necessary to understand the risk factors for pregnancy loss in South Asian countries like Pakistan for reducing the global burden of pregnancy loss. Aim: To determine the potential clinical factors affecting pregnancy outcomes of Pakistani women aged 15-49 years during 2016-2019. Study design: This study was

conducted using Pakistan Maternal Mortality Survey (PMMS 2019) during 2020-2021. All eligible ever-married women (n= 7096) aged 15-49 were selected for this study. In this study, the clinical risk factors considered are fever, unconsciousness, high blood pressure, diabetes, vaginal bleeding, problems associated with the placenta, problems associated with the position of the baby, and preeclampsia. The response variable was pregnancy outcome comprising four categories that are live-birth, stillbirth, miscarriage, and abortion. A multinomial logistic regression model was applied to test the relationship between the dependent variable and each of the eight risk factors.Results: Multinomial logistic regression model identified that fever (OR= 0.723), vaginal bleeding (OR= 1.614), high blood pressure (OR= 1.473), and problems associated with the position of the baby (OR= 0.396) are significantly associated with a stillbirth at a 10% level of significance. Additionally, unconsciousness (OR= 1.019) appears as a potential risk factor for abortion. Practical implication: Understanding the most significant risk factors that contribute to negative pregnancy outcomes, it can prioritize resources to improve maternal health. Also, assistance to healthcare providers and policymakers in making informed decisions regarding maternal health in Pakistan can be provided. Conclusion: Fever, vaginal bleeding, high blood pressure, problems associated with the position of the baby are significant risk factors of stillbirth. However, unconsciousness identified a risk factor of abortion. It is concluded that in Pakistan pregnancy loss can be reduced by controlling the prevalence of diseases during pregnancy.
https://pjmhsonline.com/index.php/pjmhs/article/view/4318

18. **Sami, F.,** Amin, M., Butt, M. M., & **Yasin, S. (2023). An Almost Unbiased Ridge Estimator for the Conway–Maxwell–Poisson Regression Model.** *Iranian Journal of Science,* **1-11. https://doi.org/10.1007/s40995-023-01477-9. Faiza Sami, Seyab Yasin** (Economics & Statistics/HSM) Date of Publication: August 2023 HJRS: X (Null)

The Poisson model is the most widely used model for counts type response variables. It has a limitation of equal mean and variance, which undermines its application as compared to the Conway–Maxwell–Poisson–regression model (COMPRM). In general, the maximum likelihood estimator (MLE) is used to estimate the COMPRM, but when there is a high correlation among the explanatory variables, the MLE may not provides efficient estimates. In this situation, the ridge estimation technique provides a better alternative to the MLE but with a larger bias. In this work, we propose an almost unbiased ridge estimator for the estimation of COMPRM coefficients and derive its theoretical properties. The proposed estimator is compared with the available biased estimator as well as the MLE based on the mean squared error (MSE) and bias criteria. A Monte Carlo simulation analysis is performed for comparisons under various controlled conditions. A real application is considered to study the significance of the proposed estimator using MSE and cross-validation criteria. The simulation and real-world application results show that the proposed estimator outperforms the classical MLE and ridge estimators in terms of the minimum MSE and bias.
https://link.springer.com/article/10.1007/s40995-023-01477-9

19. **Adeleye, B. N., Musbahu, H. O., Abdulkareem, H. K., & Kanwal, A. (2023). Growth-Led Tourism and the Role of Exchange Rate: Empirical Evidence from Sri Lanka.** *Tourism: An International Interdisciplinary Journal,* **71(3), 600-617. https://doi.org/10.37741/t.71.3.11**. **Asma Kanwal** (Economics & Statistics/HSM) Date of Publication: September 2023 HJRS: X (Clay)

We re-visit the growth-led tourism hypothesis to examine the role of the exchange rate in the nexus. Using yearly data on Sri Lanka from 1995 to 2018, preliminary tests reveal a long-run association between tourism receipts, economic growth, and the official exchange rate. Consistent robustness results from a battery of econometric techniques validate that the connection holds autonomously and interactively. Conclusions drawn from the linear models suggest that a percentage change in economic growth increases tourism by 0.8% to 1.2%. Likewise, the exchange rate boosts tourism by 0.006% to 0.008%, on average, ceteris paribus. For the most part, the interaction of the exchange rate with economic growth upholds the" growth-led tourism" hypothesis. We also find that the results hold across the conditional distribution of tourism. Additional evidence from the margin plot reveals that the effect of economic growth on tourism is positive as the Sri Lankan Rupee depreciates. The upward trend of the plot within the 95% confidence interval shows that currency depreciation enhances the impact of economic growth on tourism. These are novel contributions to the literature as it suggests that currency depreciation in Sri Lanka is pro-tourism. Policy recommendations are discussed.
https://hrcak.srce.hr/en/clanak/440339

20. **Eyisi, N., Ichoku, H. E., & Kanwal, A. (2023). Front-end Innovation and Top Income Inequality: Evidence from Emerging Markets.** J*ournal of the Knowledge Economy,* **1-45. https://doi.org/10.1007/s13132-023-01105-2.** **Asma Kanwal** (Economics & Statistics/HSM) Date of Publication: March 2023 HJRS: X (Honorable Mention)

We contribute to the literature on income inequality, by extending existing models to examine the effect of front-end innovation (FEI) on top income inequality. We use a fixed effect panel regression, on annual country-level data for twenty-four emerging markets, over twenty-four (1995–2018) years, and find an insignificant correlation between income inequality and FEI. The instrumental variable estimates, however, show a

significant association between measures of FEI and top income shares. Furthermore, we confirm that FEI is weakly related to broad measures of income inequality. Our instrumentation strategy and robustness checks suggest that this correlation partly reflects a causality, from FEI to top income inequality. Finally, we reveal that FEI is necessary for the survival of new ventures, in the crucial early years. Overall, our findings confirm that that; a) sectors that scale slowly because institutions are a substantial barrier for FEI and, b) sectors that rely solely on the most skilled front-end innovators to access credit, significantly expand top entrepreneurial income share across emerging markets.

https://link.springer.com/article/10.1007/s13132-023-01105-2

21. **Sidra Raza, Muhammad Ibrahim Saeed, & Abdul Ghaffar.** (2023). **Impact of Climate Change and Tourist Industry of Azad Jammu & Kashmir: A Systematic Literature Review.** *International Journal of Kashmir Studies, 5*(1). **Sidra Raza, Abdul Ghaffar** (Economics & Statistics/HSM) **Muhammad Ibrahim Saeed (ORIC) Date of Publication: June 2023** HJRS: Y (Null)

Climate change has become a critical challenge with significant economic, developmental, and scientific implications, affecting various aspects of life, including economies. This in-depth study focuses on exploring the impact of climate change on the tourist industry in Azad Jammu & Kashmir (AJ&K). The tourism sector plays a vital role in the economy of AJ&K. Through a systematic literature review, this study examines 16 relevant articles, encompassing empirical, theoretical, exploratory, and both quantitative and qualitative research methodologies. To identify these articles, multiple research databases were selected based on their popularity, credibility, and acceptance. Additionally, the study offers an exploratory perspective, highlighting the factors responsible for climate change and their relationship with the tourism industry. The study concluded that the tourist sector is negatively impacted by climate change.

http://ojs.kprijk.org/index.php/openjournalsystem/article/view/121

22. **Usman, T. ., Asia, ., Haq, F. ., & Ahmad, S.** (2023). **Parent-Child Relationship, Demographic Attributes and Self-Defeating Behaviour Patterns among Individuals with Substance Use Disorder: Parent-Child Relationship and Substance Use Disorder.** *Pakistan Journal of Health Sciences, 4*(03), 108–112. **Fizzah Haq, Sheraz Ahmad** (Economics & Statistics/HSM) **Date of Publication: March 2023** HJRS: Y (Null)

The human needs belong to the universal, fundamental, and influential needs and its effects on mental health if people get social rejection and exclusion. The maladaptive patterns were developed, and it could continue till adulthood. **Objective:** To look at the relationship and prediction of Parent-Child and self-defeating behaviour in individuals with substance use disorder. **Methods:** It was correlational research in which purposive sampling was used to collect data of 150 participants with substance use disorder from Hospital and Rehabilitation Centres. Pearson product moment correlation analysis, linear regression analysis was used to find correlation and predication respectively, while 5% (0.05). p-value was used for the study to analysis significance of the variables. The inventory of parents and peer attachment, and Ottawa self-injury inventory were individually administered to measure parent-child relationship, and self-defeating behaviour respectively. **Results:** Parent-child relationship was negative significant with Self-defeating behaviour (r=-0.182, p≤.05), family member (r= -0.33, p≤0.005) and with life satisfaction (r= -0.27, p≤0.001), while self-defeating behaviour was positively significant with age (r= 0.29, p≤0.005), family status (r=0.19, p≤0.05) and duration with drug use (r= 0.17, p≤0.05). Negatively significant with education (r= -0.19, p≤0.05), marital status (r= -0.28, p≤0.005) and life satisfaction (r= -0.27, p ≤0.005). The result showed that 11% of the variance explained by demographic variable in self-defeating behaviour of participants. **Conclusions:** It was concluded that negative relationship found between parent-child relationship and self-defeating behaviour. Parent-Child relationship is significant predictor of self-defeating behaviour with demographic variables.

https://thejas.com.pk/index.php/pjhs/article/view/579

23. **Munir, M., Oubaid, M., Baig, A. A., Azam, A., & Khalil, H.** (2023). **Recent facts of eating habits and obesity among adolescent; a case of Pakistan.** *International Journal of Natural Medicine and Health Sciences, 2*(2), 49–57. **Mubbasher Munir (Economics & Statistics/HSM) Maria Oubaid, Anam Azam** (Life Sciences/SSC) **Date of Publication: March 2023** HJRS: Y (Null)

Background: Obesity is an escalating problem that is reaching to pandemic level. Multiple factors may involve in causing obesity such as improper food pattern of physical activities, social and ecological variables, choice of menu and other biological factors. Conducting to a study to evaluate the primary cause. However, a few studies are conducting to see the impact of eating patterns on health and weight. Methods: University students (n=150, ages 18-24 years) 50% males and 50% females were selected for data collection via questionnaire. The outcomes showed that 70 individuals prefer to eat saturated fats that can lead to accumulation of bad cholesterol. 5% females and 5% males prefer using trans-fat that is even worse. On the other hand, 44 respondents prefer to choose low fat food. Results: About 25% individuals are unaware of nutritional on facts of the products but females are more conscious as compared to the men. 55% individuals eat unconsciously while watching television and consume more than the requirement. 94 individuals got attracted by advertisement tactics of food companies and but to eat them. It is also witnessed that males (32%)

consume more carbonated drinks than females (13%). 64 students strongly agreed that supplements lead to obesity. In our sample population 10% obese, 14% were overweight and 47% were of normal weight. Conclusion: The major reason of obesity could be that they are eating out more often. It could be due to the fact they are dependent on high calorie food. There is a lack of vegetables and fruits in their diet. On the other hand, fruits, veggies and whole grains are linked to less gain and even weight loss. Making smart food choices can help you stay slim and healthy.

https://journals.iub.edu.pk/index.php/ijnms/article/view/1800

24. **Khalid, L., Rasul, F., & Asghar, N. (2023). The Impact of Financial Development, Renewable Energy Consumption, and Information and Communication Technology-oriented Strategies on Inclusive Growth of Asian Economies.** *JISR management and social sciences & economics, 21*(2), 1-21. **https://doi.org/10.31384/jisrmsse/2023.21.2.1. Laila Khalid, Farhat Rasool (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: Y (Null)**

This study aims to accentuate the role of financial development, renewable energy consumption, and information and communication technology (ICT)-oriented strategies to achieve inclusive growth in 21 Asian economies from 1995-2019. The long-run findings of panel linear ARDL reveal positive but insignificant responses in inclusive growth to financial development. Whereas, the estimates of panel NARDL depict that financial development positive and negative movements boost inclusive growth significantly. Interestingly, both techniques provide significant but contradictory outcomes for the effects of renewable energy on inclusive growth. Moreover, the results confirm that the individual impact of financial development and ICT increases but their interaction decreases inclusive growth. It indicates that ICT fails to complement the financial sector in enhancing inclusive growth. Therefore, the study recommends improving ICT infrastructure through the appropriate investment so that it could complement the financial sector effectively to achieve inclusive growth. It implicates for the stakeholders to boost the efficiency of the financial intermediaries and equitable access to digital finance and clean energy to attain inclusive growth.

https://jisrmsse.szabist.edu.pk/index.php/szabist/article/view/559/569

25. **Iqbal, M., Kalim, R. (2023). Environmental sustainability through aggregate demand and knowledge economy interaction—a case of very high–HDI countries.** *Environ Sci Pollut Res 30*, 70229–70245 (2023). **https://doi.org/10.1007/s11356-023-27220-w.Mubasher Iqbal, Rukhsana Kalim (Economics & Statistics/HSM) Date of Publication: May 2023 HJRS: W (Silver)**

The magnitude of the economic activities is immense in very high–Human Development Index (HDI) countries, leading to environmental degradation, a crucial problem. This study is aimed at testing aggregate demand's role in the environmental Kuznets curve (EKC) perspective and explores the role of four pillars of the knowledge economy, viz., technology, innovations, education, and institutions, as proposed by World Bank, in maintaining sustainable development of environmental quality in these countries. The analysis covers the period ranging from 1995 to 2022. The departure of normality of the variables provides a solid base for panel quantile regression (PQR). Unlike ordinary least squares (OLS) regression, which estimates the conditional mean of the dependent variable, PQR estimates the conditional quantiles. The estimated results using PQR confirm both U and inverted U-shaped aggregate demand–based EKC. In fact, these knowledge pillars in the model determine the shape of EKC. Results also reveal that two knowledge pillars, i.e., technology and innovations, are responsible for significantly reducing carbon emissions. In comparison, education and institutions are responsible for expanding carbon emissions. As a moderator, all knowledge pillars except institutions are shifting the EKC downward. The key lessons from these findings are that technology and innovation can reduce carbon emissions, while education and institutions may have a mixed impact. The relationship between knowledge pillars and emissions may be moderated by other factors, underscoring the need for further research. Moreover, urbanization, energy intensity, financial development, and trade openness significantly contribute to environmental deterioration.

https://link.springer.com/article/10.1007/s11356-023-27220-w#citeas

26. **De Clercq, D., Haq, I. U., Azeem, M. U., & Khalid, S. (2023). The link between fear about COVID-19 and insomnia: Mediated by economic concerns and psychological distress, moderated by mindfulness.** *Journal of Management and Organization*, **29(3), 445-463. doi: 10.1017/jmo.2021.3. Muhammad Umer Azeem (Economics & Statistics/HSM) Date of Publication: May 2023 HJRS: W (Bronze)**

This paper adds to extant research by examining the relationship between employees' fear of coronavirus disease 2019 and their suffering from insomnia. It specifically proposes mediating roles of employees' economic concerns and psychological distress and a moderating role of mindfulness in this process. The research hypotheses are tested with survey data collected through two studies among Pakistani-based professionals: 316 in study 1 and 421 in study 2. The results pinpoint a salient risk for employees who experience fear during a pandemic crisis, in that the associated economic and psychological hardships make the situation worse by undermining their sleep quality, which eventually could diminish the quality of their

lives even further. It also reveals how organizations can mitigate this risk if employees can leverage pertinent personal resources, such as mindfulnes
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7900663/

27. **Hanif, N., Javaid, A., Arshed, N., & Rafay, A. (2023). Foreign exploration of immature markets and incidence of money laundering.** *Journal of Money Laundering Control.* **doi: 10.1108/JMLC-10-2022-0153. Anam Javaid, (Economics & Statistics/HSM) Abdul Rafay (Banking and Finance/HSM) Date of Publication: November 2023 HJRS: X (Clay)**

Purpose: Money laundering (ML) is the process used to convert the proceeds of crimes into lawful form. This global problem promotes social ills, corruption and organized crimes. Various instruments are used to counter individual illicit behavior. However, in low-income countries, these regulations are not common because of weak institutions, poor governance and a lack of awareness about the negative consequences of ML. In these countries, multinational corporations take advantage of poor law and order, lower environmental regulations and corruption and shift their domestic operations into foreign countries. Design/methodology/approach: This study uses a multiple mediator model to investigate the link between foreign direct investment (FDI), environmental degradation measured as CO_2 emissions (CE), exports and ML for 118 countries between 2008 to 2018. Findings: Results indicate that FDI promotes exports and CE, leading to illicit financial flows. Originality/value: Policymakers should enforce checks on foreign funds flow and adopt illicit flow mitigation measures to minimize ML globally.
https://www.emerald.com/insight/content/doi/10.1108/JMLC-10-2022-0153/full/html

28. **Hassan, M. S., Hassan, N., Kalim, R., Saeed, M. I., & Mahmood, H. (2023). Inquiring asymmetric effects of oil prices, money supply, and domestic debt on consumer prices: an empirical evidence from Pakistan.** *Environmental Science and Pollution Research,* **30(50), 109571-109584. doi: 10.1007/s11356-023-30036-3. Muhammad Shahid Hassan, Rukhsana Kalim (Economics & Statistics/HSM) Muhammad Ibrahim Saeed (ORIC) Date of Publication: September 2023 HJRS: W (Silver)**

Oil prices (OP) may play a significant role in determining inflation in any oil-importing economy and could have an asymmetrical effect as well. Thus, this paper aims to explore the asymmetric influence of OP, broad money supply (BMS), and domestic debt (DD) on the Consumer Price Index (CPI) in the oil-importing economy of Pakistan using the nonlinear autoregressive distributive lag (NARDL) methodology on an annual sample from 1980 to 2021. The long-run results show that increasing OP and BMS have a positive effect on CPI. Similarly, decreasing OP and BMS have a positive effect on CPI. So, increasing OP and BMS is raising price levels, and decreasing OP and BMS is reducing price levels. OP has a positive and symmetrical effect on CPI. However, the BMS has a positive but asymmetrical effect on CPI. Furthermore, the effect of decreasing BMS is found greater than increasing BMS. Moreover, the effect of DD on CPI is also found asymmetrical. The increasing DD has a positive effect, and decreasing DD has a negative effect on CPI. The most of short-run results follow the long-run results. However, energy usage shows a negative effect on CPI in the short run, which is insignificant in the long-run results. This study recommends controlling the money supply and oil prices to reduce consumer prices.
https://link.springer.com/article/10.1007/s11356-023-30036-3#Abs1

29. **Honey, D., Nosheen, S., & Farid, S. (2023). Identifying the Moderating Role of Income Smoothing and Credit Quality towards Corporate Governance and Determinants.** *Iranian Economic Review,* **27(3), 855-894. doi: 10.22059/ier.2023.327811.1007230. Damian Honey, Safia Nosheen, Saqib Farid (Economics & Statistics/HSM) Date of Publication: October 2023 HJRS: Y (Null)**

Though studies related to corporate governance shaping risk management are ubiquitous, fathoming income smoothing behavior and credit quality are fundamental to commercial banks, especially pertaining to economies in transition. In this context, we used panel data of eighteen commercial banks of Pakistan including both conventional and Islamic, for the period 2007 to 2017. The concept is supplemented by ownership and board structure as apt indicators of corporate governance and deeming income smoothing and credit quality as moderators is the peculiarity of our study. Surprising to note, our risk management model outperformed regulatory capital and profitability, on the road to monitoring effectiveness. Albeit income smoothing constantly remains a matter of concern, credit quality is imperative for risk management in our case. Hence, based on the findings, practitioners are suggested to consider board meetings and block holder ownership with aplomb for monitoring effectiveness of commercial banks in Pakistan. Nonetheless, institutional ownership demands further attention
https://ier.ut.ac.ir/article_94345.html

30. **Hyder, M., Raza, S. M. M., Mahmood, T., & Abbas, N. (2023). Enhanced Dispersion Monitoring Structures Based on Modified Successive Sampling: Application to Fertilizer Production Process.** *Symmetry,* **15(5). doi: 10.3390/sym15051108. Mehvish Hyder, Syed Muhammad Muslim Raza (Economics & Statistics/HSM) Date of Publication: May 2023 HJRS: W (Honorable Mention)**

In this era of Industry 4.0, efficient and affordable monitoring solutions are needed for the surveillance of manufacturing/service operations. In general, memory-type control charts outperform memoryless control charts when it comes to determining the changes in location and dispersion parameters of symmetrically distributed processes. Before monitoring the process location, it is essential to monitor the process dispersion, since the latter presumes that the process variance remains stable. In practice, the modified successive sampling (MSS) mechanism is preferred over simple random sampling for its cost-effectiveness and efficiency. This study was designed in order to propose moving average and double moving average control charts based on the MSS mechanism for monitoring the dispersion parameter. The performance of the proposed charts is evaluated using run-length measures, and a comparison is made with an existing control chart based on MSS and repetitive sampling. Furthermore, the application of the designed moving and double moving average charts is demonstrated using a case study related to fertilizer production. It is observed that the proposed double moving average control chart performs better than the other control charts designed under the MSS and repetitive sampling schemes.

https://www.mdpi.com/2073-8994/15/5/1108

31. **Iqbal, M., Hassan, M. S.,** & Arshed, N. (2023). Sustainable environment quality: moderating role of renewable energy consumption in service sector for selected HDR listed countries. *Environmental Science and Pollution Research,* 30(30), 75777-75787. doi: 10.1007/s11356-023-27764-x. **Mubasher Iqbal, Muhammad Shahid Hassan** (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: W (Silver)
Considering environmental deterioration, an emerging global problem, this study is aimed at determining the impact of the service sector economic activity on environmental quality from the environmental Kuznets curve (EKC) perspective and finding ways to reduce the carbon impact of service sector within the EKC relationship. This study proposes that renewable energy intensity in the economy plays an important role in reducing carbon print of service sector. This study is based on secondary data from 1995 to 2021 for different development-wise categorized country groups leading to 115 countries, according to the Human Development Report (HDR) on the Human Development Index (HDI). Estimated results using panel feasible generalized least squares (FGLS) have confirmed inverted U-shaped for very high HDI and medium HDI and U-shaped EKC for low HDI countries. This study is instrumental in confirming the moderating role of renewable energy in the service sector EKC. Policymakers can plan a gradual reduction of carbon footprint in the service sector by transitioning toward renewable energy.

https://link.springer.com/article/10.1007/s11356-023-27764-x

32. **Iqbal, M., Kalim, R.,** & Arshed, N. (2023). Evaluating industrial competitiveness strategy in achieving environmental sustainability. *Competitiveness Review.* doi: 10.1108/CR-12-2022-0191. **Mubasher Iqbal, Rukhsana Kalim** (Economics & Statistics/HSM) Date of Publication: April 2023 HJRS: X (Clay)
Purpose: This study has incorporated competitiveness by considering it a significant factor behind determining as well as moderating industrial value added in the environmental Kuznets curve (EKC) framework. This study aims to explore the moderating role of competitiveness policy in EKC with an aim to promote business led sustainability at national level. Design/methodology/approach: Considering the environmental deterioration aspect of industrialization, this study tests the existence of EKC for SAARC countries using the data from 1996 to 2021 using second-generation static panel data model. Findings: Estimated results have validated that moderating effect is responsible for improving environmental sustainability in SAARC countries. Furthermore, population density is responsible for increasing while trade openness is responsible for decreasing carbon emissions. Originality/value: Higher industrial activities are a symbol of upward-moving economic growth. But its other impact is in the form of environmental deterioration. However, the relationship between industrialization and environmental quality can be identified through EKC.

https://www.emerald.com/insight/content/doi/10.1108/CR-12-2022-0191/full/html

33. **Iqbal, M., Kalim, R.,** Ul-Durar, S., & Varma, A. (2023). Environmental sustainability through aggregate demand behavior – Does knowledge economy have global responsibility? *Journal of Global Responsibility.* doi: 10.1108/JGR-02-2023-0018. **Mubasher Iqbal, Rukhsana Kalim** (Economics & Statistics/HSM) Date of Publication: July 2023 HJRS: Y (Null)
Purpose: This study aims to consider environmental sustainability, a global challenge under the preview of sustainable development goals, highlighting the significance of knowledge economy in attaining sustainable aggregate demand behavior globally. For this purpose, 155 countries that have data available from 1995 to 2021 were selected. The purpose of selecting these countries is to test the global responsibility of the knowledge economy to attain environmental sustainability. Design/methodology/approach: Results are estimated with the help of panel quantile regression. The empirical existence of aggregate demand-based environmental Kuznets curve (EKC) was tested using non-linear tests. Moreover, principal component analysis has been incorporated to construct the knowledge economy index. Findings: U-shaped aggregate demand-based EKC at global level is validated. However, environmental deterioration increases with an additional escalation after US$497.945m in aggregate demand. As a determinant, the knowledge economy is reducing

CO2 emissions. The knowledge economy has played a significant role in global responsibility, shifting the EKC downward and extending the CO2 reduction phase for every selected country. Further, urbanization, energy intensity, financial development and trade openness significantly deteriorate the environmental quality. Originality/value: This study contains the empirical existence of aggregate demand-based EKC. The role of the knowledge economy is examined through an index which is calculated by using four pillars of the knowledge economy (technology, innovations, education and institutions). This study is based on a combined panel of all the countries for which the data was available.
https://www.emerald.com/insight/content/doi/10.1108/JGR-02-2023-0018/full/html

34. **Iqbal, M.,** Ul-Durar, S., Arshed, N., Shahzad, K., & **Ayub, U.** (2023). **Connecting higher education and renewable energy to attain sustainability for BRICS countries: A climate Kuznets curve perspective.** *International Journal of Emerging Markets.* **doi: 10.1108/IJOEM-04-2023-0555. Mubasher Iqbal, Umer Ayub (Economics & Statistics/HSM) Date of Publication: September 2023 HJRS: W (Honorable Mention)**
Purpose: Increased trapped heat in the atmosphere leads to global warming and economic activity is the primary culprit. This study proposes the nonlinear impact of economic activity on cooling degree days to develop a climate Kuznets curve (CKC). Further, this study explores the moderating role of higher education and renewable energy in diminishing the climate-altering effects of economic activity. Design/methodology/approach: All the selected BRICS economies range from 1992 to 2020. The CKC analysis uses a distribution and outlier robust panel quantile autoregressive distributed lagged model. Findings: Results confirmed a U-shaped CKC, controlling for population density, renewable energy, tertiary education enrollment and innovation. The moderating role of renewable energy and education can be exploited to tackle the progressively expanding climate challenges. Hence, education and renewable energy intervention can help in reducing CKC-based global warming. Research limitations/implications: This study highlighted the incorporation of climate change mitigating curriculum in education, so that the upcoming economic agents are well equipped to reduce global warming which must be addressed globally. Originality/value: This study is instrumental in developing the climate change-based economic activity Kuznets curve and assessing the potential of higher education and renewable energy policy intervention.
https://www.emerald.com/insight/content/doi/10.1108/IJOEM-04-2023-0555/full/html

35. **Kalim, R.,** Ul-Durar, S., **Iqbal, M.,** Arshed, N., & Shahbaz, M. (2023). **Role of knowledge economy in managing demand-based environmental Kuznets Curve.** *Geoscience Frontiers.* **doi: 10.1016/j.gsf.2023.101594. Rukhsana Kalim, Mubasher Iqbal (Economics & Statistics/HSM) Date of Publication: March 2023 HJRS: W (Platinum)**
Aggregate demand or supply at equilibrium is commonly used as a representative of the macroeconomic activity of an economy whereby aggregate demand denotes the behaviour of individuals and households. However, aggregate demand can also directly affect environmental deterioration via changes in aggregate production. This study tried to explore this relationship, known as the demand-based Environmental Kuznets Curve (Demand EKC) and the role of different knowledge economy indicators. Knowledge economy indicators are proposed to influence consumption patterns, altering the demand EKC that empirical studies have understudied. For this purpose, secondary data for 147 countries were collected from 2008 to 2018, also classified as development-wise. This study found that aggregate demand significantly affects carbon emissions. The long-run results are estimated using the Fully Modified Ordinary Least Square method. Controlling factors like renewable energy consumption, population density, and financial development significantly affect carbon emissions in sample countries. This study has incorporated four pillars of a knowledge-based economy and the results showed that these indicators helped reduce consumption-related CO2 emissions.
https://www.sciencedirect.com/science/article/pii/S1674987123000610

36. **Akhtar, M. J., Rehman, H. U.,** & Abbas, Q. (2023). **"The promissory note at COP-21 of sustainable energy for all" Is it converging toward economic development? Environment, Development and Sustainability. doi: 10.1007/s10668-023-03743-7. Muhammad Javeed Akhtar, Hafeez Ur Rehman (Economics & Statistics/HSM) Date of Publication: August 2023 HJRS: W (Gold)**
Concerns regarding current energy patterns are increasing over the period. The debate over the converging or diverging impact on energy transition for SDGs-2030 needs comprehensive empirical analysis. This study attempted to fill this research gap by considering a dataset of 82 economies of selected income levels (Low-Middle-Income & High-income countries) between 2000 and 2019. This study initiated two-stage analyses; TOPSIS is a very useful technique to rank countries as per their current level of lack in the sustainable energy transition. In this view, outcomes indicate that the overall world is converging regarding the sustainable energy gap, especially in high-income economies. However, fluctuations have been observed in low-middle-income economies. Secondly, this study empirically analyzes this lacking position in this transition on economic development. In this way, the study applied the panel's two-step system Generalized Methods of Moment (System GMM) techniques to find the regression relation between sustainable energy transition and economic development. The regression outcomes confirm the Environmental Kuznets Curve (EKC) theory regarding

sustainable energy transitions and economic development. In addition, the panel quantile regression technique has been used to verify the earlier results of the model. Based on the empirical outcomes, this study suggested that low-middle-income economies need more effort to achieve sustainable energy convergence. In contrast, high-income economies need to be more consistent.
https://link.springer.com/article/10.1007/s10668-023-03743-7

37. **Ali, S., Waheed, M., Shah, I., & Raza, S. M. M. (2023). Bayesian sample size determination for coefficient of variation of normal distribution. Journal of Applied Statistics. doi: 10.1080/02664763.2023.2197571. Syed Muhammad Muslim Raza (Economics & Statistics/HSM) Date of Publication: 2023 HJRS: W (Bronze)**
Sample size determination is an active area of research in statistics. Generally, Bayesian methods provide relatively smaller sample sizes than the classical techniques, particularly average length criterion is more conventional and gives relatively small sample sizes under the given constraints. The objective of this study is to utilize major Bayesian sample size determination techniques for the coefficient of variation of normal distribution and assess their performance by comparing the results with the freqentist approach. To this end, we noticed that the average coverage criterion is the one that provides relatively smaller sample sizes than the worst outcome criterion. By comparing with the existing frequentist studies, we show that a smaller sample size is required in Bayesian methods to achieve the same efficiency.
https://www.tandfonline.com/doi/full/10.1080/02664763.2023.2197571

38. **Ali Shah, S. Q., Waris, U., Ahmed, S., Agyekum, E. B., Hussien, A. G., Kamal, M., . . . Kamel, S. (2023). What is the role of remittance and education for environmental pollution? - Analyzing in the presence of financial inclusion and natural resource extraction. Heliyon, 9(6). doi: 10.1016/j.heliyon.2023.e17133. Umra Waris, Sheraz Ahmed (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: W (Gold)**
This study assessed the impact of gross domestic product (GDP), education, natural resources, remittances, and financial inclusion on carbon emissions in G-11 countries from 1990 to 2021. Based on the negative impact of pollution and the need for sustainable development, this study examined factors affecting CO_2 emissions in G-11 countries using non-linear panel ARDL model. The study found that a positive GDP shock increases CO_2 emissions in the short and long term, while a negative shock decreases emissions in the short term and increases emissions in the long term. Education was found to increase CO_2 emissions in the long term but decrease them in the short term, emphasizing the need for education on combating emissions. Natural resources were also found to increase emissions in the long term, highlighting the need for government-defined institutions to minimize extraction effects and enforce transparency and accountability. Positive changes in personal remittances and financial inclusion were found to increase emissions in both the short and long term, suggesting the need for policies that encourage renewable energy sources and energy efficiency improvement. The study concludes that policymakers should prioritize efficient resource allocation, promote renewable energy usage, and enhance environmental awareness to achieve sustainable development goals in G-11 countries. The possible applications of this study include the use of the models to investigate the asymmetric effects on CO_2 emissions. This model can be applied in future studies to examine the relationship between GDP, education, natural resources, personal remittances, financial inclusion, and CO_2 emissions in other countries.
https://www.sciencedirect.com/science/article/pii/S2405844023043414

39. **Amjad, M. A. (2023). Moderating the role of social progress with greenhouse gases to determine the health vulnerability in developing countries. Environmental Science and Pollution Research, 30(40), 92123-92134. doi: 10.1007/s11356-023-28867-1. Muhammad Asif Amjad (Economics & Statistics/HSM) Date of Publication: August 2023 HJRS: W (Silver)**
Human activities have compelled massive environmental degradation, which causes climate vulnerability and that has emerged as a significant health issue. The present study assesses the role of social progress with greenhouse gases to determine the health vulnerability in 77 developing countries from 2011 to 2020. The empirical results are estimated by using the panel ARDL econometric approach. The study found that greenhouse gas emission proposes a U-shaped relationship to determine health vulnerability. In this study, social progress is used as the moderator variable, which shifts the turning point of the U-shaped curve. For this purpose, the interaction term of social progress with greenhouse gases shifts the turning point to the left side of the U-shaped curve and further flattens it. Furthermore, this study explores that urbanization, export openness, and government education expenditure negatively impact health vulnerability while industrialization increases health vulnerability. The study recommends that government should pay special attention to declining greenhouse gases and rising social progress to improve health vulnerability.
https://link.springer.com/article/10.1007/s11356-023-28867-1#Abs1

40. **Arshed, N., Kalim, R., Iqbal, M., & Shaheen, S. (2023). Role of Real Sector and HDI: Does Competitiveness Contribute? Journal of the Knowledge Economy, 14(3), 3044-3070. doi: 10.1007/s13132-022-00997-w.**

Rukhsana Kalim, Mubbashir Iqbal (Economics & Statistics/HSM) Sadaf Shaheen (Banking and Finance/HSM) Date of Publication: September 2023 HJRS: W (Honorable Mention)

This study envisages exploring the role of business competitiveness as a potential moderator in boosting the capacity of the real sector to cause development. Hence, it is proposed that competitiveness policy can be elementary in increasing the development-based productivity of the real sector. Using the panel data of 110 countries between 2006 and 2017, the FGLS estimates show that business competitiveness policy is useful in increasing productivity of service sector and agriculture sector of low- and low-middle-income countries, while it helps increase productivity of the industry sector and agriculture sector of high-income countries. It is evident from the estimates that higher-income countries are extracting higher returns from the competitiveness policy. Surprisingly, competitiveness reaps positive externality as the overall model shows higher returns to competitiveness than income-wise models.

https://link.springer.com/article/10.1007/s13132-022-00997-w

41. **Aslam, B., Zhang, G., Amjad, M. A., Guo, S., & Ji, M. (2023). Does the impact of financial development reinforce sustainability ecological footprint? Fresh evidence from middle and high-income economies.** *Journal of Cleaner Production*, **429. doi: 10.1016/j.jclepro.2023.139573. Muhammad Asif Amjad (Economics & Statistics/HSM) Date of Publication: December 2023 HJRS: W (Platinum)**

In this age of globalization, every country tries to achieve sustainable growth by handling environmental challenges. In the last few decades, massive human activities have been fulfilled by destroying natural resources, and ecological footprint is an excellent way to assess it. Thus, the present study delves into the role of financial development and ecological footprint by controlling urbanization, export diversification, and industrialization. A selected dataset covering 1990 to 2020, containing 43 middle income and 45 high income countries, has been compiled due to data availability. The empirical outcomes were deduced using the Panel Quantile Regression due to outliers and non-normality in the data set. The results demonstrate that financial development suggests the inverted U-shaped curve to determine the ecological footprint in the 25th and 50th quantiles. It shows that a sophisticated financial development declines ecological footprint. Further analysis explores that in middle income countries, only China and higher income countries, Australia, Denmark, Italy, Germany, Japan, France, Korea(R), Netherlands, Luxembourg, Singapore, Switzerland, Spain, the United Kingdom, and the United States have achieved higher financial development, which started declining their ecological footprint. In addition, Industrialization increases the ecological footprint, while export diversification and urbanization have mixed effects across quantiles and countries. This study suggests that the remaining countries should focus on improving their financial development sector to reduce their ecological footprint.

https://www.sciencedirect.com/science/article/abs/pii/S0959652623037319

42. **Li, Y., Teng, R., & Iqbal, M. (2023). Natural resources rent and climate vulnerability: An inverted U-shaped relationship moderated by productive capacity, trade openness, and urbanization in resource-abundant countries.** *Resources Policy,* **86. doi: 10.1016/j.resourpol.2023.104306. Mubasher Iqbal (Economics & Statistics/HSM) Date of Publication: October 2023 HJRS: W (Gold)**

Natural resources play a pivotal role in the global economy, with numerous nations leveraging their extraction, utilization, and exportation as primary drivers for economic advancement. Nonetheless, an overreliance on these resources can expose countries to the adverse effects of climate change, including droughts, floods, and other extreme climatic events, thereby jeopardizing production and revenue streams. Paradoxically, the revenues derived from natural resource extraction can be channeled towards initiatives aimed at climate change mitigation and adaptation, underscoring the intricate interplay between natural resources and climate vulnerability. This research endeavors to elucidate the inverted U-shaped relationship between total natural resources rent and climate vulnerability. The study encompasses nineteen resource-rich countries over the period 2000–2021. Employing the panel quantile ARDL (Auto-Regressive Distributed Lag) methodology with a dynamic fixed effect specification, we delve into the moderating influence of overall productive capacity, trade openness and urbanization on the nexus between resource extraction and climate vulnerability. The panel QARDL estimations are segmented into the 25th, 50th, and 75th quantiles for both long-term and short-term outcomes. In the long-term perspective, our findings validate an inverted U-shaped association between total natural resources rent and climate vulnerability. Factors such as urbanization and trade openness exhibit a positive correlation with climate vulnerability, whereas economic growth demonstrates an inverse relationship. Significantly, the study reveals that productive capacity, when acting as a moderator for natural resources rent, holds the potential to attenuate climate vulnerability.

https://www.sciencedirect.com/science/article/abs/pii/S0301420723010176

43. **Liu, M., Baisheng, S., Alharthi, M., Hassan, M. S., & Hanif, I. (2023). The role of natural resources, clean energy and technology in mitigating carbon emissions in top populated countries.** *Resources Policy,* **83. doi: 10.1016/j.resourpol.2023.103705. Muhammad Shahid Hassan (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: W (Gold)**

This study highlights the significance of natural resources, clean energy production, and technological advancement to control carbon emissions and to attain COP-26 targets in populous counties of the World. The empirical investigation is based on 30 years (1990–2019) of data analysis of 14 world's highly populated countries. This study tries to investigate the aforementioned relationship by employing CS-ARDL econometric techniques that mitigate Cross-sectional Dependence and heterogeneity in slop parameters across panels. For this purpose, the study employed some additional independent variables such as economic growth. The empirical findings reveal the facts that high reliance on natural resources to earn more rent worsen the environmental quality. While, clean energy, and technological innovation brings economies toward a clean natural environment through carbon mitigation. The study suggests that the abundance of green natural resources, efficient use of natural resources may help to protect the natural environment even in those countries which are experiencing high population pressure. In addition, the study spot lights that clean energy production and improvement in technology are also helping to achieve the carbon neutrality targets of COP-26 in highly populated economies of the world

https://www.sciencedirect.com/science/article/abs/pii/S0301420723004166

44. **Mahmood, H., Hassan, M. S., Rej, S., & Furqan, M. (2023). The Environmental Kuznets Curve and Renewable Energy Consumption: A Review.** *International Journal of Energy Economics and Policy,* **13(3), 279-291. doi: 10.32479/ijeep.14270. Muhammad Shahid Hassan (Economics & Statistics/HSM) Date of Publication: May 2023 HJRS: X (Clay)**

Renewable Energy Consumption (REC) would reduce pollution and a large pool of literature has probed the Environmental Kuznets Curve (EKC) including REC in a panel or a country-specific model. The present study reviewed 69 empirical studies and found that 57 out of 69 studies validated the EKC but 12 studies did not confirm the EKC. Out of these, 64 studies found that REC reduced emissions. In the country-specific analyses, 18 out of 25 studies validated the EKC and 24 out of 25 studies substantiated that REC reduced emissions. In the panel studies, 39 out of 44 studies validated the EKC and 40 out of 44 studies found that REC reduced emissions. Comparatively, panel studies reported more evidence of the EKC compared to country-specific studies. However, country-specific studies reported more evidence of the positive environmental effect of REC. The results of logistic regression show that the chance of the validity of the EKC is 4.82 times more in the studies if REC reduced emissions in a model. Thus, future studies on EKC testing should include REC in the model. In comparison, panel studies carry more chance of confirmation of the EKC than country-specific studies.

https://www.zbw.eu/econis-archiv/bitstream/11159/630256/1/1860532764_0.pdf

45. **Rani, T., Amjad, M. A., Asghar, N., & Rehman, H. U. (2023). Exploring the moderating effect of globalization, financial development and environmental degradation nexus: a roadmap to sustainable development.** *Environment, Development and Sustainability,* **25(12), 14499-14517. doi: 10.1007/s10668-022-02676-x. Muhammad Asif Amjad, Hafeez Ur Rehman (Economics & Statistics/HSM) Date of Publication: May 2023 HJRS: W (Silver)**

Financial development is a multidimensional process that contributes to economic growth but sometimes it has a devastating effect on climate change. No country can achieve sustainable development goals without caring the environmental quality. The present study investigates the moderating role of globalization (KOF) in determining the financial development (FD) on environmental degradation in the SAARC countries from 1990 to 2020. The long-run coefficients are estimated using the panel quantile regression (PQR) approach at lower, middle and upper quantile groups. The study shows the U-shaped relationship across three quantile groups based on financial development and carbon emissions. The moderator globalization (KOF) brings up the change in the turning point and flattens before the maturity of the U-shaped curve at the middle quantile while flattens after the maturity of the U-shaped curve at the upper quantile. The study recommends that by using energy-efficient technologies, better financial sector interaction with globalization enhances the environmental quality in SAARC countries.

https://link.springer.com/article/10.1007/s10668-022-02676-x#Abs1

46. **Umar, M., Sial, M. H., Ali, S. A., Bari, M. W., & Ahmad, M. (2023). Trust and social network to boost tacit knowledge sharing with mediation of commitment: does culture moderate?** *VINE Journal of Information and Knowledge Management Systems,* **53(6), 1135-1158. doi: 10.1108/VJIKMS-01-2021-0012. Muhammad Umar, Maqbool Hussain Sial, Syed Ahmad Ali (Economics & Statistics/HSM) Date of Publication: November 2023 HJRS: W (Bronze)**

Purpose – This paper aims to investigate the tacit knowledge-sharing framework among Pakistani academicians. The objective is to study trust and social networks as antecedents to foster tacit knowledge sharing with the mediating role of commitment. Furthermore, the moderating role of organizational knowledge-sharing culture is also examined. Design/methodology/approach – The study applied a survey-based quantitative research design to test the proposed model. The nature of data are cross-sectional and collected with stratified random sampling among public sector higher education professionals of Pakistan. The

total sample size for the present research is 247 respondents. The variance-based structural equation modeling technique by using Smart_PLS software is used for analysis. Findings – Data analysis and results reveal that trust and social networks are significant predictors of tacit knowledge sharing among Pakistani academicians while commitment positively mediated the relationships. While the moderating role of organizational knowledge-sharing culture is also established
https://www.emerald.com/insight/content/doi/10.1108/VJIKMS-01-2021-0012/full/html

47. **Wang, Y., Arshed, N., Shabeer, M. G., Munir, M., Rehman, H. U., & Khan, Y. A. (2023). Does globalization and ecological footprint in OECD lead to national happiness. PLoS ONE, 18(10 OCTOBER). doi: 10.1371/journal.pone.0288630. Noman Arshed, Muhammad Ghulam Shabeer, Mubbasher Munir, Hafeez ur Rehman (Economics & Statistics/HSM) Date of Publication: October 2023 HJRS: W (Platinum)**
This study examines the relationship between globalization, ecological footprint, innovation, and subjective wellbeing in the form of happiness, using a comprehensive assessment of OECD countries from 2008 to 2020. The study employs FGLS, Quantile, and Bootstrap Quantile regression estimation to investigate the quadratic effects of globalization, ecological footprint, and the moderating effect of innovation while controlling for renewable energy and population density. Happiness is a multidisciplinary subject, and this study focuses on the economic dimensions of happiness. The findings reveal a nonlinear relationship between ecological footprint and globalization, with negative effects on subjective wellbeing at high levels of ecological footprint and globalization. However, the moderating effect of innovation mitigates these adverse effects, indicating that innovation can help to offset the detrimental impacts of ecological footprint and globalization on subjective wellbeing. The study's implications are significant for policymakers promoting sustainable economic growth while enhancing subjective wellbeing. The findings highlight the importance of investing in innovation and sustainable development to promote subjective wellbeing in the face of increasing ecological footprint and globalization. Additionally, this research contributes to the multidisciplinary understanding of happiness and provides valuable insights for future research in this area.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0288630

48. **Xing, L., Khan, Y. A., Arshed, N., & Iqbal, M. (2023). Investigating the impact of economic growth on environment degradation in developing economies through STIRPAT model approach. *Renewable and Sustainable Energy Reviews,* 182. doi: 10.1016/j.rser.2023.113365. Mubasher Iqbal (Economics & Statistics/HSM) Date of Publication: August 2023 HJRS: W (Platinum)**
This study aims to investigate the economic factors underlying the current scenario of environmental deterioration, and the role of innovations in achieving sustainable development. For this reason, this study has applied the Environmetnal Kuznets Curve (EKC) and Stochastic Effects by Population, Affluence, and Technology (STIRPAT) structure together using the panel data regression from Asian economies between 1990 and 2019. This study employs panel Auto-Regressive Distributed Lag (ARDL) and Pooled Mean Group (PMG) approaches of dynamic panel data. The funding suggests that the inverted U-shaped relationship for the economic growth per capita and environmental degradation is not supported. However, this study finds that innovations can facilitate the achievement of EKC at lower levels of growth. This study contributes to the methodological understanding of investigating the inverted U-shaped relationship and explains the functioning of the EKC model. The empirical evidence presented in the study challenges the existence of EKC and proposes innovation as a viable approach for Asian economies to achieve sustainable development.
https://www.sciencedirect.com/science/article/abs/pii/S1364032123002228

49. **Akhtar, M. J., ur Rehman, H., & Abbas, Q. (2023). Evaluating the Current Energy-Cleanability Position and its Impact on the Economic Sustainability. *Annals of Social Sciences and Perspective*, 4(1), 129-149. https://doi.org/10.52700/assap.v4i1.253. Muhammad Javeed Akhtar, Hafeez Ur Rehman (Economics & Statistics/HSM) Date of Publication: April 2023 HJRS: Y (Null)**
The transition from traditional to sustainable energy is nothing without easy access to clean energy. Therefore, different economies have made smooth transitions but still there is gap in energy cleanability across the world. Here, this study adopted two stage-analyses; initially it presents an overlook of energy cleanability transition through applying Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS) with entropy weightage in low middle & upper middle income countries. Therefore, the fallout of TOPSIS discloses the outcomes and found more divergence trends in lower middle income countries. Furthermore, the current study examined the impact of energy cleanability gap on economic development in selected panels from 2000 to 2019. Then, unclean energy is to blame for the declining trend in economic development. Furthermore, sustainability in the energy transition is more required as it has its costs and benefits and needs more government commitment and regulatory changes. So, avoiding such vulnerabilities requires massive financing to tackle it and improve flexibility to economic development.
https://assap.wum.edu.pk/index.php/ojs/article/view/253

50. **Amjad, M. A., & ur Rehman, H. (2023). The Long Run Dynamics of Sustainable Economic Development on Ecological Footprint in Developed and Developing Countries: Panel Quantile Regression.** *Review of Education, Administration & Law*, **6(2), 191-210. https://doi.org/10.47067/real.v6i2.322. Muhammad Asif Amjad, Hafeez-ur-Rehman** (Economics & Statistics/HSM) Date of Publication: June 2023 **HJRS: Y (Null)**

Rapid human consumption increases natural resource consumption, which damages the environment. The present study links sustainable economic development and Ecological Footprint in 78 developing and 93 developed countries from 1990 to 2020. This study measures sustainable economic development using the Human Development Index (HDI). The study uses panel quantile regression (PQR) to analyze data from the lower, middle, and higher ecological footprint groups. The study concluded that in developed countries with lower ecological footprint groups, a U-shaped relationship exists while in higher ecological footprint groups the inverted U-shaped EKC is valid between ecological footprint and HDI. It shows that developed countries initially degrade the environment by increasing their ecological footprint. Furthermore, as these countries grow, they divert their attention to more environmentally friendly technologies, resulting in a declining ecological footprint. However, developing countries demonstrate a U-shaped relationship in all quantile groups, indicating that these countries are prioritizing economic growth over environmental concerns. This study recommends that developing countries should follow the developed countries to reduce their ecological footprint by using environmentally friendly practices.

https://real.spcrd.org/index.php/real/article/view/322

51. **Sardar, M. S., Asghar, N., & ur Rehman, H. (2023). Environmental Sustainability Analysis Using Moderation of Transport Competitiveness for Industrial-Induced EKC.** *Review of Applied Management and Social Sciences*, **6(2), 373-390. https://doi.org/10.47067/ramss.v6i2.326. Muhammad Shahzad Sardar, Hafeez-ur-Rehman** (Economics & Statistics/HSM) Date of Publication: June 2023 **HJRS: Y (Null)**

Combating adversities of climate change and promoting clean energy are two important goals of the Sustainable Development Goals (SDGs). The nations of the World have developed various commitments to reduce global warming. The transportation sector share is above twenty percent in total global Greenhouse Gas emissions which is continuously rising over time. The Intergovernmental Panel on Climate Change (IPCC) in its recent report conducted a scenario analysis and suggested reducing net emissions by 2050. The transport competitiveness index indicates the quality and expansion of transport services. Accordingly, this research study uses the data of 121 countries for which transport competitiveness is documented by the World Economic Forum (WEF). The period of the study is confined to 2008-2018. The sample countries are segregated into four groups on the basis of transport sector emissions. The study uses Panel Quantile Regression (PQR) framework to estimate results and to validate the industrial Environmental Kuznets Curve (EKC). The findings indicate that transport competitiveness mitigates transport sector emissions in the majority of groups/categories. Inverted U shape industrial EKC has been authenticated in group-1 and U shape industrial EKC for the other three groups. The moderation of transportation competitiveness specified the flattening of industrial EKC across all quantile groups. The empirical findings indicate that moderation results in the sustainability of industrial EKC at higher levels of industrial growth. Among other variables, the governing ability of institutions and planned population expansion are observed in mitigating emissions. The policy options are discussed depending on the results of the groups.

https://ramss.spcrd.org/index.php/ramss/article/view/326

52. **Butt, M., Amin, H. F., Iqbal, J., Sial, M. H., Hassan, N. U., & Azad, M. U. D. (2023). Homogeneously Weighted Moving Average Control Chart for Rayleigh Distribution.** *Bulletin of Business and Economics (BBE)*, **12(3), 366-384. https://doi.org/10.61506/01.00043. Mehwish Butt, Maqbool Hussain Sial, Mueen-ud-Din Azad** (Economics & Statistics/HSM) Date of Publication: October 2023 **HJRS: Y (Null)**

In this paper, we have proposed Homogeneously Weighted Moving Average (HWMA) control chart for Rayleigh distribution. The Average Run Length (ARL1) is used to evaluate the performance of the proposed HWMA control charts. The ARL1 performance of HWMA control chart is compared to the Exponentially weighted moving average (EWMA) control charts with respect to the different shift size (i.e. 10%, 15%, 20%, 30%, 40% increase and decrease in shift). The results are calculated using sample size n=5. It is observed that with the increase in shift proposed HWMA chart shows more efficient results i.e. ARL1 values decrease with the increase in shifts. It is found that the proposed HWMA chart for Rayleigh distribution outperforms the existing EWMA control chart.

https://bbejournal.com/BBE/article/view/535

53. **Zaman, B., Raza, S. M. M., Iqbal, J., Shehzadi, N., Butt, M. M., & Riaz, M. (2023). Efficient control charting methodology based on Distance Weighted Mean for normal distribution.** *Natural and Applied Sciences International Journal (NASIJ)*, **4(1), 1-16. https://doi.org/10.47264/idea.nasij/4.1.1. Bisma Zaman, Syed Muhammad Muslim Raza, Naima Shehzadi, Muhammad Moeen Butt** (Economics & Statistics/HSM) Date of Publication: May 2023 **HJRS: Y (Null)**

This research suggests a Distance Weighted Mean (DWM) based control chart under normal distribution implementing Simple Random Sampling (SRS). The control limits are calculated using the quantile point method. The control chart's performance is assessed using the Average Run Length (ARL) statistic. The numerical findings are illustrated using samples of sizes 3 and 5. The ARL1 values are determined using Monte Carlo Simulation for increasing and decreasing shifts in the location parameter ranging from 5% to 30%. Using the ARL1 measurement, the proposed DWM control charts are compared to the existing Shewhart control charts. According to the comparison analysis, the suggested DWM control chart surpasses the competing Shewhart control chart. The real-life application of the proposed DWM control chart is also shown by using the lifetime of the light bulb (in hours). The results suggest that the proposed DWM control chart can be a useful tool for monitoring process mean shifts, especially when the sample size is large, and the magnitude of the shift is significant.

https://ideapublishers.org/index.php/nasij/article/view/934

54. **Asghar, N., ur Rehman, H., & Salman, M. (2023). Analyzing the Impact of Urbanization on Carbon Dioxide Emissions: Fresh Evidence from Pakistan. *Forman Journal of Economic Studies*, 19(1). doi: 10.32368/FJES.20231902. Hafeez-ur-Rehman, Muhammad Salman (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: Y (Null)**

Over several decades, unplanned urbanization is increasing CO_2 emissions due to higher energy demand from industrial activities, transportation, and waste management. The present study assesses the link between urbanization and CO_2 emissions in Pakistan from 1985 to 2020 by controlling FDI, access to electricity, and institution quality. The empirical results are estimated by using the ARDL approach while causality is extracted through the Granger Causality test. The empirical findings depict that urbanization leads to CO_2 emissions. Furthermore, institutional quality declines CO_2 emissions, while FDI and access to electricity significantly increase CO_2 emissions. The Granger Causality results indicate a bidirectional causality between electricity access and CO_2 emissions. At the same time, CO_2 emissions and urbanization show unidirectional causality. The study suggests that Pakistan needs to promote an environment-friendly energy consumption pattern.

https://www.fccollege.edu.pk/wp-content/uploads/2.-Analyzing-the-Impact-of-Urbanization-on-Carbon-Dioxide-Emissions-Fresh-Evidence-from-Pakistan-1.pdf

55. **Asghar, N., Amjad, M. A., & ur Rehman, H. (2023). An Asymmetric Analysis of Renewable Energy in Mitigating Carbon Emissions in Pakistan. *iRASD Journal of Economics*, 5(3), 713-724. https://doi.org/10.52131/joe.2023.0503.0156. Muhammad Asif Amjad, Hafeez-ur-Rehman (Economics & Statistics/HSM) Date of Publication: September 2023 HJRS: Y (Null)**

To achieve sustainable growth, energy is incumbent because all modern production is based on it. Unfortunately, about 80% of the global population uses polluted energy, adversely damaging the environment. The present study asses the asymmetric role of renewable energy in the mitigation of CO_2 emissions in Pakistan. The Non-linear ARDL econometric approach is used to estimate the empirical results of the time series data from 1980 to 2020. The study found that positive change in renewable energy adversely declines CO_2 emissions while negative change increases CO_2 emissions. Additionally, the HDI and trade openness lessens CO_2 emissions, while urbanization increases CO_2 emissions. The study recommends that Pakistan should promote eco-friendly consumption patterns. Pakistan should focus on promoting renewable energy resources, which will help combat the upsurge in industrial and housing carbon dioxide emissions.

https://www.internationalrasd.org/journals/index.php/joe/article/view/1803

56. **Kalim, R., & Arshed, N. (2023). Exploring Stability of Ijarah Financing Market in Full Fledged Islamic Banks. *International Journal of Contemporary Economics and Administrative Sciences*, 13(1), 022-046. https://doi.org/10.5281//zenodo.8267500. Rukhsana Kalim, Noman Arshed (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: Y (Null)**

Ijarah contract is apparent analogues to conventional lease contract for customers, but in essence, it is different. Many empirical studies have worked on the issues and acceptability of Ijarah. However, the exploration of demand and supply based determinants of Ijarah is overlooked. This study is designed to find such determinants using the bank-based indicators from financial statements and macroeconomic data for countries with full-fledged Islamic banks. This study has used Panel FGLS model to estimate the demand for Ijarah and supply of Ijarah models using determinants via theoretical model and empirical literature. The result of the study is instrumental in determining the equilibrium Ijarah and future trends in terms of under- or over-supply of Ijarah. Further, this study has identified the price elasticity of demand and supply for the case of Ijarah financing. Islamic banks can identify their operational strategies based on the elasticity of their Ijarah product.

http://ijceas.com/index.php/ijceas/article/view/467

57. **Qamar, U., & Kalim, R. (2023). Aid Composition, Institutional Quality, and Economic Growth: A Multi-Faceted Examination for Developing Countries. *Journal of Excellence in Management Sciences*, 2(2), 29-43. Rukhsana Kalim (Economics & Statistics/HSM) Date of Publication: September 2023 HJRS: Y (Null)**

Foreign aid and institutional quality are the crucial aspects of the development process of the developing nations. This paper examines the effect of foreign assistance and institutional quality on the economic growth of 49 developing countries from 1990 to 2020. The Generalized Method of Moment (GMM) technique has been used for the analysis. Two types of aid, namely project based aid and total aid have been used in the analysis. The overall institutional quality and quality of economic, political and legal institutions have been used in the analysis. The study found that aid without institutional quality has no significant impact on growth. While aid when interacted with institutional quality has a significant impact. It shows that if institutional quality improves in a country than aid will have significant impact on country's economic growth.
https://journals.smarcons.com/index.php/jems/article/view/145

58. **Shakeel, M., Saeed, M. I., & Raza, S. (2023). The impact of tax reform on economic growth: Evidence from Pakistan: An ARDL Approach.** *Journal of Business and Management Research*, **2(2), 1022-1041. Muhammad Ibrahim Saeed, Sidra Raza (Economics & Statistics/HSM) Date of Publication: December 2023 HJRS: Y (Null)**
This study investigates the impact of Tax Reform on economic growth by using time series data from 1978 to 2011 for Pakistan economy. Augmented Dickey Fuller (ADF) test is applied to check the stationarity of variables. Tax Reform, Literacy rate, Import, foreign direct investment (FDI) and economic growth variables are considered. Autoregressive Distributive Lag (ARDL) approach to co-integration proposed by Pesaran et al. (1999, 2001) is employed to find short run and long run relationship among variables. Results indicate that tax reform has negative and significant impact on economic growth both in short run and long run, whereas effect of foreign direct investment on economic growth is positive and significant. Moreover, import has positive and insignificant effect on economic growth in short run, but in long run its effect is negative and significant. Finally, Literacy rate is an insignificant determinant of economic growth. Diagnostic tests confirm that functional form is appropriate, and no serial correlation and heteroscedasticity is found, which highlights the performance of the estimated model. The CUSUM and CUSUMSQ are showing that the model is structurally stable and are lying within the 5% of critical bounds.
https://jbmr.com.pk/index.php/Journal/article/view/79

59. **Hassan, A., Bashir, R., & Raza, S. (2023). An Analysis of the Effects of Ethical Leadership and Organizational Learning on Innovation in the Hospitality Industry.** *Journal of Asian Development Studies*, **12(3), 1581-1593. https://doi.org/10.62345/. Sidra Raza (Economics & Statistics/HSM) Date of Publication: September 2023 HJRS: Y (Null)**
During the last few decades, several researchers have established the positive effect of ethical leadership on organizational innovation. Still, there are very few research studies presenting a deeper understanding of the role of organizational learning in this relationship, which is the main objective of this research. For this purpose, two hypotheses were developed: the first predicts the positive relationships between ethical leadership and organizational innovation, and the second one is the moderating role of organizational learning in the effect of ethical leadership on organizational innovation. The respondents consisted of the staff members of the hospitality sector. The variables of the research scored high on the reliability tests. The results of the study supported all the hypotheses.
https://poverty.com.pk/index.php/Journal/article/view/228

60. **Shair, W., Rasul, F., Raza, S., & Qamar, A. (2023). Panic News and media Hype Effects on Stock Market Returns and Volatility amid Infectious Diseases Turmoil.** *Bulletin of Business and Economics (BBE)*, **12(4), 79-87. https://doi.org/10.61506/01.00085. Farhat Rasul, Sidra Raza (Economics & Statistics/HSM) Date of Publication: December 2023 HJRS: Y (Null)**
This study investigates the effect of fake news, panic news, and media hype on stock market returns amid COVID-19 in Pakistan. It also scrutinizes the asymmetric effect of bad and good news on stock market volatility. For empirical analysis, data of six indicators related to news collected from Ravenpack. The data is ranged from the date of first COVID-19 case recognition dated February 26, 2020, to October 26, 2020. This time span consist on the 166 working days in which stock market remains open. The estimates of the Multivariate EGARCH model revealed that fake news and media hype is negatively associated with the stock market returns. The negative effect of media hype is greater than fake news. The aftermath of variance equation suggests that media hype, infodemic, and panic new increase the stock market volatility. The findings of the study suggests that strong co-ordination among NCOC and Information ministry may result in stabilizing the stock market return by enhancing the investors' confidence and reducing the panic.
https://bbejournal.com/BBE/article/view/580

61. **Khalid, L., Rasul, F., & Asghar, N. (2023). Exploring the Complementary and Nonlinear Effects of Financial Development and ICT on Inclusive Growth in South Asia.** *Annals of Financial Economics*, **18(04), 2350013. https://doi.org/10.1142/S2010495223500136. Laila Khalid, Farhat Rasul (Economics & Statistics/HSM) Date of Publication: December 2023 HJRS: X (Null)**

The current research aims to examine the dynamics among financial development, renewable energy consumption, information and communication technology (ICT) and inclusive growth by focusing on the interaction of finance and ICT in South Asia from 1995 to 2019. The objectives of the study are obtained by using new and broad measures for inclusive growth and financial development. The panel co-integration tests confirm the long-run association between the selected variables. The existence of cross-sectional dependence and mixed order of integration of analyzed variables require the application of panel linear and nonlinear autoregressive distributed lag (ARDL). The findings of both techniques disclose that financial development and ICT individually are significant and vital contributors to inclusive growth in the long run. While their collaboration does not supplement inclusive growth during the same period which is an interesting and unique finding. The short-run outcomes also endorse this outcome. However, the individual impact of financial development remains insignificant while ICT enhances inclusive growth significantly in the short run. The panel nonlinear autoregressive distributed lag (NARDL) results have more explanatory powers than panel ARDL and endorse the assumptions of significant complementarity and nonlinearity between financial development-ICT and inclusive growth. Therefore, it is suggested to increase the access and efficiency of financial intermediaries to accelerate the participation of the masses in the economic growth process and its benefits. In addition, more investment in ICT infrastructure and education is needed so that the ICT sector can complement the financial sector efficiently to boost inclusive growth in South Asia.

https://www.worldscientific.com/doi/epdf/10.1142/S2010495223500136

Department of Quantitative Method

1. **Mehmood, Q.,** Arshad, H. M., Noreen, K., Munir, I., Salam, A., & Ahmed, R. (2023). Some New Constructors for Minimal Circular Partially Balanced Neighbor Designs. *Journal of Statistics Applications and Probability,* **12(1), 93-99. doi: 10.18576/jsap/120110.** Qaiser Mehmood (Quantitative Method/HSM) Date of Publication: January 2023 HJRS: X (Clay)
Minimal circular neighbor designsa are economical to minimize the bias due to neighbor effects for v odd. For v even, minimal circular partially balanced neighbor designs (MCPBNDs) are used. Generators to obtain MCPBNDs-II in equal, two and three different blocks sizes are available in literature for c = 0 and 1, where c is remainder if m is divided by 4, m = (v − 2)/2 and v is number of treatments. These designs have not been constructed for c = 2 and 3. To complete the construction of this class of neighbor designs, MCPBNDs-II are, therefore, constructed for the remaining cases. MCPNBDs-II are the neighbor designs in which 3v/2 pairs of different treatments do not appear as neighbors.
https://digitalcommons.aaru.edu.jo/jsap/vol12/iss1/10/

2. **Waris, U., Sarif, S.,** & Batool, S. A. (2023). Exploring association and forecasting of evapotranspiration based on meteorological factors over megacity Lahore (Pakistan) and central place of Indo-Gangetic Basin. *Environment, Development and Sustainability,* **1-23. https://doi.org/10.1007/s10668-023-03471-y.** Umra Waris, Saira Sharif (Quantitative Methods/HSM) Date of Publication: June2023 HJRS: W (Silver)
Any change in a meteorological variable can affect an environmental element's evapotranspiration over time. This paper studies the dynamic causal relationships between evapotranspiration and meteorological parameters, which have long-term equilibrium relationships in Lahore, Pakistan, during the period from October 2004 to March 2020. The Augmented Dicky Fuller test reveals that the ARDL Approach to Cointegration is used for forecasting ET (kg m^{-2} s^{-1}). The results depicted that geopotential height, surface air temperature, relative humidity at the surface, surface wind speed, tropopause height, surface skin temperature, and water vapor mass mixing ratio have a statistically significant long-run relationship with evapotranspiration. The results also revealed that cloud fraction, relative humidity at the surface, surface air temperature, total surface precipitation, water vapor mass mixing ratio, and tropopause height have a statistically significant short-run relationship with evapotranspiration. The CF(t−1) has the strongest effect on ET (kg m^{-2} s^{-1}) in the short and long run. Speed of adjustment (ECTt−1) shows a highly significant and negative relation, which indicates that after a 1 unit increase in the period, evapotranspiration (kg m^{-2} s^{-1}) will go toward long-run equilibrium with a rate of 66.4%. The forecasted evapotranspiration time plot shows a long-term trend with seasonal components from April 2020 to March 2025.
https://link.springer.com/article/10.1007/s10668-023-03471-y#citeas

3. **Mehmood, Q.,** Arshad, H. M., Noreen, K., Munir, I., Salam, A., & Ahmed, R. (2023). Some New Constructors for Minimal Circular Partially Balanced Neighbor Designs. Journal of Statistics Applications and Probability, **12(1), 93-99. doi: 10.18576/jsap/120110.** Qaisar Mehmood (Quantitative Methods/HSM) Date of Publication: June 2023 HJRS: X (Clay)
Minimal circular neighbor designsa are economical to minimize the bias due to neighbor effects for v odd. For v even, minimal circular partially balanced neighbor designs (MCPBNDs) are used. Generators to obtain MCPBNDs-II in equal, two and three different blocks sizes are available in literature for c = 0 and 1, where c is remainder if m is divided by 4, m = (v − 2)/2 and v is number of treatments. These designs have not been

constructed for c = 2 and 3. To complete the construction of this class of neighbor designs, MCPBNDs-II are, therefore, constructed for the remaining cases. MCPNBDs-II are the neighbor designs in which 3v/2 pairs of different treatments do not appear as neighbors.
https://www.naturalspublishing.com/Article.asp?ArtcID=25893

4. **Sami, F., Butt, M. M., & Amin, M. (2023). Two parameter estimators for the Conway–Maxwell–Poisson regression model. Journal of Statistical Computation and Simulation, 93(13), 2137-2157. doi: 10.1080/00949655.2023.2173195.** **Faiza Sami, Muhammad Moeen Butt (Quantitative Methods/HSM) Date of Publication: September 2023** **HJRS: X (Honorable Mention)**
The two-parameter estimator (TPE) was proposed for the Poisson regression model. It has the limitation of a single parameter. Contrary to this, count data models often exhibit the problems of dispersion and multicollinearity. The Conway–Maxwell–Poisson regression model (COMPRM) is suitable to handle both the dispersion and the multicollinearity issues simultaneously. The TPE for COMPRM is proposed to overcome these issues. In order to estimate the COMPRM co-efficient, the method of iterative reweighted least square (IRLS) is used. The efficiency of the estimator is evaluated in terms of mean square error (MSE) through a Monte Carlo simulation study. In the presence of multicollinearity, mostly the Asar and Genc's two-parameter estimator (AGTPE) gives more efficient results for COMPRM as compared to the maximum likelihood (MLE), the Ridge estimator, the Liu estimator and the TPE by Huang and Yang (HYTPE). The proposed estimator is also being studied for real-life application.
https://www.tandfonline.com/doi/full/10.1080/00949655.2023.2173195

Department of Operations and Supply Chain

1. **Abbasi, I. A., Ashari, H., & Yusuf, I. (2023). System Dynamics Modelling: Integrating Empty Fruit Bunch Biomass Logistics to Reduce GHG Emissions. Resources, 12(4). doi: 10.3390/resources12040053. Ijaz Yusuf (Operation & Supply Chain/HSM) Date of Publication: April 2023** **HJRS: X (Clay)**
The world is shifting toward renewable energy sources due to global warming and rising GHG emissions. Malaysia has joined other nations in the conference of parties to develop policies for the reduction of GHG and carbon emissions. Malaysia is switching towards sustainable, eco-friendly and renewable energy sources. EFB biomass, one of the by-products of palm oil, has enormous potential as a sustainable energy source. Malaysia, one of the top exporters of palm oil, is unable to employ EFB-biomass-based power generation due to storage, logistics and supply-chain-related constraints. Therefore, this study integrates EFB biomass supply-chain logistics to overcome the reported challenges. The current study employs the system dynamics (SD) approach to achieve the objectives as it explains the dynamics of interaction and behaviour among the sub-systems. A document-based model-building approach is employed to collect data to develop the base model. The document-based model-building approach and system dynamics modelling facilitates the achievement of two outcomes: integrated EFB biomass logistics and GHG reduction using EFB. These outcomes are crucial to enhancing the base model and realizing the zero-carbon emission goal to contribute to sustainable development goals.
https://www.mdpi.com/2079-9276/12/4/53

2. **Muneeb, D., Aslam, H., Abdalla, S., Hayat, N., & Ahmad, S. Z. (2023). Catalyzing resource recombination in higher education through potential building and value realizing capabilities. Journal of Asia Business Studies, 17(2), 385-403. doi: 10.1108/JABS-10-2021-0442. Haris Aslam (Operation & Supply Chain/HSM) Date of Publication: February 2023** **HJRS: X (Clay)**
Purpose – This paper aims to examine internal market orientation (IMO), potential building capabilities and value realizing capabilities, i.e. dynamic capabilities (DC) as an antecedent of resource recombination in higher education institutions of the United Arab Emirates. Design/methodology/approach – Data was collected from 349 faculty members and analyzed using the covariance-based structural equation modeling technique. Findings – Results did not support a direct relationship between IMO and resource recombination. However, results did provide support for IMO's significant impact on potential building and value realizing capabilities. The impact of potential building capabilities on resource recombination was partially supported, whereas the impact of value realizing capabilities on resource recombination was fully supported. Practical implications – This study provides guidelines for the higher education managers, especially for the strategic management of its resources. The study also provides a basis for improving internal market policies to remain abreast of DC to succeed in the market. Most significantly, the findings of the study offer guidance toward effective resource planning and innovative management practices. Originality/value – This study identifies the essential resources and capabilities framework that guides firms to modify their capabilities in the face of changing environment.
https://www.emerald.com/insight/content/doi/10.1108/JABS-10-2021-0442/full/html

3. **Abbasi, I. A., Ashari, H., Ariffin, A. S., & Yusuf, I. (2023). Farm to Fork: Indigenous Chicken Value Chain Modelling Using System Dynamics Approach. Sustainability, 15(2), 1402.**

https://doi.org/10.3390/su15021402. **Ijaz Yusuf (Operation & Supply Chain/HSM) Date of Publication: January 2023 HJRS: W (Silver)**

Farm to fork strategy, advocated by the European Commission, aims for a 'fair, healthy,and environmentally healthy food system. It requires a renewed mindset and an in-depth analysis of the intricate agricultural-based value- chain that forms the food system. Indigenous chicken micro-farming, the focus of this study, for example, is a highly potential candidate for the Farm to Fork strategy but requires a deep analysis of its disintegrated value chain to achieve the strategy. Indigenous chicken farming provides opportunities for the poor and marginal people for a steady income while at the same time being more environmentally friendly and a source of healthy food. These have motivated this study to analyse the indigenous chicken micro-farming value chain in Malaysia, with the objectives to evaluate the present status of the indigenous chicken farm value chain and develop an initial integrated model for indigenous chicken farms. This study uses qualitative system dynamics in data collection and analysis and model development to achieve the objectives. The proposed model is simulated to understand the dynamics of interaction and behaviour among the sub-systems. The findings lead to two outcomes of the study- the first is the dynamics model of the typical indigenous chicken value chain, and the second is the potential integrated value chain model for indigenous chicken farming. These findings are imperative for future research to enhance further the integrated model to be able to realise the farm-to-fork strategy and to contribute to the sustainable development goals.
https://www.mdpi.com/2071-1050/15/2/1402

4. **Firdous, H., & Ramish, A. (2023). Reverse Logistics Inefficiencies: A Multiple Case Study Analysis of Food Supply Chains from Pakistan and Malaysia.** *Operations and Supply Chain Management,* **16(3), 365-377. doi: 10.31387/oscm0540396. Hina Firdous, Asher Ramish (Operation & Supply Chain/HSM) Date of Publication:2023 HJRS: X (Clay)**

The purpose of this study is to examine the fundamental roadblocks of reverse logistics (RL) process in the food supply chains (FSC). This paper employs an exploratory approach with multiple case study perspective to examine RL inefficiencies within two contexts namely, Pakistan and Malaysia. Backed by an extensive review of recent literature of various types of challenges and hurdles of RL design and implementation, the study proposed a framework to mitigate all the risks and hurdles. Qualitative data was collected through semi-structured interviews followed by thematic analysis for the identification of RL inefficiencies in FSC. Findings demonstrated that although both countries have different reverse logistics designs, they face common issues in terms of managing complexity, communication, financials, and waste. The framework has practical implications in guiding the logistics and supply chain professionals for the effective design and development of RL strategy and best practices in food sector.
https://journal.oscm-forum.org/publication/article/reverse-logistics-inefficiencies-a-multiple-case-study-analysis-of-food-supply-chains-from-pakistan-

5. **Akbar, B., & Aslam, H. (2023). Reinforcing resilience on the supply side: the role of supplier capabilities. Business Process Management Journal, 29(6), 1938-1957. doi: 10.1108/BPMJ-01-2023-0032. Bilal Akbar (Operation & Supply Chain/HSM) Date of Publication: October 2023 HJRS: W (Silver)**

Purpose: This research study aims to investigate supplier integration's (SI) impact on supply-side resilience (SSR) while considering the intervening role of supplier sustainability and supplier flexibility (SF). Design/methodology/approach: Grounded in the dynamic capabilities view (DCV), the study posits that integration of the focal firm with firm's suppliers leads to sustainability on the supplier's side, which makes the firms more flexible to work with during disruptive circumstances, resulting in resilience on the supply side. The hypotheses are tested on the data of 181 manufacturing firm supply chain managers from a developing country. Findings: The research findings confirmed the hypothesized model suggesting that SI positively impacts SSR. The results also confirm the existence of sequential mediation of supplier sustainability and SF between the SI–SSR relationship. Practical implications: The results of this study show that SI is the primary capability for organizations seeking SSR. Furthermore, the supply-side capabilities, to be effective, are developed in a specific order. Originality/value: This research advances the body of knowledge by identifying the underlying mechanisms through which SI augments SSR. © 2023, Emerald Publishing Limited
https://www.emerald.com/insight/content/doi/10.1108/BPMJ-01-2023-0032/full/html

6. **Asghar, M. I., Aslam, H., & Saeed, A. (2023). Linking supply chain professional's competencies to resilience in a turbulent world. International Journal of Productivity and Performance Management, 72(5), 1304-1320. doi: 10.1108/IJPPM-05-2021-0262. Muhammad Idrees Asghar, Haris Aslam, Amer Saeed (Operation & Supply Chain/HSM) Date of Publication: May 2023 HJRS: W (Silver)**

Purpose: This research aims to understand how competencies for supply chain professionals are developed and how they can affect the manager's performance, especially the manager's resilience in times of significant supply chain disruptions. Design/methodology/approach: A research model was developed based on a comprehensive literature survey in the area of individual competencies grounded in the knowledge-based view

of the firm. We tested our research model using a quantitative, survey-based study with a sample of 175 Pakistani supply chain managers. The hypotheses were tested using structural equation modelling (SEM). Findings: The analysis identified corporate training and knowledge sharing as the main antecedents of supply chain professional's competencies. It also showed that these competencies result in higher performance in the form manager's resilience and job performance. Research limitations/implications: This study provides a valuable framework for organisations to focus on skill-developing training and promoting a knowledge-sharing culture among employees to achieve desired performance levels. Originality/value: This study is unique as no prior research studied such a comprehensive model of antecedents and consequences of supply chain professionals' competencies.

https://www.emerald.com/insight/content/doi/10.1108/IJPPM-05-2021-0262/full/html

7. **Shoukat, H., Pervaiz, F., Rehman, S., Akram, F., Noreen, S., Khan, K. U., . . . Ashraf, M. A. (2023). Development, in vitro and in vivo evaluation of β-cyclodextrin/Polyvinyl alcohol-co-poly (2-acrylamide-2-methylpropane sulfonic acid) cross-linked hybrid IPN-nanogels to improve the dissolution and absorption of anti-hyperlipidemic drug. Polymer-Plastics Technology and Materials, 62(14), 1945-1967. doi: 10.1080/25740881.2023.2237130. Muhammad Azeem Ashraf (Operation & Supply Chain/HSM) Date of Publication: September 2023 HJRS: Y (Null)**

This research is planned to synthesize and characterize interpenetrating polymer network (IPN) nanogels by combining natural (β-cyclodextrin) and synthetic (Polyvinyl alcohol) polymers by free radical polymerization utilizing N,N-methylenebisacrylic acid (MBA) and 2-acrylamido-2-methylpropane sulfonic acid (AMPS). FTIR, DSC, and TGA were employed to characterize the thermal stability of components and the conception of cross-linked networks. The porosity and amorphousness of the structure were shown using SEM and XRD. The entrapment efficiency of prepared nanogels was found to be more than 70%. The enormous increase in rosuvastatin solubility compared to the usual formulation led to a significant development in the drug's release profile and released more than 90% of the drug within 5–30 minutes. As compared to the commercially available tablet (Rovista®), triglyceride and total cholesterol levels were significantly lower in hyperlipidemic rats treated with RST-loaded nanogel. Therefore, the atherosclerosis index of nanogels demonstrated a considerable improvement in pharmacodynamic effectiveness in animals.

https://www.tandfonline.com/doi/full/10.1080/25740881.2023.2237130

Conference Proceedings

1. **Touseef, M., Shahzad, A., & Yusuf . I (2023). Developing the Inventory Policies with the application of ABC Categorization: The case of Footware Industry (PAKISTAN) In *International Congress on Social Sciences, Innovation and Educational Technologies*. Ijaz Yusuf (Operation & Supply Chain/HSM) Date of Publication: 21-22, February 2023.**

http://psasir.upm.edu.my/id/eprint/99668/1/4.%20ICSSIET%202023%20PROCEEDINGS%20BOOK.pdf

2. **Yusuf. I., & Alkamel. M. (2023) Unveiling the structures of HIV and Recommended Policy Levers (PAKISTAN) In *International Congress on Social Sciences, Innovation and Educational Technologies*. Ijaz Yusuf (Operation & Supply Chain/HSM) Date of Publication: 21-22, February 2023.**

http://psasir.upm.edu.my/id/eprint/99668/1/4.%20ICSSIET%202023%20PROCEEDINGS%20BOOK.pdf

Department of Management

1. **De Clercq, D., Haq, I. U., & Azeem, M. U. (2023). Ignoring leaders who break promises or following god: How depersonalization and religious faith inform employees' timely work efforts. *British Journal of Management*, *34*(1), 16-36.doi: 10.1111/1467-8551.12573. Muhammad Umer Azeem (Management/HSM) Date of Publication: January 2023 HJRS: W (Gold)**

This study investigates the relationship between employees' perceptions of psychological contract breaches and their failure to meet work-related deadlines, with a particular focus on the mediating role of the depersonalization they assign to organizational authorities and the moderating role of their religious faith. Results based on multisource data, collected among employees and their supervisors in Pakistani organizations, show that an important factor that underpins the connection between beliefs about broken organizational promises and a diminished propensity to finish work on time is that employees depersonalize organizational leaders. This mediating effect is mitigated by employees' religious faith. For organizations, this study thus identifies a key mechanism – exhibiting indifference to the people in charge – by which employees' frustrations about resource-depleting contract breaches may inadvertently escalate into ineffective time management, and it identifies some workers among whom this counterproductive dynamic is less likely, namely, employees who can draw from their religious faith.

https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8551.12573

2. **Haq, I. U., De Clercq, D., & Azeem, M. U. (2023). The danger of feeling sorry for oneself: How coworker incivility diminishes job performance through perceived organizational isolation among self-pitying employees.** *Australian Journal of Management, 48*(1), 130-146. doi: 10.1177/03128962221092088. **Muhammad Umer Azeem (Management/HSM) Date of Publication: February 2023 HJRS: W (Bronze)**
The study examined how employees' experience of resource-draining coworker incivility might undermine their job performance, with a focus on how this harmful process might be explained by perceptions of organizational isolation and moderated by susceptibility to self-pity. Three-wave survey data, collected among employees and their supervisors in various industries, indicated that an important reason that employees' exposure to rude coworker treatment escalated into diminished performance outcomes was a belief that the employing organization was the source of their sense of abandonment. As a mediator, perceived organizational isolation exerted an especially prominent effect among employees who had a general tendency to pity themselves in difficult circumstances. Organizations accordingly can contain the risk that disrespectful coworker relationships translate into tarnished performance by discouraging employees to feel bad for themselves in the face of work-related hardships.
https://journals.sagepub.com/doi/pdf/10.1177/03128962221092088

3. **Munir, S., Abdul Rasid, S. Z., Aamir, M., Jamil, F., & Ahmed, I. (2023). Big data analytics capabilities and innovation effect of dynamic capabilities, organizational culture and role of management accountants.** *Foresight, 25*(1), 41-66. doi: 10.1108/FS-08-2021-0161. **Farrukh Jamil (Management/HSM) Date of Publication: March 2023 HJRS: X (Clay)**
Purpose: This paper aims to assess the impact of big data analytics capabilities (BDAC) on organizational innovation performance through process-oriented dynamic capabilities (PODC), as a mediator, as well as the moderating roles of organizational culture (OC) and management accountants, in this artificial intelligence (AI) era. This paper also aims to provide information on the emerging trends and implications of the abovementioned relationships by focusing on these relationships and interactions. Design/methodology/approach: This exploratory study used the close-ended questionnaire approach based on the resource-based view and socio-materiality theories. This included sending questionnaires to top-level management, including Chief Financial Officer/Chief Executive Officers/Chief Information Officers (CFO/CEOs/CIOs), having an in-depth understanding of the concepts, practical applications and usage of big data as well as BDAC.181 valid questionnaire-based responses were analyzed using the partial least square structural equation modelling technique and bootstrapping moderated mediation method. Findings: This study provides empirical insights into how BDAC impact innovative performance through PODC as well as the moderating effects of OC and management accountants. This involves a shift in focus from almost standardized approaches to developing BDAC without contextual focus on approaches that are much more heterogeneously related to each organization and hence are more focused on the context of the pharmaceutical industry. Research limitations/implications: The main aim of key research questions in this study is to increase the contributions of BDAC toward improving innovation performance in the presence of the abovementioned variables and relationships that exist between them. The chosen research approach can be improved by carrying out interviews with the top management to obtain more relevant and detailed information for developing a better understanding of the abovementioned relationships. Practical implications: This study outlines how organizations that are developing BDAC approaches can focus on relevant factors and variables to help their initiatives and its role in organizational innovative performance. This will also help them develop sustainable competitive advantage in manufacturing concerns, specifically in the health industry, namely, the pharmaceutical industry. Originality/value: This study investigated the effects and implications of big data on organizations in the AI era that aim to achieve innovation performance. At the same time, it provides an original understanding of the contextual importance of investing in BDAC development. It also considers the role of management accountants as a bridge between data scientists and business managers in a big data environment, especially in the pharmaceutical industry. The current study used first-time data from surveys involving CFOs, CEOs or CIOs of pharmaceutical companies in Pakistan and analyzed the proposed model using bootstrapping moderated mediation analysis.
https://www.emerald.com/insight/content/doi/10.1108/FS-08-2021-0161/full/html

4. **Salem, N. H., Ishaq, M. I., Yaqoob, S., Raza, A., & Zia, H. (2023). Employee engagement, innovative work behaviour, and employee wellbeing: Do workplace spirituality and individual spirituality matter?** *Business Ethics, the Environment and Responsibility, 32*(2), 657-669. doi: 10.1111/beer.12463. **Samina Yaqoob (Management/HSM) Date of Publication: April 2023 HJRS: Y (Null)**
Promoting innovative work behaviour and employee wellbeing has become essential as it endows companies with competitive advantages to thrive in today's complex business environment. This study investigates the role of workplace spirituality in inducing innovative work behaviour and employee wellbeing based on the social exchange theory and the spillover theory. It also looks at the previously unexplored mediating function of employee engagement in the relationship between workplace spirituality and the outcomes above.

Additionally, it examines the interactive effect of workplace spirituality and individual spirituality on employee engagement. Two waves of survey data were collected from 538 employees and their managers working in the IT sector in Pakistan. This study contributes to the expanding corpus of research on workplace spirituality, confirming that the latter positively influence innovative work behaviour and employee wellbeing. The mediating effect of employee engagement on the relationship between workplace spirituality and innovative work behaviour and employee wellbeing is also significant. Further, the results confirm that the influence of workplace spirituality on employee engagement is contingent on the degree of individual spirituality. Theoretical contributions and practical implications are discussed.
https://onlinelibrary.wiley.com/doi/full/10.1111/beer.12463

5. **Mehmood, I.,** Macky, K. and Le Fevre, M. (2023), "High-involvement work practices, employee trust and engagement: the mediating role of perceived organisational politics", *Personnel Review, 52*(4), 1321-1344. **https://doi.org/10.1108/PR-03-2021-0151**. Iqbal Mehmood (Management/HSM) Date of Publication: April 2023 HJRS: Y (Null)
The purpose of this paper is to examine perceptions of organisational politics (POP) as a mediator of the relationship between high-involvement work practices (HIWPs) and employee outcomes (trust in employer and employee engagement).Design/methodology/approach. Using a longitudinal time-lagged quantitative survey design, data were collected in two waves (n = 1,554, time 1, and n = 970, time 2). Direct and indirect (mediation) effects were tested through structural equation modelling (SEM) in AMOS. Findings. The results of SEM suggest that HIWPs are positively associated with trust in the employer and employee engagement and negatively associated with POP. The data supported a partial mediation model in which POP mediated the relationship between HIWPs and both trust in the employer and employee engagement levels.Practical implications. HIWPs reduce employees' perceptions of the degree to which their work environment is politicised, enhance employee engagement and develop a more trusting relationship between employee and employer. Originality/value.Perceptions that workplace environments are characterised by political behaviours are ubiquitous and a large body of research has highlighted their detrimental effects on both employees and employers. This is the first study that has examined the potential of HIWPs in reducing such perceptions, which in turn, can foster employee engagement and enhance trust in the employer. Longitudinal studies of the effect HIWPs have on employee perceptions and attitudes are also still scarce.
https://www.emerald.com/insight/content/doi/10.1108/PR-03-2021-0151/full/html

6. **Hameed, K., Shahzad, K., & Yazdani, N.** (2023). Global Incidences of Inclusive Entrepreneurial Ecosystem: Conceptualization and Measurement Framework. *Journal of the Knowledge Economy,* 1-32. **https://doi.org/10.1007/s13132-023-01427-1.** Kamran Hameed, Khuram Shahzad, Naveed Yazdani (Management/HSM) Date of Publication: June 2023 HJRS: Y (Null)
This study introduces a novel concept of inclusive entrepreneurial ecosystem that addresses the backdrops in entrepreneurial ecosystem literature. The inclusive entrepreneurial ecosystem is conceptualized by combining two well-known concepts: inclusive entrepreneurship and the entrepreneurial ecosystem. Combining these two ecosystems enables us to comprehend the interaction between marginalized communities and factors which incorporates both individual and social aspects. Four principles comprise the inclusive entrepreneurial ecosystem: inclusive governance and resources, inclusive policies, inclusive culture, and inclusive markets. This study proposes a conceptual framework and develops an inclusive entrepreneurial ecosystem index for each of the four categories by using multisided platforms of world reputed databases to better understand and empirically investigate the inclusive entrepreneurial ecosystem in the future.
https://link.springer.com/article/10.1007/s13132-023-01427-1

7. **Guo, J., Arshed, N., Hameed, K**. et al. (2023). Leadership EKC augmentation for social wellbeing: an exploration of situational leadership. *Current Psychology,* (2023). https://doi.org/10.1007/s12144-023-04573-6 . Kamran Hameed (Management/HSM) Mubbashir Munir (Economics & Statistics/HSM) Asma Seher (ORIC) Date of Publication: March 2023 HJRS: X (Honorable Mention)
Empirical studies provide a convincing argument that a cleaner environment ensures a better standard of living and has far-reaching economic gains. Researchers have widely tested the Environmental Kuznets Curve (EKC) to identify the link between emissions and economic activity. Still, they majorly ignored exploring the factors that could work as policy interventions in shifting or flattening the EKC curve for human wellbeing. This study has explored selected 50 countries for exploring the potential of leadership in moderating the EKC relationship. The Panel data model results showed that leadership is instrumental in moderating EKC. Some of the prominent indicators, like Team-Oriented Leadership and Participatory Leadership have shown an ability to reduce the net Carbon Dioxide (CO_2) emissions in the economy. Policymakers could inculcate a sustainable/green leadership environment in achieving several Sustainable Development Goals (SDGs).
https://link.springer.com/article/10.1007/s12144-023-04573-6s

8. **Hameed, K., Saher, A., Arshed, N., Abbas, R. Z., & Munir, M. (2023). Does Climate Change Risk and Environmental Quality Influence Macroeconomic Entrepreneurship.** *International Journal of Social Science & Entrepreneurship, 3*(2), 367-386. **Kamran Hameed, Rana Zamin Abbas (Management/HSM) Mubbashir Munir (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: Y (Null)**

The critiques on modernism have challenged the current set of rules of free market societies where demands are fulfilled without considering the adverse consequences of the environment. The business environment has yet to transform to explore modern innovative entrepreneurial solutions to create harmony in the natural ecosystem. Recent studies have separately investigated the role of business growth in economic development and its negative influence on the global environment. This study analyzes global data by analyzing global data to develop a nonlinear relationship between climate change and entrepreneurship. Based on the disruptive innovation theory, we argue that economic activities cause a rise in CO_2 emissions and create opportunities for entrepreneurship. Data has been taken from 45 countries to analyze the impact of climate change on entrepreneurship. The results show a nonlinear relationship exists between climate change and entrepreneurship at the global level. Policy developments are required for a sustainable environment through entrepreneurship.

https://ijsse.salmaedusociety.com/index.php/ijsse/article/view/117/112

9. **Hameed, K., Saher, A., Arshed, N., Abbas, R. Z., & Munir, M. (2023). Does Climate Change Risk and Environmental Quality Influence Macroeconomic Entrepreneurship. International Journal of Social Science & Entrepreneurship, 3(2), 367-386. Kamran Hameed, Rana Zamin Abbas (Management/HSM) Mubbashir Munir (Economics & Statistics/HSM) Date of Publication: April 2023 HJRS: Y (Null)**

The critiques on modernism have challenged the current set of rules of free market societies where demands are fulfilled without considering the adverse consequences of the environment. The business environment has yet to transform to explore modern innovative entrepreneurial solutions to create harmony in the natural ecosystem. Recent studies have separately investigated the role of business growth in economic development and its negative influence on the global environment. This study analyzes global data by analyzing global data to develop a nonlinear relationship between climate change and entrepreneurship. Based on the disruptive innovation theory, we argue that economic activities cause a rise in CO_2 emissions and create opportunities for entrepreneurship. Data has been taken from 45 countries to analyze the impact of climate change on entrepreneurship. The results show a nonlinear relationship exists between climate change and entrepreneurship at the global level. Policy developments are required for a sustainable environment through entrepreneurship

https://ijsse.salmaedusociety.com/index.php/ijsse/article/view/117

10. **Haq, M. Z., & Aslam, H. (2023). Impact of entrepreneurial leadership on supply chain performance: the mediating role of supply chain resilience. Journal of Manufacturing Technology Management, 34(5), 694-712. doi: 10.1108/JMTM-10-2022-0376. Muhammad Zia ul Haq (Management/HSM) Date of Publication: July 2023 HJRS: W (Gold)**

Purpose: The purpose of this study is to discern the role of entrepreneurial leadership (EL) – a dynamic capability – in increasing supply chain performance (SCP), through building supply chain resilience (SCR). The study further suggests that the presence of supply chain orientation (SCO) within a firm will enhance the relationship between EL and SCR. Design/methodology/approach: Dynamic capabilities view is used to develop the hypotheses and a survey method is used to collect data from manufacturing firms in Pakistan. The hypothesized model is tested using structural equation modeling (SEM). Findings: The results in general confirm the hypothesized model. The findings suggest that SCR mediates the relationship between EL and SCP. The results also confirm that SCO moderates the relationship between EL and SCR. Originality/value: This paper contributes by studying the pivotal role of EL in building SCR and sustaining a competitive advantage in an uncertain environment.

https://www.emerald.com/insight/content/doi/10.1108/JMTM-10-2022-0376/full/html

11. **Islam, T., Rizvi, F., Farooq, W., & Ahmed, I. (2023). Employee silence as a response to cronyism in the workplace: the roles of felt violation and continuance commitment. Kybernetes. doi: 10.1108/K-01-2023-0148. Farheen Rizvi (Management/HSM) Date of Publication: September 2023 HJRS: X (Clay)**

Purpose: The practice of cronyism is a pervasive problem for most businesses and a great hindrance for employees, but empirical literature on its outcomes is scant. In light of such gaps, the objective of this study is to examine the relationship between organizational cronyism and employees' silence behavior through the mediating role of felt violation and the moderating role of continuance commitment. Design/methodology/approach: A time-lagged cross-sectional survey comprising 226 respondents is carried out in a metropolitan city of a developing country (Lahore, Pakistan). The respondents were selected using the convenience sampling technique. Findings: The findings reveal that organizational cronyism influences employees' silence (acquiescent and quiescent) both directly and indirectly (via felt violation). However, continuance commitment was noted to work as a boundary condition only between felt violation and

quiescent silence. Research limitations/implications: Although the study deals with common method bias by collecting data in two waves, it may restrict causality. The findings not only have implications for the academicians, but also contribute to the conservation of resources theory. This study suggests organizations develop and implement a comprehensive intervention strategy that focuses on both prevention and damage control as a result of organizational cronyism. Originality/value: Drawing upon the conservation of resources theory, this study adds value to the literature by empirically investigating the outcomes of cronyism at work. Moreover, the outcomes and mechanisms under consideration have largely been ignored in the literature.
https://www.emerald.com/insight/content/doi/10.1108/K-01-2023-0148/full/html

12. **Shahzad, K.**, Hong, Y., Jiang, Y., & Niaz, H. (2023). **Knowledge-Intensive HRM Systems and Performance of Knowledge-Intensive Teams: Mediating Role of Team Knowledge Processes. Group and Organization Management, 48(5), 1430-1466. doi: 10.1177/10596011211063667.** Khuram Shahzad (Management/HSM) Date of Publication: February 2023 HJRS: W (Silver)

This study investigates whether and how knowledge-intensive HRM systems (KIHRS) impact the performance of knowledge-intensive teams (KITs). We integrate the ability-motivation-opportunity theory with the knowledge management literature to hypothesize that KIHRS affect KIT performance through team knowledge exploration and knowledge exploitation processes. A total of 543 responses (408 team members and 135 team leaders) from 135 KIT of 119 firms were collected in two waves with a time lag of 3 months. The findings indicate that KIHRS relate positively to KIT performance. Furthermore, team knowledge exploration and knowledge exploitation work in a sequence to mediate the relationship between KIHRS and KIT performance.
https://journals.sagepub.com/doi/abs/10.1177/10596011211063667

13. **Shahzad, K., Hong, Y., Muller, A., DeSisto, M., & Rizvi, F. (2023a). Correction to: An Investigation of the Relationship Between Ethics-Oriented HRM Systems, Moral Attentiveness, and Deviant Workplace Behavior (Journal of Business Ethics, (2023), 10.1007/s10551-023-05513-x). Journal of Business Ethics. doi: 10.1007/s10551-023-05525-7.** Farheen Rizvi (Management/HSM) Date of Publication: August 2023 HJRS: W (Platinum)

Deviant workplace behaviors (DWB) cause enormous costs to organizations, sparking considerable interest among researchers and practitioners to identify factors that may prevent such behavior. Drawing on the theory of moral development, we examine the role of ethics-oriented human resource management (HRM) systems in mitigating DWB, as well as mechanisms that may mediate and moderate this relationship. Based on 232 employee-supervisor matched responses generated through a multi-source and multi-wave survey of 84 small and medium enterprises (SMEs) in Pakistan, our multilevel analysis found that ethics-oriented HRM systems relate negatively to employee DWB via the mediation of perceptual and reflective moral attentiveness. This indirect relationship is further moderated by two societal-inequality induced factors – employee gender and income level – such that the indirect effects of ethics-oriented HRM systems on DWB through perceptual and reflective moral attentiveness are stronger among women and lower-income employees.
https://link.springer.com/article/10.1007/s10551-023-05513-x

14. **Shuja, A., Awan, M. I., & Saleem, I. (2023). Cotton Web Limited: a journey from disintegrated complaint handling to an efficient and robust e-complaint management system. Emerald Emerging Markets Case Studies, 13(2), 1-19. doi: 10.1108/EEMCS-11-2022-0440.** Aleena Shuja (Management/HSM) Imran Saleem (SPA) Date of Publication: August 2023 HJRS: Y (Null)

Learning outcomes The purpose of this study is to make students understand the logic behind and implications of the "Socio-Technical Imbrication Framework" that can help them understand the importance of aligning workforce motivation and capabilities with the modern technology deployed in the organization. Moreover, students will understand the essentiality and criticality of customer satisfaction for the organization. Case overview/synopsis The technical services operations team at Cotton Web Limited formerly relied on JS Node, e-coordination system, to address customer complaints. There were many bugs in that system as it did not carry along the complaint tracking protocol, was slow in response, fundamentally structured upon manual complaint record keeping that resulted in piling up un-resolved complaints for a longer period of time. The team under the leadership of Mr. Hasan Ali, a competent expert working as GM Research and Data Analytics, undertook detailed analysis of recurring glitches in this system and replaced it with a novel Web-based automated complaint management system at Cotton Web Limited. This entire diagnosis and intervention process took almost three months till completion. The case is written for use in courses in the curriculum of BBA, BBIS, BSIT and BSCS programs at undergraduate level. It is most suitable for the courses in leadership, change management, business process reengineering, soft engineering, team building and business communication. Complexity academic level The case is suitable for teaching at Undergraduate level to the students of BBIS, BBA, BSCS and BSIT students in the last year of their degree programs. Teaching faculty can use case-based methodology for student learning by putting them into a real-life situation faced by an organization and letting them think critically and identify following points for further discussion and clarity: individual or in groups; problem identification through discussion; the stakeholders involved in the company's

situation through presentation or one-pager presentation; case analysis with reaching best solution to prevailing issue at hand through group discussion; reaching a decision or solution with reasonable logic and justification through group discussions; and create further dilemma on the basis of questions unanswered within this case story.

https://www.emerald.com/insight/content/doi/10.1108/EEMCS-11-2022-0440/full/html

15. **Shuja, A., & Shuja, A. (2023). Inter-Organizational Relationships and Perceived Innovation Performance: The Moderating Role of Social Capital and Mediating Role of Knowledge Sharing. Pakistan Journal of Commerce and Social Science, 17(1), 162-190. Aleena Shuja (Management/HSM) Date of Publication: March 2023 HJRS: X (Null)**

This study aims to analyze the role of inter-organizational relationship in boosting innovative performance of ICT enterprises through knowledge sharing supported by social capital. Gaining sustenance from Dynamic Capability View (DCV), the study investigates perceived enterprises' innovation performance as a result of inter-organizational relationships embedded with social ties and knowledge sharing among each other. Cross-sectional data were collected from managerial level employees working in ICT enterprises in Pakistan. The study findings based on Process Hayes Macro regression analysis using SPSS stated that the ICT businesses in knowledge hub are collaborating to build strong social relationships while sharing practical experiences and support each other through abstract resources for achieving higher levels of innovative outcomes. Inter-organizational relationships have an affirmative impact on innovation performance, invariably, knowledge sharing mediates the correlation between both. The influence of inter-organizational relationships on innovation performance through knowledge sharing is significant for firms with strong social capital. Consistently, social capital considerably moderates the relationships, as such organizations co-ordinate and work jointly with other organizations for driving service and product improvements. The research contributes by steers focus towards developing relationships among ICT enterprises, building ties based on faith and exchanging key information consistently to help and polish each other's innovation capabilities. Strong social ties among ICT enterprises will help acquire and capitalize on diverse knowledge to improve their innovation performance.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4436739

16. **Usman, S. M., Bukhari, F. A. S., Zubair, M., You, H., Shahzad, F., & Khan, M. A. (2023). Financing Decisions and the Role of CSR in Donation-Based Crowdfunding: Evidence from Pakistan and Indonesia. Business and Information Systems Engineering. doi: 10.1007/s12599-023-00827-6. Muhammad Zubair (Management/HSM) Date of Publication: August 2023 HJRS: W (Gold)**

Donation-based crowdfunding and corporate social responsibility (CSR) activities have potential symbiotic ramifications to raise funds, but campaigners are confronted with challenges and competition to accomplish their charitable target. For instance, CSR activities could warrant the possibility of using crowdfunding to raise money. On the other hand, a company's CSR objectives can be achieved by using crowdfunding to micro-fund various social initiatives. Current research investigates the relationship between fundraisers in donation-based crowdfunding activities, which become potential CSR activities. Exclusively, the study analyzes the correlation among the value raised at the end of fundraising activity, the amounts targeted by the fundraiser, and CSR-Type activities on the project's success in donation-based crowdfunding. Based on this, a research taxonomy has been established for a comparative analysis between Pakistan and Indonesia. Secondary data is collected from donation-based platforms and analyzed through Ordinary Least Square (OLS) regression and the models are validated using a robustness check. The outcomes show that a higher value raised (V) correlates more positively with project success in Pakistan (164) as compared with Indonesia (122). The Target fund (T) has a significant and negative association with the project's success in the Pakistani market, however, the significant and negative effect on the project's success in the Indonesian market. Lastly, CSR-related activities such as education, environment, community, and health have a positive relationship with project success in Pakistan, except for the product which has a negative, however significant relationship. In contrast, for Indonesia, CSR-type activities such as education, environment, community, product, and health have a positive and significant relationship with the project's success. This study contributes to the donation-based crowdfunding literature to develop a vivid understanding of different CSR activities and their impact on the project's success. The current study is one of the first to examine the significance of CSR activities and will enrich the body of knowledge regarding crowdfunding in diverse economies.

https://link.springer.com/article/10.1007/s12599-023-00827-6#Abs1

17. **Waheed, M., Kausar, A. R., & Ali, S. A. (2023). Configuration of Agile Operant Resources in Family Firms Through Stakeholders Partnership. Global Business Review. doi: 10.1177/09721509231160876. Mehreen Waheed, Abdul Rashid Kausar, Syed Ahmad Ali (Management/HSM) Date of Publication: August 2023 HJRS: X (Honorable Mention)**

Family firms are often recognized as wealthy in resources, especially in operant resources. These resources are hidden and play a phenomenal role in sustainable development. Fewer studies are available to spotlight the

role of operant resources. This study aims to surface the magnificent hidden role of agile operant resources that facilitate the diverse needs of stakeholders in family firms. Data for this study were collected using in-depth interviews with complementary observations. Almost 29 interviews were considered with the owners of family firms from Pakistan. Interviews were translated and transcribed. Gioia Methodology is used to develop broader themes for discussion in terms of first-order concepts, themes and aggregate dimension that explained the mystical hidden role of agile operant resources in family firms. Research findings portrayed that Collaborative Capability, Reputational Resources, Religious Resources and Relationship Proneness are the agile operant resources which strengthen stakeholder's partnership in family businesses. The authors proposed a conceptual model for highlighting the pertinent role of agile operant resources that facilitate stakeholder partnership in family-owned businesses (FOBs). Recent study provides the conceptual framework to academia for future research in the literature of family firms. FOBs may adopt all these agile operant resources to cater firm diverse stakeholder partnerships in today's business world. It will open new avenues of growth and innovation for FOBs. This research can apply to all FOBs.

https://journals.sagepub.com/doi/abs/10.1177/09721509231160876

18. **Waheed, M., & Waseem, A.** (2023). **Exploring the Role of Experiential Learning on Individual Adaptive Competencies. Vision. doi: 10.1177/09722629231169111.** Mehreen Waheed, Ansar Waseem (Management/HSM) Date of Publication: July 2023 HJRS: X (Clay)

The purpose of this study is to explore the role of the experiential learning process in nurturing individual adaptive competencies. Another aim is to understand the process of individual learning and ascertain the role of conceptual learning in the experiential learning process. This research is based on a qualitative research paradigm. It is an exploratory nature of the study. The unit of analysis is the process of experiential learning taking place in the medical discipline. The case study is used as a research methodology to establish an in-depth understanding of the phenomenon (experiential learning process) through subjective perspectives of informants' lived experiences. For data collection, semi-structured interviews were conducted. Data are analysed through the grounded theory method. It is inferred that experiential learning creates individual adaptive competencies in terms of delivered competencies, strong decision-making abilities, enhance confidence level and problem-solving ability, expert learning, generative competencies, reinforcement of experiences, and professional grooming. These dimensions are validated through the subjective saturated shreds of evidence of informants. This study has importance for both academics and practitioners alike. For academics, it provides a conceptual storyline about how individuals learn based on their experiences then the integration of experiences leads towards experiential learning. For practitioners, it supports how academia and practical learning are integrated to enhance individual learning competencies. Practical exposure of experiences serves as the fundamental tool for learning new knowledge.

https://journals.sagepub.com/doi/abs/10.1177/09722629231169111

19. **Waseem, A., Rashid, Y., & Kausar, A. R.** (2023). **Composition-based strategy and firm's performance: the mediating role of competitive advantage. International Journal of Globalisation and Small Business, 13(3), 291-314. doi: 10.1504/IJGSB.2023.130346.** Ansar Waseem, Yasir Rashid, Abdul Rashid Kausar (Management/HSM) Date of Publication: April 2023 HJRS: Y (Null)

The resource-based view (RBV) has been the dominant strategic perspective to study the growth of firms. However, few believe that RBV is more suited for large organisations as its central tenants are not aligned with the characteristics of small firms. Thus, a composition-based view (CBV) is an alternative perspective to studying the survival and growth of small and medium enterprises in emerging economies. Very little empirical work has been done using this strategic perspective. This paper attempts to test the central propositions of CBV by developing a causal mechanism that links composition-based strategy with a firm's performance through competitive advantage. For this purpose, data were collected from 150 owners/managers of different retail stores located in Lahore, Pakistan. Findings indicate that composition-based strategy is positively and significantly related to both firm's performance and competitive advantage. Moreover, competitive advantage mediates the underlying relationship between composition-based strategy and the performance of firms. These results provide interesting insight to both academics and managers. Academics may further explore composition-based strategy as a determinant of competitive advantage and firm's performance. Similarly, managers of small firms may pursue a composition-based strategy to attain multiple sources of competitive advantage and exploit them to achieve superior performance.

https://www.inderscienceonline.com/doi/abs/10.1504/IJGSB.2023.130346

20. **Yaqoob, S., Ishaq, M. I., Mushtaq, M., & Raza, A.** (2023). **Family or otherwise: Exploring the impact of family motivation on job outcomes in collectivistic society.** *Frontiers in Psychology,* **14. doi: 10.3389/fpsyg.2023.889913.** Samina Yaqoob, Mamoona Mushtaq (Management/HSM) Date of Publication: March 2023 HJRS: W (Silver)

The motive of the current research is to determine the influence of family motivation on intent to leave and job performance using self-determination theory. Moreover, this study also explores the moderating role of

collectivistic culture and the mediating role of psychological meaningfulness on the relationship between family motivation and work outcomes. The data (N = 175) were collected from paramedical staff working in Pakistani public hospitals, and data was analyzed using PROCESS method. The findings revealed that family motivation enhanced employee job performance and lessened employees' intent to leave. At the same time, family motivation and psychological meaningfulness are stronger in highly collectivistic cultures compared to less collectivist cultures. This study extends the investigation of the newly developed construct of family motivation by focusing on psychological meaningfulness and collectivistic culture. Moreover, this study is the first to introduce psychological meaningfulness as a mediator and collectivistic culture as a moderator for the relationship between family motivation and employee job outcomes. This study provides several critical insights for the hospitals by exploring the importance of family motivation as a potential motivational resource for maintaining high employee job-performance levels and lessening the intent of employees to leave. https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2023.889913/full

21. **Ahmad, B., Ayub, U., Kausar, A. R., & Rashid, S. (2023). Knowledge spillovers and entrepreneurial ecosystem: A systematic literature review.** *Knowledge Management & E-Learning,* **15(4), 575–599. https://doi.org/10.34105/j.kmel.2023.15.033.** Bilal Ahmad, Umer Ayub, Abdul R. Kausar (Management/HSM) Date of Publication: December 2023 HEC W Category

The purpose of this study was to synthesize the literature that has been established on the interrelationship of "knowledge spillovers and entrepreneurial ecosystem" through a systematic literature review. The query strings generated 85 articles, of which 51 were selected for final review. The analysis was performed using MySLR software that uses the Latent Dirichlet Allocation (LDA) method, and the effectiveness was measured through the perplexity score and coherence value of the topics. The results reveal that although a plethora of literature is available on these two topics individually, the mutual relationship between these two concepts is understudied. A stronger research interest was observed after 2018 which indicates the infancy of the topic as a whole, which is yet to be explored and empirically tested, specifically in developing economies. Most of the research was focused on the role of universities, innovation, geographic dynamics and policies with respect to entrepreneurial ecosystems. Results reveal the disparity of knowledge spillovers with regard to other contributors; significantly lesser attention was paid to its role in relation to the entrepreneurial ecosystem. Along with critical analysis and synthesis of literature, future directions have also been presented in the paper. https://www.kmel-journal.org/ojs/index.php/online-publication/article/view/566

22. **Kanwal, F., Ayub, U., & Rathore, K. (2023). Triple Bottom Line Corporate Sustainability and Organizational Performance: The Mediation of Employees Work Engagement.** *Journal of Quantitative Methods,* **7(2), 1-34. https://doi.org/10.29145/jqm.0702.01.** Umer Ayub (Management/HSM) Date of Publication: December 2023 HEC Y Category

Management scholars are currently focusing on designing research that could cater the big issues of 21st century organizations including sustainability. Current research uses and extends Triple Bottom Line perspective that conceptualizes sustainability as comprising of economic, social and environmental dimensions. Though most of the previous research has focused on sustainability as a consequence of innovation and quality, present research contributes to literature by studying corporate sustainability as an antecedent of quality performance and innovation performance. Employees' work engagement has also been incorporated in the framework as a potential mediator. To test the conceptual framework, a positivist research philosophy was utilized with cross-sectional design and quantitative approach via structured questionnaires. Data was collected from Iron and Steel Industry of Pakistan that has second highest growth rate for year 2017-18, and the responses aggregated to 216 in number. Structural equation modeling was used to validate the constructs through measurement model, and to test the hypotheses through structural model. The results revealed that corporate sustainability (economic, social and environmental) positively influences organizational performance (quality and innovation performance), and employees' work engagement partially mediates this relationship. In Pakistan, the GDP and the cost of environmental degradation are increasing simultaneously. Current research offers a solution to this problem through suggesting that adopting sustainable practices can help resolve country's environmental issues without taking a toll on organizational performance. It also explains that corporate sustainability leads to organizational performance through employees' work engagement, thus providing an effective way to enhance employees' work engagement as well. https://ojs.umt.edu.pk/index.php/jqm/article/view/1563

Department of Marketing

1. **Ahmad, W., Jafar, R. M. S., Waheed, A., Sun, H., & Kazmi, S. S. A. S. (2023). Determinants of CSR and green purchase intention: Mediating role of customer green psychology during COVID-19 pandemic.** *Journal of Cleaner Production,* **389, 135888. doi: https://doi.org/10.1016/j.jclepro.2023.135888.** Abdul Waheed (Marketing/HSM) Date of Publication: February 2023 HJRS: W (Platinum)

COVID-19 is a viral disease also comprehended as a coronavirus pandemic that has compelled the world to revisit business strategies to encounter COVID-19 challenges. Over the last decade, ample research has been accomplished on corporate social responsibility (CSR) and circular economy. Nevertheless, a key research gap requires to be filled that how CSR can perform a foremost role in engaging stakeholders like consumers during the COVID-19 era. Drawing from the stakeholder theory, this research endeavors to probe CSR's impact on green purchase intention (GPI) with mediating role of green psychology (GP). Data for the study were gathered from mainland China employing convenience sampling and examined by utilizing SEM (Structural Equation Model). First, the study indicated a direct relationship between CSR and GPI as well as between CSR and GP within three streams, i.e., green trust (GT), green satisfaction (GS), and green perceived value (GPV). It is found that GT, GS, and GPV positively influence GPI whereas the positive mediating relationships of each GP factor were autonomously observed between CSR and GPI, respectively. This research can improve the understanding of the enterprises about consumers and how incorporating green activities may enhance consumers' GPI and GP during the COVID-19 pandemic. This study addresses numerous interesting and insightful implications for strategic management together with certain possibilities for prospective researchers. https://www.sciencedirect.com/science/article/pii/S095965262300046X

2. **Shahid, K., Yang, Q., Waheed, A., & Arif, F. (2023). Insights into consumers: exploring the impact of brand coolness on consumers' brand engagement with intervening role of brand love.** *International Journal of Information Systems and Change Management,* **13(2), 131–147. doi: 10.1504/ijiscm.2022.129259. Abdul Waheed, Farrah Arif (Marketing/HSM) Date of Publication: February 2023 HJRS: Y (Null)**

The goal of this study is to explore the relationships between brand coolness (BrC) and consumers' brand engagement (CBE) employing consumers' brand love (CBL) as a mediation within the realm of the hospitality industry of China. A systematised questionnaire was formed and stretched amongst 530 respondents to accomplish the responses. A total of 493 questionnaires were ultimately deemed and gauged using confirmatory factor analysis along with a structural model (SEM). The findings proved that BrC components such as attractiveness, rebelliousness, usability, desirability, reliability, and innovativeness of technology have a connection with CBE of the consumers. Brand love ensured the tie between BrC and CBE in the present instant. This study equips the ample indications and recommendations for service-oriented sectors, specifically the hospital industry. This study ought to contribute a substantial role in positioning the hospitality image as a brand to build up deeper interactions with consumers. This paper struggles to stimulate the perception of BrC, CBE, and brand love pointing out multifarious fascinating implications for hospitality management. Besides, work prospects are reported along with the lines of the current study drawbacks. https://dl.acm.org/doi/abs/10.1504/ijiscm.2022.129259

3. **Ahmad, W., Waheed, A., Arif, F., Jafar, R. M. S., & Fatima, N. (2023). Exploring the linkage between service quality and customer satisfaction in the Chinese air industry during the COVID-19 pandemic.** International *Journal of Electronic Customer Relationship Management,* **14(1), 1-19. https://doi.org/10.1504/IJECRM.2023.131076. Abdul Waheed, Farrah Arif (Marketing/HSM) Date of Publication: May 2023 HJRS: Y (Null)**

Most companies of the world have been affected by the COVID-19 pandemic and lockdown. Only healthcare and necessary personnel were permitted during the early stages of the epidemic to come out of their homes. This article aimed to examine the airline industry's service quality in China for the period of the COVID-19 pandemic using the AIRQUAL scale. The questionnaire consisted of 58 items and was completed by 1,002 people being selected using convenience sample method. The causal linkages among AIRQUAL dimensions, COVID-19 safety procedure, and customer satisfaction (CS) were determined by employing SEM. The results revealed that six dimensions, i.e., terminal tangibles, airline tangibles, image, empathy, and COVID-19 protocols have a positive direct effect on CS in terms of Chinese airline industry. Furthermore, personnel service has a substantial detrimental impact on CS. This research is one of the pioneers that investigated the quality of airline service during the COVID-19 era. The results may offer the government an assessment for the aviation industry's adherence to the COVID-19 procedures. https://www.inderscienceonline.com/doi/epdf/10.1504/IJECRM.2023.131076

4. **Guo, L., Sun, D., Warraich, M. A., & Waheed, A. (2023). Does industry 5.0 model optimize sustainable performance of Agri-enterprises? Real-time investigation from the realm of stakeholder theory and domain.** *Sustainable Development.* **https://doi.org/10.1002/sd.2527. Abdul Waheed (Marketing/HSM) Date of Publication: August 2023 HJRS: W (Platinum)**

The research on Industry 5.0 (i5.0) is relatively new and emerging therefore professionals are still striving to reveal its influence globally. This study investigates the impact of industry 5.0 to comprehend the insights into how it optimizes the sustainable performance (STP) within three core streams, that is, economic, environmental, and social perspectives from the realm of stakeholder theory within the Chinese agricultural industry. The results stated that i5.0 positively affects the STP of Agri-enterprises. The empirical testing additionally affirmed the positive nexus of i5.0 practices toward each dimension of STP such as social,

environmental, and economic perspectives based on structural equation modeling. First, it found that i5.0 has a positive correlation with the economic perspective. Second, the findings affirmed the positive linkage between i5.0 and the social perspective. Finally, the study indicated a significant correlation between i5.0 and the environmental perspective. This study provides real-time empirical evidence for the management of Agri-enterprises regarding i5.0 and insights into the embodiment of such capabilities to optimize enterprise STP by incorporating i5.0 model. This study presents several theoretical and managerial enrichments for Agri-enterprises along with future avenues for the researchers to test the i5.0 capabilities toward rest of the sectors across the world.

https://onlinelibrary.wiley.com/doi/full/10.1002/sd.2527

5. **Rehman, S. U., Usman, M., Fernando, Y., Kamarudin, D., & Waheed, A. (2023). Improving manufacturing supply chain performance: nexus of industrial Internet of Things, blockchain technology and innovativeness. Journal of Science and Technology Policy Management. doi: 10.1108/JSTPM-12-2021-0191. Abdul Waheed (Marketing/HSM) Date of Publication: July 2023 HJRS: X (Honorable Mention)**

Purpose – This paper aims to model the mediating effects of facilitating conditions and innovativeness in the industrial Internet of Things (IIoT) and blockchain technology (BT) on manufacturing supply chain performance (MSCP). Design/methodology/approach – Partial least square structural equation modelling was used to test the goodness of the model fit and hypotheses by using SmartPLS 3.3.3. Data was collected from 464 managers in Pakistan's automotive industry through a stratified random sampling technique. Findings – IIoT, BT, facilitating conditions and innovativeness significantly enhanced the MSCP. Therefore, the mediation between facilitating conditions and innovativeness to IIoT and BT adoption was significant in the MSCP. Practical implications – The adoption of digital technology to improve the MSCP can assist companies in reducing the cost of complex procurement, production and distribution processes through secured and efficient operations. Furthermore, organisations must establish a conducive atmosphere that fosters experimentation, collaboration and resource allocation towards technological advancements to capitalise on the advantages of these technologies effectively. Originality/value – This study developed a research model integrating IIoT technology, BT, facilitating conditions and innovativeness to determine the MSCP under the resource-based view theory. The outcome of this study could help organisations design a framework to improve supply chain performance by integrating innovativeness.

https://www.emerald.com/insight/content/doi/10.1108/JSTPM-12-2021-0191/full/html

6. **Waheed, A., Shahid Khan, M., Warraich, M. A., & Ali, M. A. (2023). Environmental policy vs. Environmental innovation: An examination of policies disclosure on sustainable development from stakeholder theory perspective. Sustainable Development. doi: 10.1002/sd.2782. Abdul Waheed (Marketing/HSM) Date of Publication: October 2023 HJRS: W (Platinum)**

Studying environmental policy (EnP) and environmental innovation (EnI) is a crucial domain for addressing global challenges such as climate change, resource depletion, and pollution. It equips the corporates with the knowledge and tools to develop effective strategies, regulations, and technological advancements that can mitigate environmental impact and promote sustainable practices for the benefit of current and future generations. This study attempts to uncover the influence of both EnP and EnI toward sustainable development (SD) within three dimensions, that is, social aspect, economic aspect, and environmental aspect from Chinese multinational enterprises (MNEs). A total of 723 documents were considered for data analysis using the SEM method and SmartPLS tool. The outcomes of the study are found interesting and fruitful where firstly a positive connection between EnP and SD was affirmed within Chinese MNEs. Second, the study found a positive nexus between EnI and SD, respectively. The findings highlight the insights by demonstrating EnP and EnI can help attain ultimate output and can strengthen SD of the Chinese MNEs. Additionally, this study offers several thought-provoking and useful managerial recommendations as well as implications for both theoretical and managerial issues. Moreover, some possible opportunities are reported for future researchers by assuming the current flaws to carry out more research both within the Chinese market and rest of the regions, worldwide.

https://onlinelibrary.wiley.com/doi/full/10.1002/sd.2782

7. **Yuan, J., Shahzad, M. F., Waheed, A., & Wang, W. (2023). Sustainable development in brand loyalty: Exploring the dynamics of corporate social responsibility, customer attitudes, and emotional contagion. Corporate Social Responsibility and Environmental Management. doi: 10.1002/csr.2621. Abdul Waheed (Marketing/HSM) Date of Publication: September 2023 HJRS: W (Platinum)**

Corporate social responsibility (CSR) significantly bolsters brand loyalty by demonstrating a company's commitment to societal and environmental well-being. This article investigates the link between brand loyalty based on consumer perception and CSR. The study looks at the effects of unfavorable perceptions of CSR initiatives and how emotional contagion affects brand loyalty. The results emphasize the importance of CSR and how it influences consumer attitudes toward brands. To this end, this study particularly targeted young consumers for adopting a sample of this study. The findings reveal that brand disloyalty can be caused by

negative attitudes toward a company's CSR initiatives, and brand perception can amplify this effect. The study emphasizes how crucial it for businesses is to demonstrate dedication to sustainability and environmental stewardship to sustainable environmentally conscious clients. However, the geographical sampling size and sampling methods are the research's limitations, which should be considered by the researchers in the future for additional validation and contribution.

https://onlinelibrary.wiley.com/doi/full/10.1002/csr.2621

8. **Zakir, F., Wang, D., Rehman, A., & Waheed, A. (2023). Supply Chain Process Improvement for International Airline Industry. Journal of Engineering, Project, and Production Management, 13(1), 10-19. doi: 10.32738/JEPPM-2023-0002. Abdul Waheed (Marketing/HSM) Date of Publication: January 2023 HJRS: Y (Null)**

In the aviation sector, supply chain management is critical for reducing operating costs. The performance of a corporation is determined by how successfully it implements the supply chain strategy. This research aims to propose the improvement in the field of business process improvement (BPI) and supply chain management (SCM) processes in the international airline industry. Improvisation of efficient SCM has dramatically changed the way organizations conduct business by implementing procedures that can improve process efficiency, reduce costs, and improve the organization's performance. This paper leads to formulating the concept of an effective model of the SCM process for Pakistan Int. Airlines (PIA) taken as an example and obtained results can be implemented on any international airline as well. BPI provides competent strategies for the target organization keeping in view the implementation of the proposed SCM model. Simulation analysis is executed using the ARENA software tool to analyze the performance of the proposed model. Ttest has been taken into account to demonstrate the competency of the proposed SCM model. It is observed that the implementation of effective business techniques in the SCM process can lead to enhancing the efficiency of a target organization.

https://www.airitilibrary.com/Article/Detail/22238379-N202301110019-00002

Department of Information System

1. **Ashraf, M., Abid, F., Din, I. U., Rasheed, J., Yesiltepe, M., Yeo, S. F., & Ersoy, M. T. (2023). A Hybrid CNN and RNN Variant Model for Music Classification. *Applied Sciences (Switzerland), 13*(3). doi: 10.3390/app13031476. Fazeel Abid (IS/HSM) Date of Publication: February 2023 HJRS: W (Bronze)**

Music genre classification has a significant role in information retrieval for the organization of growing collections of music. It is challenging to classify music with reliable accuracy. Many methods have utilized handcrafted features to identify unique patterns but are still unable to determine the original music characteristics. Comparatively, music classification using deep learning models has been shown to be dynamic and effective. Among the many neural networks, the combination of a convolutional neural network (CNN) and variants of a recurrent neural network (RNN) has not been significantly considered. Additionally, addressing the flaws in the particular neural network classification model, this paper proposes a hybrid architecture of CNN and variants of RNN such as long short-term memory (LSTM), Bi-LSTM, gated recurrent unit (GRU), and Bi-GRU. We also compared the performance based on Mel-spectrogram and Mel-frequency cepstral coefficient (MFCC) features. Empirically, the proposed hybrid architecture of CNN and Bi-GRU using Mel-spectrogram achieved the best accuracy at 89.30%, whereas the hybridization of CNN and LSTM using MFCC achieved the best accuracy at 76.40%.

https://www.mdpi.com/2076-3417/13/3/1476

2. **Farooque, G., Xiao, L., Sargano, A. B., Abid, F., & Hadi, F. (2023). A dual attention driven multiscale-multilevel feature fusion approach for hyperspectral image classification. *International Journal of Remote Sensing, 44*(4), 1151-1178. doi: 10.1080/01431161.2023.2176721. Fazeel Abid (IS/HSM) Date of Publication: February-March 2023 HJRS: W (Silver)**

Deep learning has achieved promising results for hyperspectral image (HSI) classification in recent years due to its hierarchical structure and automatic feature extraction ability from raw data. The HSI has continuous spectral information, allowing for the precise identification of materials by capturing minute spectral differences. Convolutional neural networks (CNNs) have proven to be effective feature extractors for HSI classification. However, inherent network limitations prevent them from adequately mining and representing the sequence attributes of spectral signatures and learning critical and valuable features from both spectral and spatial dimensions simultaneously. This paper proposes a deep learning-based framework called a novel dual attention-based multiscale-multilevel ConvLSTM3D (DAMCL) to address these challenges. In this work, our contribution is threefold; firstly, a dual attention mechanism is proposed, effectively learning critical and valuable features from spectral and spatial dimensions. Secondly, multiscale ConvLSTM3D blocks can learn the discriminative features alongside handling long-range dependencies of spectral data. Thirdly, these features are combined by a multilevel feature fusion approach to maximize the impact of features learned at different levels. To assess the performance of the proposed method, extensive experiments are carried out on five different

benchmark datasets containing complex and challenging land cover classes. The results confirm that the proposed method outperforms state-of-the-art techniques with a small number of training samples in terms of overall accuracy (OA), average accuracy (AA), and Kappa (k)(�). The overall accuracy of 98.88%, 99.42%, 99.20%, 95.37%, and 92.57% is achieved over the Indian Pines, Salinas Valley, University of Pavia, Houston 2013, and Houston 2018 datasets, respectively.
https://www.tandfonline.com/doi/full/10.1080/01431161.2023.2176721

3. **Saleem, I.,** Jamil, A., & Mehmood, M. A. (2023). **Employing Sentiment Analysis to Enhance Customer Relationships for Mobile Phone Operators Working in Pakistan.** *Journal of Applied Research and Multidisciplinary Studies, 4*(1). https://doi.org/10.32350/jarms.41.09. **Imran Saleem (IS/HSM) Date of Publication: July 2023** HJRS: Y (Null)
Customer relationship management (CRM) is a process through which a company or organization manages its contacts and coordinates with customers, usually by analyzing vast volumes of data. CRM systems collect information from a variety of sources, such as a company's website, phone, email, live chat, marketing materials, and, more recently, social media. Active coordination with the customers is the key to improving the quality of service being provided by a business. Social media has been proven a great tool for accessing and awareness of public opinion regarding a particular topic and opinion forming. Thus, CRM enables organizations to gain a better understanding of their target audiences and how to best respond to their demands, resulting in client retention and sales growth. Sentiment analysis can be characterized as a qualitative approach to data mining that recognizes and separates subjective data as a source, to help an organization understand public opinion regarding the service and products it offers. In this study, Twitter data is analyzed to perform sentiment analysis, for enhancing the quality of service provided by Mobile Phone operators working in Pakistan. After the analysis, the produced results will be very helpful for the Mobile Phone Operators to make smart decisions for enhancing their Customer Relationship Management concerning quality-of-service improvement.
https://journals.umt.edu.pk/index.php/jarms/article/view/4336

4. **Gujjar, M. A., Khan, H. W.,** Raza, U. A., **Abid, F.,** Ashraf, M., & **Shah, A. R.** (2023). **A Bidirectional Long Short-Term Memory Network and Bidirectional Encoder Representations from Transformers for Cyber-Bullying Detection.** *VAWKUM Transactions on Computer Sciences,11 (1).* **Muhammad Arslan Gujjar, Hamza Wazir Khan, Fazeel Abid, Abdul Rehman Shah (IS\HSM) Date of Publication: Jan- June 2023** HJRS: Y (Null)
Social media has brought people from all around the world to one place to share their feelings, thoughts, and emotions with their close ones. However, using social media Cyberbullying involves harming social masses emotionally and sharing threatening content. Further, social media has become the spotlight of cyberbullying to down someone emotionally or physically with the use of aggressive words, abusive language, or even by the user of power. Machine and Deep learning models outperform to detect of cyberbullying, We Utilized Multiple Algorithms such as Naïve Bayes, Bi-directional long short-term memory (Bi-LSTM), and BERT (Bi-Directional Encoder Representation from Transformers) models, to detect bullying tweets using the pre-trained model of word2vec embeddings. This work efficiently reveals the techniques for the detection of cyberbullying over social platforms by classifying tweets for cyberbullying into five different classes: 1-Racism, 2-Age, 3-Gender, 3-Ehtnicity, 4-Not Bullying, 5-Other Bullying. The work in this paper will identify and provide cyberbullying in text, videos, pictures, and audio as an automatic tool to detect bullying and prevent the public from bullying using social media. We evaluate the model through a baseline model using the naive Bayes on the Twitter dataset. The baseline model compared with the proposed Bi-Directional LSTM using the same dataset which surpasses the baseline and achieves higher accuracy.
https://vfast.org/journals/index.php/VTCS/article/view/1526

5. **Ghaffar, A., Abid, F.,** Ashraf, M., Jamil, A., Abbas, A., & Malik, F. R. (2023). **Identification of an Optimized Google PageSpeed Audit-Rule-Sequence to Optimize Page Speed.** *VAWKUM Transactions on Computer Sciences, 11*(1) 123–137. **Abdul Ghaffar, Fazeel Abid (IS\HSM) Date of Publication: Jan- June 2023** HJRS: Y (Null)
World Wide Web is a collection of online resources and websites including e-commerce, social sites, educational content, etc. To find relevant online resources, people search these by using search engines by providing their desired keywords. After filtering those keywords, search engine list the most relevant websites which are more optimized and efficient in terms of loading speed. Search engine optimization is a set of techniques used to make a website optimized and relevant to those keywords, and set the rank of a website. An online resource or website will be on the top of the search result set if it has a higher rank in search engines. Page speed is one of the most important on-page search engine optimization techniques that is used to make web site efficient in load time, so the user will get the content of the websites in a minimum time. Google has set page speed as the main factor in a higher ranking in search engines. Getting higher page speed is not an easy task, as several performance matrices must be optimized to get efficient loading time. There are many audit rules which are irrelevant or have less impact on the performance score. So selection of audit rules to be

optimized is one of the main decisions before starting page speed optimization work. It will waste of time to investigate audit rules for their impact on performance scores. In this paper, we have analyzed all of the audit rules and identified the most important and relevant audit rules in optimizing page speed. A tool is used to generate the best sequence of relevant audit rules based on weighted performance benefit scores in the execution of each audit rule. The same audit rule sequence is applied on five different websites and is found more than 80% improvement in performance scores by applying the first three audit rules only and above 90% performance score obtained by using the first five to seven audit rules in our proposed audit rules sequence.
https://vfast.org/journals/index.php/VTCS/article/view/1329

6. **Abid, F.,** Alam, M., Alamri, F. S., & **Siddique, I. (2023). Multi-directional gated recurrent unit and convolutional neural network for load and energy forecasting: A novel hybridization.** *AIMS Mathematics,* **8(9), 19993-20017.** Fazeel Abid (IS\HSM) Imran Siddique (Mathematics/SSC) Date of Publication: June 2023 **HJRS: W (Honorable Mentioned)**

Energy operations and schedules are significantly impacted by load and energy forecasting systems. An effective system is a requirement for a sustainable and equitable environment. Additionally, a trustworthy forecasting management system enhances the resilience of power systems by cutting power and load-forecast flaws. However, due to the numerous inherent nonlinear properties of huge and diverse data, the classical statistical methodology cannot appropriately learn this non-linearity in data. Energy systems can appropriately evaluate data and regulate energy consumption because of advanced techniques. In comparison to machine learning, deep learning techniques have lately been used to predict energy consumption as well as to learn long-term dependencies. In this work, a fusion of novel multi-directional gated recurrent unit (MD-GRU) with convolutional neural network (CNN) using global average pooling (GAP) as hybridization is being proposed for load and energy forecasting. The spatial and temporal aspects, along with the high dimensionality of the data, are addressed by employing the capabilities of MD-GRU and CNN integration. The obtained results are compared to baseline algorithms including CNN, Long Short-Term Memory (LSTM), Bidirectional Long Short-Term Memory (Bi-LSTM), Gated Recurrent Unit (GRU), and Bidirectional Gated Recurrent Unit (Bi-GRU). The experimental findings indicate that the proposed approach surpasses conventional approaches in terms of accuracy, Mean Absolute Percentage Error (MAPE), and Root Mean Square Error (RSME).
http://www.aimspress.com/aimspress-data/math/2023/9/PDF/math-08-09-1019.pdf

School of Systems & Technology (SST)
Department of Computer Science

1. **Abosaq, H. A.,** Ramzan, M., Althobiani, F., Abid, A., **Aamir, K. M., Abdushkour, H., . . . Rahman, S. (2023). Unusual Driver Behavior Detection in Videos Using Deep Learning Models.** *Sensors,* **23(1). doi: 10.3390/s23010311.** Muhammad Ramzan, Adnan Abid (Computer Science\SST) Date of Publication: January 2023 **HJRS: W (Bronze)**

Anomalous driving behavior detection is becoming more popular since it is vital in ensuring the safety of drivers and passengers in vehicles. Road accidents happen for various reasons, including health, mental stress, and fatigue. It is critical to monitor abnormal driving behaviors in real time to improve driving safety, raise driver awareness of their driving patterns, and minimize future road accidents. Many symptoms appear to show this condition in the driver, such as facial expressions or abnormal actions. The abnormal activity was among the most common causes of road accidents, accounting for nearly 20% of all accidents, according to international data on accident causes. To avoid serious consequences, abnormal driving behaviors must be identified and avoided. As it is difficult to monitor anyone continuously, automated detection of this condition is more effective and quicker. To increase drivers' recognition of their driving behaviors and prevent potential accidents, a precise monitoring approach that detects abnormal driving behaviors and identifies abnormal driving behaviors is required. The most common activities performed by the driver while driving is drinking, eating, smoking, and calling. These types of driver activities are considered in this work, along with normal driving. This study proposed deep learning-based detection models for recognizing abnormal driver actions. This system is trained and tested using a newly created dataset, including five classes. The main classes include Driver-smoking, Driver-eating, Driver-drinking, Driver-calling, and Driver-normal. For the analysis of results, pre-trained and fine-tuned CNN models are considered. The proposed CNN-based model and pre-trained models ResNet101, VGG-16, VGG-19, and Inception-v3 are used. The results are compared by using the performance measures. The results are obtained 89%, 93%, 93%, 94% for pre-trained models and 95% by using the proposed CNN-based model. Our analysis and results revealed that our proposed CNN base model performed well and could effectively classify the driver's abnormal behavior.
https://www.mdpi.com/1424-8220/23/1/311

2. **Farooq, M. S., Khalid, H.,** Arooj, A., Umer, T., Asghar, A. B., Rasheed, J., ... & Yahyaoui, A. (2023). A Conceptual Multi-Layer Framework for the Detection of Nighttime Pedestrian in Autonomous Vehicles Using

Deep Reinforcement Learning. *Entropy*, *25*(1), 135.doi: 10.3390/e25010135. **Muhammad Shoaib Farooq, Haris Khalid (Computer Science/SST) Date of Publication: January 2023 HJRS: W (Bronze)**

The major challenge faced by autonomous vehicles today is driving through busy roads without getting into an accident, especially with a pedestrian. To avoid collision with pedestrians, the vehicle requires the ability to communicate with a pedestrian to understand their actions. The most challenging task in research on computer vision is to detect pedestrian activities, especially at nighttime. The Advanced Driver-Assistance Systems (ADAS) has been developed for driving and parking support for vehicles to visualize sense, send and receive information from the environment but it lacks to detect nighttime pedestrian actions. This article proposes a framework based on Deep Reinforcement Learning (DRL) using Scale Invariant Faster Region-based Convolutional Neural Networks (SIFRCNN) technologies to efficiently detect pedestrian operations through which the vehicle, as agents train themselves from the environment and are forced to maximize the reward. The SIFRCNN has reduced the running time of detecting pedestrian operations from road images by incorporating Region Proposal Network (RPN) computation. Furthermore, we have used Reinforcement Learning (RL) for optimizing the Q-values and training itself to maximize the reward after getting the state from the SIFRCNN. In addition, the latest incarnation of SIFRCNN achieves near-real-time object detection from road images. The proposed SIFRCNN has been tested on KAIST, City Person, and Caltech datasets. The experimental results show an average improvement of 2.3% miss rate of pedestrian detection at nighttime compared to the other CNN-based pedestrian detectors.

https://www.mdpi.com/1099-4300/25/1/135

3. **Malik, H., Naeem, A., Naqvi, R. A., & Loh, W. K. (2023). DMFL_Net: A Federated Learning-Based Framework for the Classification of COVID-19 from Multiple Chest Diseases Using X-rays.** *Sensors*, *23*(2), 743.doi: 10.3390/s23020743. **Hassaan Malik, Ahmad Naeem (Computer Science/SST) Date of Publication: January 2023 HJRS: W (Bronze)**

Coronavirus Disease 2019 (COVID-19) is still a threat to global health and safety, and it is anticipated that deep learning (DL) will be the most effective way of detecting COVID-19 and other chest diseases such as lung cancer (LC), tuberculosis (TB), pneumothorax (PneuTh), and pneumonia (Pneu). However, data sharing across hospitals is hampered by patients' right to privacy, leading to unexpected results from deep neural network (DNN) models. Federated learning (FL) is a game-changing concept since it allows clients to train models together without sharing their source data with anybody else. Few studies, however, focus on improving the model's accuracy and stability, whereas most existing FL-based COVID-19 detection techniques aim to maximize secondary objectives such as latency, energy usage, and privacy. In this work, we design a novel model named decision-making-based federated learning network (DMFL_Net) for medical diagnostic image analysis to distinguish COVID-19 from four distinct chest disorders including LC, TB, PneuTh, and Pneu. The DMFL_Net model that has been suggested gathers data from a variety of hospitals, constructs the model using the DenseNet-169, and produces accurate predictions from information that is kept secure and only released to authorized individuals. Extensive experiments were carried out with chest X-rays (CXR), and the performance of the proposed model was compared with two transfer learning (TL) models, i.e., VGG-19 and VGG-16 in terms of accuracy (ACC), precision (PRE), recall (REC), specificity (SPF), and F1-measure. Additionally, the DMFL_Net model is also compared with the default FL configurations. The proposed DMFL_Net + DenseNet-169 model achieves an accuracy of 98.45% and outperforms other approaches in classifying COVID-19 from four chest diseases and successfully protects the privacy of the data among diverse clients.

https://www.mdpi.com/1424-8220/23/2/743

4. **Alqahtani, A., Akram, S., Ramzan, M., Nawaz, F., Khan, H. U., Alhashlan, E., ... & Ali, Z. (2023). A Transfer Learning Based Approach for COVID-19 Detection Using Inception-v4 Model.** *Intelligent Automation & Soft Computing*, *35*(2) 1721-1736. doi: 10.32604/iasc.2023.025597. **Muhammad Ramzan (Computer Science/SST) Date of Publication: February 2023 HJRS: X (Clay)**

Coronavirus (COVID-19 or SARS-CoV-2) is a novel viral infection that started in December 2019 and has erupted rapidly in more than 150 countries. The rapid spread of COVID-19 has caused a global health emergency and resulted in governments imposing lock-downs to stop its transmission. There is a significant increase in the number of patients infected, resulting in a lack of test resources and kits in most countries. To overcome this panicked state of affairs, researchers are looking forward to some effective solutions to overcome this situation: one of the most common and effective methods is to examine the X-radiation (X-rays) and computed tomography (CT) images for detection of Covid-19. How-ever, this method burdens the radiologist to examine each report. Therefore, to reduce the burden on the radiologist, an effective, robust and reliable detection system has been developed, which may assist the radiologist and medical specia-list in effective detecting of COVID. We proposed a deep learning approach that uses readily available chest radio-graphs (chest X-rays) to diagnose COVID-19 cases. The proposed approach applied transfer learning to the Deep Convolutional Neural Network (DCNN) model, Inception-v4, for the automatic detection of COVID-19 infection from chest X-rays images. The dataset used in this study contains 1504 chest X-ray images, 504 images of COVID-19 infection, and 1000 normal images obtained from publicly available medical repositories. The results showed that the

proposed approach detected COVID-19 infection with an overall accuracy of 99.63%.
https://www.techscience.com/iasc/v35n2/48867

5. **Raza, R.,** Bajwa, U. I., Mehmood, Y., Anwar, M. W., & Jamal, M. H. (2023). dResU-Net: 3D deep residual U-Net based brain tumor segmentation from multimodal MRI. *Biomedical Signal Processing and Control*, *79*, 103861.doi: 10.1016/j.bspc.2022.103861. **Rehan Raza** (Computer Science/SST) Date of Publication: January 2023 HJRS: W (Silver)

Glioma is the most prevalent and dangerous type of brain tumor which can be life-threatening when its grade is high. The early detection of these tumors can improve and save the life of the patients. The automatic segmentation of brain tumor from magnetic resonance imaging (MRI) plays a vital role in treatment planning and timely diagnosis. Automatic segmentation is a challenging task due to the massive amount of information provided by MRI and the variation in the location and size of the tumor. Therefore, a reliable and authentic method to segment the tumorous region from healthy tissues accurately is an open challenge in the field of deep learning-based medical image analysis. This research paper presents an end-to-end framework for automatic 3D Brain Tumor Segmentation (BTS). The proposed model is a hybrid of the deep residual network and U-Net model (dResU-Net). The residual network is used as an encoder in the proposed architecture with the decoder of the U-Net model to handle the issue of vanishing gradient. The proposed model is designed to take advantage from low-level and high-level features simultaneously for making the prediction. In addition, shortcut connections are employed between residual network to preserve low-level features at each level. Furthermore, skip connections between residual and convolutional blocks in the proposed architecture are used to accelerate the training process. The proposed architecture achieved promising results with the average dice score for the tumor core (TC), whole tumor (WT), and enhancing tumor (ET) on the BraTS 2020 dataset of 0.8357, 0.8660, and 0.8004, respectively. To demonstrate the robustness of the proposed model in real-world clinical settings, validation of the trained model on an external cohort is performed on randomly selected 50 patients of the BraTS 2021 benchmark dataset. The achieved dice scores on the external cohort are 0.8400, 0.8601, and 0.8221 for TC, WT, and ET, respectively. The comparison of results of the proposed approach with the state-of-the-art techniques indicates that dResU-Net can significantly improve the segmentation performance of brain tumor sub-regions.
https://www.sciencedirect.com/science/article/pii/S1746809422003809

6. **Malik, H., Anees, T., Naeem, A.,** Naqvi, R. A., & Loh, W.-K. (2023). Blockchain-Federated and Deep-Learning-Based Ensembling of Capsule Network with Incremental Extreme Learning Machines for Classification of COVID-19 Using CT Scans. *Bioengineering,* 10(2), 203. **Hassaan Malik, Ahmad Naeem (Computer Science/SST) Tayyaba Anees** (Software Engineering/SST) Date of Publication: February 2023 HJRS: X (Clay)

Due to the rapid rate of SARS-CoV-2 dissemination, a conversant and effective strategy must be employed to isolate COVID-19. When it comes to determining the identity of COVID-19, one of the most significant obstacles that researchers must overcome is the rapid propagation of the virus, in addition to the dearth of trustworthy testing models. This problem continues to be the most difficult one for clinicians to deal with. The use of AI in image processing has made the formerly insurmountable challenge of finding COVID-19 situations more manageable. In the real world, there is a problem that has to be handled about the difficulties of sharing data between hospitals while still honoring the privacy concerns of the organizations. When training a global deep learning (DL) model, it is crucial to handle fundamental concerns such as user privacy and collaborative model development. For this study, a novel framework is designed that compiles information from five different databases (several hospitals) and edifies a global model using blockchain-based federated learning (FL). The data is validated through the use of blockchain technology (BCT), and FL trains the model on a global scale while maintaining the secrecy of the organizations. The proposed framework is divided into three parts. First, we provide a method of data normalization that can handle the diversity of data collected from five different sources using several computed tomography (CT) scanners. Second, to categorize COVID-19 patients, we ensemble the capsule network (CapsNet) with incremental extreme learning machines (IELMs). Thirdly, we provide a strategy for interactively training a global model using BCT and FL while maintaining anonymity. Extensive tests employing chest CT scans and a comparison of the classification performance of the proposed model to that of five DL algorithms for predicting COVID-19, while protecting the privacy of the data for a variety of users, were undertaken. Our findings indicate improved effectiveness in identifying COVID-19 patients and achieved an accuracy of 98.99%. Thus, our model provides substantial aid to medical practitioners in their diagnosis of COVID-19.
https://www.mdpi.com/2306-5354/10/2/203

7. **Attique, M.,** Alkhalifah, T., Alturise, F., & **Khan, Y. D.** (2023). DeepBCE: Evaluation of deep learning models for identification of immunogenic B-cell epitopes. *Computational Biology and Chemistry, 104*. doi: 10.1016/j.compbiolchem.2023.107874. **Muhammad Attique, Yaser Daanial Khan (Computer Science/SST)** Date of Publication: June 2023 HJRS: X (Clay)

B-Cell epitopes (BCEs) can identify and bind with receptor proteins (antigens) to initiate an immune response

against pathogens. Understanding antigen-antibody binding interactions has many applications in biotechnology and biomedicine, including designing antibodies, therapeutics, and vaccines. Lab-based experimental identification of these proteins is time-consuming and challenging. Computational techniques have been proposed to discover BCEs, but most lack of significant accomplishments. This work uses classical and deep learning models (DLMs) with sequence-based features to predict immunity stimulator BCEs from proteomics sequences. The proposed convolutional neural network-based model outperforms other models with an accuracy (ACC) of 0.878, an F-measure of 0.871, and an area under the receiver operating characteristic curve (AUC) of 0.945. The proposed strategy achieves 58.7% better results on average than other state-of-the-art approaches based on the Mathews Correlation Coefficient (MCC) results. The established model is accessible through a web application located at http://deeplbcepred.pythonanywhere.com. https://www.sciencedirect.com/science/article/pii/S1476927123000658

8. **Farooq, M. S.,** Tehseen, R., Qureshi, J. N., Omer, U., Yaqoob, R., Tanweer, H. A., & Atal, Z. (2023). **FFM: Flood Forecasting Model Using Federated Learning.** *IEEE Access, 11*, 24472-24483. **doi: 10.1109/ACCESS.2023.3252896. Muhammad Shoaib Farooq, Hafiz Abdullah Tanweer (Computer Science/SST) Date of Publication: March 2023** HJRS: W (Silver)

Floods are one of the most common natural disasters that occur frequently causing massive damage to property, agriculture, economy and life. Flood prediction offers a huge challenge for researchers struggling to predict floods since long time. In this article, flood forecasting model using federated learning technique has been proposed. Federated Learning is the most advanced technique of machine learning (ML) that guarantees data privacy, ensures data availability, promises data security, and handles network latency trials inherent in prediction of floods by prohibiting data to be transferred over the network for model training. Federated Learning technique urges for onsite training of local data models, and focuses on transmission of these local models on the network instead of sending huge data set towards central server for local model aggregation and training of global data model at the central server. In this article, the proposed model integrates locally trained models of eighteen clients, investigates at which station flooding is about to happen and generates flood alert towards a specific client with five days lead time. A local feed forward neural network (FFNN) model is trained at the client station where the flood has been expected. Flood forecasting module of local FFNN model predicts the expected water level by taking multiple regional parameters as input. The dataset of five different rivers and barrages has been collected from 2015 to 2021 considering four aspects including snow melting, rainfall-runoff, flow routing and hydrodynamics. The proposed flood forecasting model has successfully predicted previous floods happened in the selected zone during 2010 to 2015 with 84 % accuracy. https://ieeexplore.ieee.org/abstract/document/10058950

9. **Farooq, M. S.,** Zulfiqar, A., & Riaz, S. (2023). **Epileptic Seizure Detection Using Machine Learning: Taxonomy, Opportunities, and Challenges.** *Diagnostics, 13*(6). **doi: 10.3390/diagnostics13061058. Muhammad Shoaib Farooq, Aimen Zulfiqar, Shamyla Riaz (Computer Science/SST) Date of Publication: March 2023** HJRS: X (Honorable Mention)

Epilepsy is a life-threatening neurological brain disorder that gives rise to recurrent unprovoked seizures. It occurs due to abnormal chemical changes in our brains. For many years, studies have been conducted to support the automatic diagnosis of epileptic seizures for clinicians' ease. For that, several studies entail machine learning methods for early predicting epileptic seizures. Mainly, feature extraction methods have been used to extract the right features from the EEG data generated by the EEG machine. Then various machine learning classifiers are used for the classification process. This study provides a systematic literature review of the feature selection process and classification performance. This review was limited to finding the most used feature extraction methods and the classifiers used for accurate classification of normal to epileptic seizures. The existing literature was examined from well-known repositories such as MDPI, IEEE Xplore, Wiley, Elsevier, ACM, Springer link, and others. Furthermore, a taxonomy was created that recapitulates the state-of-the-art used solutions for this problem. We also studied the nature of different benchmark and unbiased datasets and gave a rigorous analysis of the working of classifiers. Finally, we concluded the research by presenting the gaps, challenges, and opportunities that can further help researchers predict epileptic seizures. https://www.mdpi.com/2075-4418/13/6/1058

10. Ishaq, M., Abid, A., **Farooq, M. S.,** Manzoor, M. F., Farooq, U., Abid, K., & Helou, M. A. (2023). **Advances in database systems education: Methods, tools, curricula, and way forward.** *Education and Information Technologies, 28*(3), 2681-2725. **doi: 10.1007/s10639-022-11293-0. Adnan Abid, Muhammad Shoaib Farooq, Muhammad Faraz Manzoor, Uzma Farooq (Computer Science/SST) Date of Publication: March 2023** HJRS: W (Gold)

Fundamentals of Database Systems is a core course in computing disciplines as almost all small, medium, large, or enterprise systems essentially require data storage component. Database System Education (DSE) provides the foundation as well as advanced concepts in the area of data modeling and its implementation. The first course in DSE holds a pivotal role in developing students' interest in this area. Over the years, the researchers

have devised several different tools and methods to teach this course effectively, and have also been revisiting the curricula for database systems education. In this study a Systematic Literature Review (SLR) is presented that distills the existing literature pertaining to the DSE to discuss these three perspectives for the first course in database systems. Whereby, this SLR also discusses how the developed teaching and learning assistant tools, teaching and assessment methods and database curricula have evolved over the years due to rapid change in database technology. To this end, more than 65 articles related to DSE published between 1995 and 2022 have been shortlisted through a structured mechanism and have been reviewed to find the answers of the aforementioned objectives. The article also provides useful guidelines to the instructors, and discusses ideas to extend this research from several perspectives. To the best of our knowledge, this is the first research work that presents a broader review about the research conducted in the area of DSE.
https://link.springer.com/article/10.1007/s10639-022-11293-0

11. **Kizayev, T., Irawan, S., Khan, J. A., Khan, S. A., Cai, B., Zeb, N., & Wayo, D. D. K. (2023). Factors affecting drilling incidents: Prediction of suck pipe by XGBoost model.** *Energy Reports, 9*, **270-279. doi: 10.1016/j.egyr.2023.03.083. Nazia Zeb (Computer Science/SST) Date of Publication: June 2023 HJRS: W (Bronze)**

The unproductive time is very high due to drill string jamming. So the main objective of this research is to determine the influences of the parameters in the accidents of stuck pipes using the construction of XGBoost models. To develop the model, drilling parameters are taken from daily drilling reports of the construction of 30 wells in the West Qurna field, Iraq. The data includes well drilling reports from 2013 to 2020. The results show that the factors such as Measured depth (MD), Rate of penetration (ROP), 10-sec gel (GEL1), Plastic Viscosity (PV), Mud weight (MW), Yield point (YP) contribute positively to the model predictions. In contrast, the factors such as Flow rate (FR), Rotation per minute (RPM), Filtrate (API/HPHT-FILTR and Bottom hole assembly (BHA) length has a negative contribution to the final model predictions. This research concluded that pipe sticking in the borehole is primarily due to inclination, penetration rate, and flow rate. This study is useful in the drilling of any field.
https://www.sciencedirect.com/science/article/pii/S2352484723003207

12. **Malik, H., Anees, Chaudhry, M. U., Gono, R., Jasinski, M., Leonowicz, Z., & Bernat, P. (2023). A Novel Fusion Model of Hand-Crafted Features With Deep Convolutional Neural Networks for Classification of Several Chest Diseases Using X-Ray Images.** *IEEE Access, 11*, **39243-39268. doi: 10.1109/ACCESS.2023.3267492. Hassaan Malik (Computer Science/SST) Tayyaba Anees (Software Engineering/SST) Date of Publication: April 2023 HJRS: W (Silver)**

With the continuing global pandemic of coronavirus (COVID-19) sickness, it is critical to seek diagnostic approaches that are both effective and rapid to limit the number of people infected with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The results of recent research suggest that radiological images include important information related to COVID-19 and other chest diseases. As a result, the use of deep learning (DL) to assist in the automated diagnosis of chest diseases may prove useful as a diagnostic tool in the future. In this study, we propose a novel fusion model of hand-crafted features with deep convolutional neural networks (DCNNs) for classifying ten different chest diseases such as COVID-19, lung cancer (LC), atelectasis (ATE), consolidation lung (COL), tuberculosis (TB), pneumothorax (PNET), edema (EDE), pneumonia (PNEU), pleural thickening (PLT), and normal using chest X-rays (CXR). The method that has been suggested is split down into three distinct parts. The first step involves utilizing the Info-MGAN network to perform segmentation on the raw CXR data to construct lung images of ten different chest diseases. In the second step, the segmented lung images are fed into a novel pipeline that extracts discriminatory features by using hand-crafted techniques such as SURF and ORB, and then these extracted features are fused to the trained DCNNs. At last, various machine learning (ML) models have been used as the last layer of the DCNN models for the classification of chest diseases. Comparison is made between the performance of various proposed architectures for classification, all of which integrate DCNNs, key point extraction methods, and ML models. We were able to attain a classification accuracy of 98.20% for testing by utilizing the VGG-19 model with a softmax layer in conjunction with the ORB technique. Screening for COVID-19 and other lung ailments can be accomplished using the method that has been proposed. The robustness of the model was further confirmed by statistical analyses of the datasets using McNemar's and ANOVA tests respectively.
https://ieeexplore.ieee.org/abstract/document/10103528

13. **Malik, H., Anees, T., Din, M., & Naeem, A. (2023). CDC_Net: multi-classification convolutional neural network model for detection of COVID-19, pneumothorax, pneumonia, lung Cancer, and tuberculosis using chest X-rays.** *Multimedia Tools and Applications, 82* **(9), 13855-13880. doi: 10.1007/s11042-022-13843-7. Hassaan Malik, Ahmad Naeem (Computer Science/SST) Tayyaba Anees (Software Engineering/SST) Date of Publication: April 2023 HJRS: W (Bronze)**

Coronavirus (COVID-19) has adversely harmed the healthcare system and economy throughout the world. COVID-19 has similar symptoms as other chest disorders such as lung cancer (LC), pneumothorax, tuberculosis

(TB), and pneumonia, which might mislead the clinical professionals in detecting a new variant of flu called coronavirus. This motivates us to design a model to classify multi-chest infections. A chest x-ray is the most ubiquitous disease diagnosis process in medical practice. As a result, chest x-ray examinations are the primary diagnostic tool for all of these chest infections. For the sake of saving human lives, paramedics and researchers are working tirelessly to establish a precise and reliable method for diagnosing the disease COVID-19 at an early stage. However, COVID-19's medical diagnosis is exceedingly idiosyncratic and varied. A multi-classification method based on the deep learning (DL) model is developed and tested in this work to automatically classify the COVID-19, LC, pneumothorax, TB, and pneumonia from chest x-ray images. COVID-19 and other chest tract disorders are diagnosed using a convolutional neural network (CNN) model called CDC Net that incorporates residual network thoughts and dilated convolution. For this study, we used this model in conjunction with publically available benchmark data to identify these diseases. For the first time, a single deep learning model has been used to diagnose five different chest ailments. In terms of classification accuracy, recall, precision, and f1-score, we compared the proposed model to three CNN-based pre-trained models, such as Vgg-19, ResNet-50, and inception v3. An AUC of 0.9953 was attained by the CDC Net when it came to identifying various chest diseases (with an accuracy of 99.39%, a recall of 98.13%, and a precision of 99.42%). Moreover, CNN-based pre-trained models Vgg-19, ResNet-50, and inception v3 achieved accuracy in classifying multi-chest diseases are 95.61%, 96.15%, and 95.16%, respectively. Using chest x-rays, the proposed model was found to be highly accurate in diagnosing chest diseases. Based on our testing data set, the proposed model shows significant performance as compared to its competitor methods. Statistical analyses of the datasets using McNemar's, and ANOVA tests also showed the robustness of the proposed model.
https://link.springer.com/article/10.1007/s11042-022-13843-7

14. **Malik, H., Naeem, A.,** Hassan, S., Ali, F., Naqvi, R. A., & Yon, D. K. (2023). Multi-classification deep neural networks for identification of fish species using camera captured images. *PLoS ONE, 18*(4 April). doi: 10.1371/journal.pone.0284992. **Hassaan Malik, Ahmad Naeem** (Computer Science/SST) Date of Publication: April 2023 **HJRS: W (Gold)**

Regular monitoring of the number of various fish species in a variety of habitats is essential for marine conservation efforts and marine biology research. To address the shortcomings of existing manual underwater video fish sampling methods, a plethora of computer-based techniques are proposed. However, there is no perfect approach for the automated identification and categorizing of fish species. This is primarily due to the difficulties inherent in capturing underwater videos, such as ambient changes in luminance, fish camouflage, dynamic environments, watercolor, poor resolution, shape variation of moving fish, and tiny differences between certain fish species. This study has proposed a novel Fish Detection Network (FD_Net) for the detection of nine different types of fish species using a camera-captured image that is based on the improved YOLOv7 algorithm by exchanging Darknet53 for MobileNetv3 and depthwise separable convolution for 3 x 3 filter size in the augmented feature extraction network bottleneck attention module (BNAM). The mean average precision (mAP) is 14.29% higher than it was in the initial version of YOLOv7. The network that is utilized in the method for the extraction of features is an improved version of DenseNet-169, and the loss function is an Arcface Loss. Widening the receptive field and improving the capability of feature extraction are achieved by incorporating dilated convolution into the dense block, removing the max-pooling layer from the trunk, and incorporating the BNAM into the dense block of the DenseNet-169 neural network. The results of several experiments comparisons and ablation experiments demonstrate that our proposed FD_Net has a higher detection mAP than YOLOv3, YOLOv3-TL, YOLOv3-BL, YOLOv4, YOLOv5, Faster-RCNN, and the most recent YOLOv7 model, and is more accurate for target fish species detection tasks in complex environments.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0284992

15. **Naeem, A., Anees, T.,** Ahmed, K. T., Naqvi, R. A., Ahmad, S., & Whangbo, T. (2023). Deep learned vectors' formation using auto-correlation, scaling, and derivations with CNN for complex and huge image retrieval. *Complex and Intelligent Systems, 9*(2), 1729-1751. doi: 10.1007/s40747-022-00866-8. **Ahmad Naeem** (Computer Science/SST) **Tayyaba Anees** (Software Engineering/SST) Date of Publication: April 2023 **HJRS: X (Null)**

Deep learning for image retrieval has been used in this era, but image retrieval with the highest accuracy is the biggest challenge, which still lacks auto-correlation for feature extraction and description. In this paper, a novel deep learning technique for achieving highly accurate results for image retrieval is proposed, which implements a convolutional neural network with auto-correlation, gradient computation, scaling, filter, and localization coupled with state-of-the-art content-based image retrieval methods. For this purpose, novel image features are fused with signatures produced by the VGG-16. In the initial step, images from rectangular neighboring key points are auto-correlated. The image smoothing is achieved by computing intensities according to the local gradient. The result of Gaussian approximation with the lowest scale and suppression is adjusted by the by-box filter with the standard deviation adjusted to the lowest scale. The parameterized images are smoothed at different scales at various levels to achieve high accuracy. The principal component analysis has been used to reduce feature vectors and combine them with the VGG features. These features are integrated with the spatial

color coordinates to represent color channels. This experimentation has been performed on Cifar-100, Cifar-10, Tropical fruits, 17 Flowers, Oxford, and Corel-1000 datasets. This study has achieved an extraordinary result for the Cifar-10 and Cifar-100 datasets. Similarly, the results of the study have shown efficient results for texture datasets of 17 Flowers and Tropical fruits. Moreover, when compared to state-of-the-art approaches, this research produced outstanding results for the Corel-1000 dataset.
https://link.springer.com/article/10.1007/s40747-022-00866-8

16. **Rafay, A., & Hussain, W.** (2023). EfficientSkinDis: An EfficientNet-based classification model for a large manually curated dataset of 31 skin diseases. *Biomedical Signal Processing and Control, 85*. doi: 10.1016/j.bspc.2023.104869. **Abdul Rafay (Computer Science/SST) Waqar Hussain (AI/SST) Date of Publication: August 2023 HJRS: W (Silver)**

Skin diseases are a common health issue, affecting nearly one-third of the global population, but they are often underestimated in terms of their impact despite being highly visible. Accurately diagnosing skin diseases can be challenging sometimes. Fortunately, deep learning algorithms have shown great potential for a variety of tasks, including the diagnosis of skin diseases. This research presents a novel dataset of 31 skin diseases by blending two different datasets. Three different CNN types, which were EfficientNet, ResNet, and VGG with different architectures, were used for transfer learning on the skin disease dataset. EfficientNet had the highest testing accuracy, thus, it was further trained for fine-tuning. Initially, using the training split of 70%, the EfficientNet model achieved a testing accuracy of 71%. Therefore, as this was considered low, the 70% training split comprising 3,424 samples was further augmented. As a result, the model's accuracy improved to 72%. However, it was observed that the data split of 70/30 was not effective, thus the experiment was re-conducted with a train-test split of 80/20 and an improvement in accuracy score i.e., 74% was observed. To further improve the model's accuracy, augmentations were applied to the data and were able to achieve an accuracy of 87.15%. Finally, the trained model with the best accuracy was deployed on a Streamlit webserver. The proposed model can help society in diagnosing skin disease early, therefore it can be treated timely. The webserver of EfficientSkinDis can be accessed at (https://abdulrafay97-efficientskindis-app-ooncon.streamlit.app/).
https://www.sciencedirect.com/science/article/pii/S1746809423003026

17. **Suleman, M. T., Alturise, F., Alkhalifah, T., & Khan, Y. D.** (2023). iDHU-Ensem: Identification of dihydrouridine sites through ensemble learning models. Digital Health, 9. doi: 10.1177/20552076231165963. **Muhammad Taseer Suleman, Yaser Daanial Khan (Computer Science/SST) Date of Publication: January-December 2023 HJRS: W (Bronze)**

Background: Dihydrouridine (D) is one of the most significant uridine modifications that have a prominent occurrence in eukaryotes. The folding and conformational flexibility of transfer RNA (tRNA) can be attained through this modification. Objective: The modification also triggers lung cancer in humans. The identification of D sites was carried out through conventional laboratory methods; however, those were costly and time-consuming. The readiness of RNA sequences helps in the identification of D sites through computationally intelligent models. However, the most challenging part is turning these biological sequences into distinct vectors. Methods: The current research proposed novel feature extraction mechanisms and the identification of D sites in tRNA sequences using ensemble models. The ensemble models were then subjected to evaluation using k-fold cross-validation and independent testing. Results: The results revealed that the stacking ensemble model outperformed all the ensemble models by revealing 0.98 accuracy, 0.98 specificity, 0.97 sensitivity, and 0.92 Matthews Correlation Coefficient. The proposed model, iDHU-Ensem, was also compared with pre-existing predictors using an independent test. The accuracy scores have shown that the proposed model in this research study performed better than the available predictors. Conclusion: The current research contributed towards the enhancement of D site identification capabilities through computationally intelligent methods. A web-based server, iDHU-Ensem, was also made available for the researchers at https:// taseersuleman-idhu-ensem-idhu-ensem.streamlit.app/.
https://journals.sagepub.com/doi/full/10.1177/20552076231165963

18. **Tahir, M., Naeem, A., Malik, H., Tanveer, J., Naqvi, R. A., & Lee, S. W.** (2023). DSCC_Net: Multi-Classification Deep Learning Models for Diagnosing of Skin Cancer Using Dermoscopic Images. *Cancers, 15*(7). doi: 10.3390/cancers15072179. **Ahmad Naeem, Hassaan Malik (Computer Science/SST) Date of Publication: April 2023 HJRS: W (Gold)**

Skin cancer is one of the most lethal kinds of human illness. In the present state of the health care system, skin cancer identification is a time-consuming procedure and if it is not diagnosed initially then it can be threatening to human life. To attain a high prospect of complete recovery, early detection of skin cancer is crucial. In the last several years, the application of deep learning (DL) algorithms for the detection of skin cancer has grown in popularity. Based on a DL model, this work intended to build a multi-classification technique for diagnosing skin cancers such as melanoma (MEL), basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and melanocytic nevi (MN). In this paper, we have proposed a novel model, a deep learning-based skin cancer classification network (DSCC_Net) that is based on a convolutional neural network (CNN), and evaluated it on three publicly

available benchmark datasets (i.e., ISIC 2020, HAM10000, and DermIS). For the skin cancer diagnosis, the classification performance of the proposed DSCC_Net model is compared with six baseline deep networks, including ResNet-152, Vgg-16, Vgg-19, Inception-V3, EfficientNet-B0, and MobileNet. In addition, we used SMOTE Tomek to handle the minority classes issue that exists in this dataset. The proposed DSCC_Net obtained a 99.43% AUC, along with a 94.17%, accuracy, a recall of 93.76%, a precision of 94.28%, and an F1-score of 93.93% in categorizing the four distinct types of skin cancer diseases. The rates of accuracy for ResNet-152, Vgg-19, MobileNet, Vgg-16, EfficientNet-B0, and Inception-V3 are 89.32%, 91.68%, 92.51%, 91.12%, 89.46% and 91.82%, respectively. The results showed that our proposed DSCC_Net model performs better as compared to baseline models, thus offering significant support to dermatologists and health experts to diagnose skin cancer. https://www.mdpi.com/2072-6694/15/7/2179

19. **Tanveer, M., & Alasmary, H. (2023). LACP-SG: Lightweight Authentication Protocol for Smart Grids.** *Sensors, 23*(4), 2309. **Muhammad Tanveer (Computer Science/SST) Date of Publication: February 2023 HJRS: W (Bronze)**

Smart grid (SG) recently acquired considerable attention due to their utilization in sustaining demand response management in power systems. Smart meters (SMs) deployed in SG systems collect and transmit data to the server. Since all communications between SM and the server occur through a public communication channel, the transmitted data are exposed to adversary attacks. Therefore, security and privacy are essential requirements in the SG system for ensuring reliable communication. Additionally, an AuthentiCation (AC) protocol designed for secure communication should be lightweight so it can be applied in a resource-constrained environment. In this article, we devise a lightweight AC protocol for SG named LACP-SG. LACP-SG employs the hash function, "Esch256", and "authenticated encryption" to accomplish the AC phase. The proposed LACP-SG assures secure data exchange between SM and server by validating the authenticity of SM. For encrypted communication, LACP-SG enables SM and the server to establish a session key (SEK). We use the random oracle model to substantiate the security of the established SEK. Moreover, we ascertain that LACP-SG is guarded against different security vulnerabilities through Scyther-based security validation and informal security analysis. Furthermore, comparing LACP-SG with other related AC protocols demonstrates that LACP-SG is less resource-intensive while rendering better security characteristics. https://www.mdpi.com/1424-8220/23/4/2309

20. **Tanveer, M., Bashir, A. K., Alzahrani, B. A., Albeshri, A., Alsubhi, K., & Chaudhry, S. A. (2023). CADF-CSE: Chaotic map-based authenticated data access/sharing framework for IoT-enabled cloud storage environment.** *Physical Communication, 59*. **doi: 10.1016/j.phycom.2023.102087. Muhammad Tanveer (Computer Science/SST) Date of Publication: August 2023 HJRS: X (Honorable Mention)**

Data is an essential asset of an organization or individual in this information age. Secure and resource-efficient data communication has become paramount in the IoT-enabled cloud storage environment. The users must communicate with the cloud storage servers to access, store, and share the data utilizing the public communication channel, which is exposed to various security threats. Moreover, various security frameworks have been presented to render secure data access, storage, and sharing functionalities for the cloud storage environment. Most of them are complicated and incapacitated of resisting various security attacks. Thus, it is imperative to design a secure and resource-efficient data access, storage, and sharing framework for the cloud storage environment. This paper presents a chaotic map-based authenticated data access/sharing framework for the IoT-enabled cloud storage environment (*CADF-CSE*). *CADF-CSE* is designed using the chaotic map, authenticated encryption scheme (AEGIS), and one-way hash function (Esch256). The proposed *CADF-CSE* comprises three significant phases user access control, data storage, and data sharing. The user access control phase enables the user and cloud server to attain mutual authentication followed by the secret session key establishment. Using the established SK during the access control phase user and cloud server exchange information securely across the public Internet. The data storage phase facilitates the data owner to store the data on a cloud server in encrypted form, where encryption is performed with a secret key derived from the user's biometric. The data-sharing phase enables users to access the data from the cloud server after acquiring mutual permission from the cloud server and the data owner. In addition, an explication of the *CADF-CSE* through formal and informal analysis shows its resilience to various security attacks. Finally, the performance comparison explicates that *CADF-CSE* renders better security features while requiring lower computational and communication costs than the related security frameworks. https://www.sciencedirect.com/science/article/pii/S1874490723000903

21. **Farooq, M.S., Riaz. S, Tehseen. R, Farooq, U, Saleem, K. (2023). Role of Internet of things in diabetes healthcare: Network infrastructure, taxonomy, challenges, and security model.** *Digital Health,9*. **doi:10.1177/20552076231179056. Muhammad Sohaib Farooq, Shamyla Riaz (Computer Science/SST) Uzma Farooq (Software Engineering \SST) Date of Publication: June 2023 HJRS: W (Bronze)**

The Internet of things (IoT) is an emerging technology that enables ubiquitous devices to connect with the Internet. IoT technology has revolutionized the medical and healthcare industry by interconnecting smart

devices and sensors. IoT-based devices and biosensors are ideal to detect diabetes disease by collecting the accurate value of glucose continuously. Diabetes is one of the well-known and major chronic diseases that has a worldwide social impact on community life. Blood glucose monitoring is a challenging task, and there is a need to propose a proper architecture of the noninvasive glucose sensing and monitoring mechanism, which could make diabetic people aware of self-management techniques. This survey presents a rigorous discussion of diabetes types and presents detection techniques based on IoT technology. In this research, an IoT-based healthcare network infrastructure has been proposed for monitoring diabetes disease based on big data analytics, cloud computing, and machine learning. The proposed infrastructure could handle the symptoms of diabetes, collect data, analyze it, and then transmit the results to the server for the next action. Besides, presented an inclusive survey on IoT-based diabetes monitoring applications, services, and proposed solutions. Furthermore, based on IoT technology the diabetes disease management taxonomy has also been presented. Finally, presented the attacks taxonomy as well as discussed challenges, and proposed a lightweight security model in order to secure the patient's health data.

https://journals.sagepub.com/doi/full/10.1177/20552076231179056

22. **Shah, A. A., Alturise, F., Alkhalifah, T., Faisal, A., & Khan, Y. D. (2023). EDLM: Ensemble Deep Learning Model to Detect Mutation for the Early Detection of Cholangiocarcinoma.** *Genes*, **14(5), https://doi.org/10.3390/genes14051104. Yaser Daanial Khan (Computer Science/SST) Date of Publication: May 2023 HJRS: W (Bronze)**

The most common cause of mortality and disability globally right now is cholangiocarcinoma, one of the worst forms of cancer that may affect people. When cholangiocarcinoma develops, the DNA of the bile duct cells is altered. Cholangiocarcinoma claims the lives of about 7000 individuals annually. Women pass away less often than men. Asians have the greatest fatality rate. Following Whites (20%) and Asians (22%), African Americans (45%) saw the greatest increase in cholangiocarcinoma mortality between 2021 and 2022. For instance, 60–70% of cholangiocarcinoma patients have local infiltration or distant metastases, which makes them unable to receive a curative surgical procedure. Across the board, the median survival time is less than a year. Many researchers work hard to detect cholangiocarcinoma, but this is after the appearance of symptoms, which is late detection. If cholangiocarcinoma progression is detected at an earlier stage, then it will help doctors and patients in treatment. Therefore, an ensemble deep learning model (EDLM), which consists of three deep learning algorithms—long short-term model (LSTM), gated recurrent units (GRUs), and bi-directional LSTM (BLSTM)—is developed for the early identification of cholangiocarcinoma. Several tests are presented, such as a 10-fold cross-validation test (10-FCVT), an independent set test (IST), and a self-consistency test (SCT). Several statistical techniques are used to evaluate the proposed model, such as accuracy (Acc), sensitivity (Sn), specificity (Sp), and Matthew's correlation coefficient (MCC). There are 672 mutations in 45 distinct cholangiocarcinoma genes among the 516 human samples included in the proposed study. The IST has the highest Acc at 98%, outperforming all other validation approaches.

https://www.mdpi.com/2073-4425/14/5/1104

23. **Perveen, G., Alturise, F., Alkhalifah, T., & Daanial Khan, Y. (2023). Hemolytic-Pred: A machine learning-based predictor for hemolytic proteins using position and composition-based features.** *Digital Health,* **9, https://doi.org/10.1177/20552076231180739. Yaser Daanial Khan (Computer Science/SST) Date of Publication: May 2023 HJRS: W (Bronze)**

The objective of this study is to propose a novel in-silico method called Hemolytic-Pred for identifying hemolytic proteins based on their sequences, using statistical moment-based features, along with position-relative and frequency-relative information. Methods Primary sequences were transformed into feature vectors using statistical and position-relative moment-based features. Varying machine learning algorithms were employed for classification. Computational models were rigorously evaluated using four different validation. The Hemolytic-Pred webserver is available for further analysis at http://ec2-54-160-229-10.compute-1.amazonaws.com/. Results XGBoost outperformed the other six classifiers with an accuracy value of 0.99, 0.98, 0.97, and 0.98 for self-consistency test, 10-fold cross-validation, Jackknife test, and independent set test, respectively. The proposed method with the XGBoost classifier is a workable and robust solution for predicting hemolytic proteins efficiently and accurately.Conclusions The proposed method of Hemolytic-Pred with XGBoost classifier is a reliable tool for the timely identification of hemolytic cells and diagnosis of various related severe disorders. The application of Hemolytic-Pred can yield profound benefits in the medical field.

https://journals.sagepub.com/doi/full/10.1177/20552076231180739

24. **Farooq, M. S., Tehseen, R., Sabir, M., & Atal, Z. (2023). Detection of autism spectrum disorder (ASD) in children and adults using machine learning.** *Scientific Reports,* **13(1),9605. https://doi.org/10.1038/s41598-023-35910-1 Muhammad Shoaib Farooq (Computer Science/SST) Date of Publication: June 2023 HJRS: W (Platinum)**

Autism spectrum disorder (ASD) presents a neurological and developmental disorder that has an impact on the social and cognitive skills of children causing repetitive behaviours, restricted interests, communication

problems and difficulty in social interaction. Early diagnosis of ASD can prevent from its severity and prolonged effects. Federated learning (FL) is one of the most recent techniques that can be applied for accurate ASD diagnoses in early stages or prevention of its long-term effects. In this article, FL technique has been uniquely applied for autism detection by training two different ML classifiers including logistic regression and support vector machine locally for classification of ASD factors and detection of ASD in children and adults. Due to FL, results obtained from these classifiers have been transmitted to central server where meta classifier is trained to determine which approach is most accurate in the detection of ASD in children and adults. Four different ASD patient datasets, each containing more than 600 records of effected children and adults have been obtained from different repository for features extraction. The proposed model predicted ASD with 98% accuracy (in children) and 81% accuracy (in adults).
https://www.nature.com/articles/s41598-023-35910-1

25. **Farooq, M. S., Naseem, A.,** Rustam, F., & Ashraf, I. (2023). Fake news detection in Urdu language using machine learning. *PeerJ Computer Science*, 9, e1353. https://doi.org/10.7717/peerj-cs.1353. **Muhammad Shoaib Farooq, Ansar Naseem** (Computer Science/SST) Date of Publication: May 2023 HJRS: W (Bronze)
With the rise of social media, the dissemination of forged content and news has been on the rise. Consequently, fake news detection has emerged as an important research problem. Several approaches have been presented to discriminate fake news from real news, however, such approaches lack robustness for multi-domain datasets, especially within the context of Urdu news. In addition, some studies use machine-translated datasets using English to Urdu Google translator and manual verification is not carried out. This limits the wide use of such approaches for real-world applications. This study investigates these issues and proposes fake news classier for Urdu news. The dataset has been collected covering nine different domains and constitutes 4097 news. Experiments are performed using the term frequency-inverse document frequency (TF-IDF) and a bag of words (BoW) with the combination of n-grams. The major contribution of this study is the use of feature stacking, where feature vectors of preprocessed text and verbs extracted from the preprocessed text are combined. Support vector machine, k-nearest neighbor, and ensemble models like random forest (RF) and extra tree (ET) were used for bagging while stacking was applied with ET and RF as base learners with logistic regression as the meta learner. To check the robustness of models, fivefold and independent set testing were employed. Experimental results indicate that stacking achieves 93.39%, 88.96%, 96.33%, 86.2%, and 93.17% scores for accuracy, specificity, sensitivity, MCC, ROC, and F1 score, respectively.
https://peerj.com/articles/cs-1353/

26. **Omer, U., Tehseen, R., Farooq, M. S.,** & Abid, A. (2023). Learning analytics in programming courses: Review and implications. *Education and Information Technologies,* 1-48. https://doi.org/10.1007/s10639-023-11611-0. **Muhammad Shoaib Farooq** (Computer Science/SST) Date of Publication: March 2023 HJRS: X (Honorable Mentioned)
Learning analytics (LA) is a significant field of study to examine and identify difficulties the novice programmers face while learning how to program. Despite producing notable research by the community in the specified area, rare work is observed to synthesize these research efforts and discover the dimensions that guide the future research of learning analytics in programming courses (LAPC). This work demonstrates review of the learning analytics research for initial level programming courses by exploring different types and sources of data used for LA, and evaluating some pertinent facets of reporting, prediction, intervention, and refinements exhibited in literature. Based on the reviewed aspects, a taxonomy of LAPC research has been proposed along with the associated benefits. The results reveal that most of the learning analytics studies in programming courses used assessment data, which is generated from conventional assessment processes. However, the analysis based on more granular level data covering the cognitive dimensions and concept specific facets could improve accuracies and reveal the precise aspects of learning. In addition, the coding analysis parameters can broadly be categorized into code quality and coding process. These categories can further be classified to present twenty-five sub-categories of coding parameters for analyzing the behaviors of novice programmers. Moreover, efforts are required for early identification of effective and ineffective behavioral patterns through performance predictions in order to deliver timely interventions. Lastly, this review emphasizes the integration of related processes to optimize the future research efforts of conducting the learning analytics research for programming courses.
https://link.springer.com/article/10.1007/s10639-023-11611-0

27. **Khan, A. H., Malik, H.,** Khalil, W., Hussain, S. K., **Anees, T.,** & Hussain, M. (2023). Spatial Correlation Module for Classification of Multi-Label Ocular Diseases Using Color Fundus Images. *Computers, Materials & Continua,* 76(1): 133-150. https://doi.org/10.32604/cmc.2023.039518. **Ali Haider Khan, Hassaan Malik, Muzammil Hussain** (Computer Science/SST) **Tayyaba Anees** (Software Engineering/SST) Date of Publication: June 2023 HJRS: W (Honorable Mentioned)
To prevent irreversible damage to one's eyesight, ocular diseases (ODs) need to be recognized and treated immediately. Color fundus imaging (CFI) is a screening technology that is both effective and economical.

According to CFIs, the early stages of the disease are characterized by a paucity of observable symptoms, which necessitates the prompt creation of automated and robust diagnostic algorithms. The traditional research focuses on imagelevel diagnostics that attend to the left and right eyes in isolation without making use of pertinent correlation data between the two sets of eyes. In addition, they usually only target one or a few different kinds of eye diseases at the same time. In this study, we design a patient-level multi-label OD (PLML_ODs) classification model that is based on a spatial correlation network (SCNet). This model takes into consideration the relevance of patient-level diagnosis combining bilateral eyes and multi-label ODs classification. PLML_ODs is made up of three parts: a backbone convolutional neural network (CNN) for feature extraction ie, DenseNet-169, a SCNet for feature correlation, and a classifier for the development of classification scores. The DenseNet-169 is responsible for retrieving two separate sets of attributes, one from each of the left and right CFI. After then, the SCNet will record the correlations between the two feature sets on a pixel-by-pixel basis. After the attributes have been analyzed, they are integrated to provide a representation at the patient level. Throughout the whole process of ODs categorization, the patient-level representation will be used. The efficacy of the PLML_ODs is examined using a soft margin loss on a dataset that is readily accessible to the public, and the results reveal that the classification performance is significantly improved when compared to several baseline approaches.
https://www.techscience.com/cmc/v76n1/53101

28. **Bilal, A., Liu, X., Baig, T. I., Long, H., & Shafiq, M. (2023). EdgeSVDNet: 5G-Enabled Detection and Classification of Vision-Threatening Diabetic Retinopathy in Retinal Fundus Images.** *Electronics (Switzerland),* **12(19). doi: 10.3390/electronics12194094. Talha Imtiaz Baig (Computer Science/SST) Date of Publication: September 2023 HJRS: W (Bronze)**

The rise of vision-threatening diabetic retinopathy (VTDR) underscores the imperative for advanced and efficient early detection mechanisms. With the integration of the Internet of Things (IoT) and 5G technologies, there is transformative potential for VTDR diagnosis, facilitating real-time processing of the burgeoning volume of fundus images (FIs). Combined with artificial intelligence (AI), this offers a robust platform for managing vast healthcare datasets and achieving unparalleled disease detection precision. Our study introduces a novel AI-driven VTDR detection framework that integrates multiple models through majority voting. This comprehensive approach encompasses pre-processing, data augmentation, feature extraction using a hybrid convolutional neural network-singular value decomposition (CNN-SVD) model, and classification through an enhanced SVM-RBF combined with a decision tree (DT) and K-nearest neighbor (KNN). Validated on the IDRiD dataset, our model boasts an accuracy of 99.89%, a sensitivity of 84.40%, and a specificity of 100%, marking a significant improvement over the traditional method. The convergence of the IoT, 5G, and AI technologies herald a transformative era in healthcare, ensuring timely and accurate VTDR diagnoses, especially in geographically underserved regions.
https://www.mdpi.com/2079-9292/12/19/4094

29. **Burhan, M., Hina Alam, Arsalan, A., Rehman, R. A., Anwar, M., Faheem, M., & Ashraf, M. W. (2023). A Comprehensive Survey on the Cooperation of Fog Computing Paradigm-Based IoT Applications: Layered Architecture, Real-Time Security Issues, and Solutions.** *IEEE Access,* **11, 73303-73329. doi: 10.1109/ACCESS.2023.3294479. Hina Alam (Computer Science/SST) Date of Publication: July 2023 HJRS: W (Silver)**

The Internet of Things (IoT) can enable seamless communication between millions of billions of objects. As IoT applications continue to grow, they face several challenges, including high latency, limited processing and storage capacity, and network failures. To address these stated challenges, the fog computing paradigm has been introduced, purpose is to integrate the cloud computing paradigm with IoT to bring the cloud resources closer to the IoT devices. Thus, it extends the computing, storage, and networking facilities toward the edge of the network. However, data processing and storage occur at the IoT devices themselves in the fog-based IoT network, eliminating the need to transmit the data to the cloud. Further, it also provides a faster response as compared to the cloud. Unfortunately, the characteristics of fog-based IoT networks arise traditional real-time security challenges, which may increase severe concern to the end-users. However, this paper aims to focus on fog-based IoT communication, targeting real-time security challenges. In this paper, we examine the layered architecture of fog-based IoT networks along working of IoT applications operating within the context of the fog computing paradigm. Moreover, we highlight real-time security challenges and explore several existing solutions proposed to tackle these challenges. In the end, we investigate the research challenges that need to be addressed and explore potential future research directions that should be followed by the research community.
https://ieeexplore.ieee.org/abstract/document/10179927

30. **Butt, A. H., Alkhalifah, T., Alturise, F., & Khan, Y. D. (2023). Ensemble Learning for Hormone Binding Protein Prediction: A Promising Approach for Early Diagnosis of Thyroid Hormone Disorders in Serum.** *Diagnostics,*

13(11). doi: 10.3390/diagnostics13111940. **Yaser Daanial Khan (Computer Science\SST) Date of Publication: June 2023 HJRS: X (Honorable Mention)**

Hormone-binding proteins (HBPs) are specific carrier proteins that bind to a given hormone. A soluble carrier hormone binding protein (HBP), which can interact non-covalently and specifically with growth hormone, modulates or inhibits hormone signaling. HBP is essential for the growth of life, despite still being poorly understood. Several diseases, according to some data, are caused by HBPs that express themselves abnormally. Accurate identification of these molecules is the first step in investigating the roles of HBPs and understanding their biological mechanisms. For a better understanding of cell development and cellular mechanisms, accurate HBP determination from a given protein sequence is essential. Using traditional biochemical experiments, it is difficult to correctly separate HBPs from an increasing number of proteins because of the high experimental costs and lengthy experiment periods. The abundance of protein sequence data that has been gathered in the post-genomic era necessitates a computational method that is automated and enables quick and accurate identification of putative HBPs within a large number of candidate proteins. A brand-new machine-learning-based predictor is suggested as the HBP identification method. To produce the desirable feature set for the method proposed, statistical moment-based features and amino acids were combined, and the random forest was used to train the feature set. During 5-fold cross validation experiments, the suggested method achieved 94.37% accuracy and 0.9438 F1-scores, respectively, demonstrating the importance of the Hahn moment-based features.

https://www.mdpi.com/2075-4418/13/11/1940

31. **Farooq, M. S., Abdullah, M., Riaz, S., Alvi, A., Rustam, F., Flores, M. A. L., . . . Ashraf, I. (2023). A Survey on the Role of Industrial IoT in Manufacturing for Implementation of Smart Industry. Sensors (Basel, Switzerland), 23(21). doi: 10.3390/s23218958. Muhammad Shoaib Farooq (Computer Science/SST) Date of Publication: November 2023 HJRS: W (Silver)**

The Internet of Things (IoT) is an innovative technology that presents effective and attractive solutions to revolutionize various domains. Numerous solutions based on the IoT have been designed to automate industries, manufacturing units, and production houses to mitigate human involvement in hazardous operations. Owing to the large number of publications in the IoT paradigm, in particular those focusing on industrial IoT (IIoT), a comprehensive survey is significantly important to provide insights into recent developments. This survey presents the workings of the IoT-based smart industry and its major components and proposes the state-of-the-art network infrastructure, including structured layers of IIoT architecture, IIoT network topologies, protocols, and devices. Furthermore, the relationship between IoT-based industries and key technologies is analyzed, including big data storage, cloud computing, and data analytics. A detailed discussion of IIoT-based application domains, smartphone application solutions, and sensor- and device-based IIoT applications developed for the management of the smart industry is also presented. Consequently, IIoT-based security attacks and their relevant countermeasures are highlighted. By analyzing the essential components, their security risks, and available solutions, future research directions regarding the implementation of IIoT are outlined. Finally, a comprehensive discussion of open research challenges and issues related to the smart industry is also presented.

https://www.mdpi.com/1424-8220/23/21/8958

32. **Farooq, M. S., Masooma, A., Omer, U., Tehseen, R., Gilani, S. A. M., & Atal, Z. (2023). The Role of IoT in Woman's Safety: A Systematic Literature Review.** *IEEE Access,* **11, 69807-69825. doi: 10.1109/ACCESS.2023.3252903. Muhammad Shoaib Farooq, Ayesha Masooma, Uzma Omer, Rabia Tehseen (Computer Science\SST) Date of Publication: March 2023 HJRS: W (Silver)**

Women's safety has been highlighted as one of the major concerns of any society where several women are dealing with various safety issues like harassment, rape, molestation, and domestic violence due to different social or cultural reasons. Internet of Things (IoT) is becoming a promising technology to support day-To-day concerns and provide support in handling various affairs. Many IoT-based devices have been introduced by the community to help women deal with their potential safety threats. This study presents a systematic literature review of research studies exhibiting the IoT devices for women's safety, the main features these devices offer as well as the wearable, sensors used, and the machine learning algorithms used. The review is carried out by carefully examining and synthesizing the research articles published between 2016 to 2022 in well-reputed research venues. The results revealed that different types of sensors are used to capture the state of women undergoing safety issues where the pulse-rate, and pressure sensors are most commonly used sensors in these devices. In addition, the devices used different technology to transmit the alerts including global positing system (GPS), global system for mobile communication (GSM), and Raspberry pi. Furthermore, several machine learning algorithms such as logistic regression, hidden Markov, and decision trees are used to identify the potential under threat women and help prevent the undesirable situation for women beforehand. It was identified that despite producing notable research in the underlying domain the systems emphasizing auto-Activation of alert generation with lesser human interaction and improved accuracies are required to be developed for effectively addressing the concern. In addition to reviewing the literature, this study suggests a

taxonomy posing different techniques, features, wearables, and sensors used in IoT-based women safety devices. Furthermore, the gaps and challenges pertaining to the IoT devices and their usability for women's safety have also been highlighted. In addition, this work proposes an architectural model that presents prominent components necessary to develop IoT-based women's safety devices. Lastly, this study emphasizes the use of combinations of sensors to get multiple types of input data that could lead to determining the possibility of threat with better accuracies and precision.
https://ieeexplore.ieee.org/abstract/document/10058949

33. **Farooq, M. S.,** Riaz, S., & Alvi, A. (2023). Security and Privacy Issues in Software-Defined Networking (SDN): A Systematic Literature Review. *Electronics (Switzerland),* 12(14). doi: 10.3390/electronics12143077. Muhammad Shoaib Farooq (Computer Science/SST) Date of Publication: July 2023 HJRS: W (Bronze)
Software-defined network (SDNs) have fundamentally changed network infrastructure by decoupling the data plane and the control plane. This architectural shift rejuvenates the network layer by granting the re-programmability and centralized management of networks which brings about exciting challenges. Although an SDN seems to be a secured network when compared to conventional networks, it is still vulnerable and faces rigorous deployment challenges. Moreover, the bifurcation of data and control planes also opens up new security problems. This systematic literature review (SLR) has formalized the problem by identifying the potential attack scenarios and highlighting the possible vulnerabilities. Eighty-six articles have been selected carefully to formulize the SLR. In this SLR, we have identified major security attacks on SDN planes, including the application plane, control plane, and data plane. Moreover, this research also identifies the approaches used by industry experts and researchers to develop security solutions for SDN planes. In this research, we have introduced an attack taxonomy and proposed a collaborative security model after comprehensively identifying security attacks on SDN planes. Lastly, research gaps, challenges, and future directions are discussed for the deployment of secure SDNs.
https://www.mdpi.com/2079-9292/12/14/3077

34. **Farooq, M. S.,** Riaz, S., Rehman, I. U., Khan, M. A., & Hassan, B. (2023). A Blockchain-Based Framework to Make the Rice Crop Supply Chain Transparent and Reliable in Agriculture. *Systems,* 11(9). doi: 10.3390/systems11090476. Muhammad Shoaib Farooq (Computer Science/SST) Date of Publication: September 2023 HJRS: X (Clay)
Rice is one of the major food crops across the globe, and its quality and safety highly influence human health. It is the basis of many different products, including rice flour, rice bread, noodles, rice vinegar, and others. Therefore, the rice supply chain has garnered increasing attention due to the high demand for food safety. Furthermore, malpractices in the rice supply chain can impact farmers by generating low revenues despite their great efforts in rice cultivation. In addition, they would cause governments to suffer significant economic losses due to the high cost of importing rice crops from other countries during the off-season. These issues derive from the lack of reliability, trust, transparency, traceability, and security in the rice supply chain. In this research, we propose a secure, trusted, reliable, and transparent framework based on a Blockchain for rice crop supply chain's traceability from farm to fork. A new crypto token, the Rice Coin (RC), is introduced to keep a record of all transactions between the stakeholders of the rice supply chain. Moreover, the proposed framework includes an economic model and a crypto wallet and introduces an Initial Coin Offering (ICO) for the RC. Based on smart contracts, a transaction processing system was developed for the transparency and traceability of rice crops, including the conversion of the RC to fiat currency. Furthermore, the InterPlanetary File System (IPFS) is proposed in this research to store encrypted data of companies, retailers, and farmers, so to increase data security, transparency, and availability. In the end, the experimental results showed a better performance of the proposed framework compared to already available supply chain solutions in terms of transaction verification time, transaction average gas cost, and new block latency.
https://www.mdpi.com/2079-8954/11/9/476

35. Ijaz, M., Nazir, R., Alhussein, M., **Ahmad, J.,** Aurangzeb, K., & Saleem, F. (2023). Digital resonant control of power converters under variable grid frequency conditions. *Frontiers in Energy Research,* 11. doi: 10.3389/fenrg.2023.1272329. Jameel Ahmad (Computer Science/SST) Date of Publication: September 2023 HJRS: W (Bronze)
Introduction: The proportional resonant (PR) controller is known for its ability to effectively regulate sinusoidal current and voltage with low steady-state error. However, in the context of digital power systems, where operations are discrete in time, applying conventional PR controllers directly presents challenges. This study investigates the impact of various discretization methods on the performance of PR controllers, particularly under scenarios with varying reference frequencies. Methods: To assess the performance of digital PR controllers under varying reference frequency conditions, three discretization techniques are employed: zero-order hold (ZOH), impulse invariant (II), and zero pole matching (ZPM), in addition to the conventional deadbeat controller. These controllers are tested in conjunction with a single-phase pulse-width modulated (PWM) inverter, which is a crucial component in modern power systems. Results: Simulation results indicate

the effectiveness of the different digital PR controllers in tracking both fixed and variable reference frequency signals while minimizing total harmonic distortion (THD) and steady-state error. When utilizing only the deadbeat controller, steady-state error and THD are measured at 4.9 V and 4.82%, respectively. However, the proposed ZPM-based digital PR controller significantly improves performance, reducing steady-state error to 0.12 V and THD to 0.45%, highlighting its superior performance. Discussion: The findings of this study emphasize the importance of choosing the appropriate discretization method when implementing PR controllers in digital power systems. The ZPM-based digital PR controller proves to be highly efficient in regulating power converters under varying grid frequency conditions. This research contributes to the understanding of digital PR controller behavior and its potential for improving power system performance, especially in scenarios with intermittent renewable energy resources and fluctuating grid frequencies.
 https://www.frontiersin.org/articles/10.3389/fenrg.2023.1272329/full

36. **Ilyas, K., & Younas, I. (2023). Enhancing Dynamic Multi-objective Optimization Using Opposition-based Learning and Simulated Annealing.** *International Journal on Artificial Intelligence Tools,* **32(4). doi: 10.1142/S0218213023500379. Kiran Ilyas (Computer Science/SST) Date of Publication: June 2023 HJRS: X (Clay)**

There are many dynamic real-life optimization problems in which objectives increase or decrease over time, which usually leads to variations in the dimensions of a Pareto front. Dynamic multi-objective optimization (DyMO) approaches aim to keep track of the updated Pareto front to tackle the changes which are caused by the dynamic environment. However, the current DyMO approaches do not handle dynamic environments effectively. In this study, a new hybrid dynamic two-archive evolutionary algorithm with a newly added simulated annealing and opposition-based learning strategy is proposed. The proposed method helps to preserve solutions with reasonable diversity and improve convergence by searching for promising solutions within acceptable computational time and effort. To evaluate the efficacy of the suggested method, comprehensive experiments using different multi-objective quality measures such as generational distance, and inverted generational distance have been performed on several benchmark problems with varying numbers of objectives over time. The results of the experiments show that the suggested method outperforms the strategies already in use.
https://www.worldscientific.com/doi/abs/10.1142/S0218213023500379

37. **Jehanghir, M., Ishaq, K., & Akbar, R. A. (2023). Effect of learners' autonomy on academic motivation and university students' grit.** *Education and Information Technologies.* **doi: 10.1007/s10639-023-11976-2. Kashif Ishaq (Computer Science\SST) Date of Publication: July 2023 HJRS: W (Bronze)**

Learner autonomy is the trait of an adult who displays agency concerning learning activities, whereas academic motivation is the primary driving force for students to learn, which is the drive and urge to achieve academically, while grit is an important personality trait for academic achievement. People with the motivation and persistence to work and study diligently despite hurdles and hardships to achieve a set of goals are more likely to be successful than those lacking these traits. The present study investigates the effect of learners' autonomy on academic motivation and university students' grit by employing a quantitative method. A survey method has conducted to collect the data from 1230 participants randomly selected from the general type universities. A theoretical framework has been proposed consisting of several components of learner autonomy, academic motivation, and grit. Learners' autonomy is based on social cognitive theory, while academic motivation and grit are based on self-determination theory. This study uses three instruments: Learner Autonomy Profile-Short Form (LAP-SF), academic motivation scale (AMS), and grit scale. The LAP-SF adapted consists of four constructs (desire, resourcefulness, initiative, and persistence), whereas the scale's reliability is 0.96. Similarly, the AMS developed by Vallerand adopted to collect data consists of three factors that have the reliability of a scale of 0.87. Lastly, data related to grit has been collected through the grit scale developed by Duckworth, which consists of two factors that have reliability of a scale of 0.81. The data has been analyzed through Linear Regression to answer the study research questions. Findings of the regression analysis with its four factors (Desire, Resourcefulness, Initiative, and persistence) revealed that LAS and AMS have a positive association whereas these factors also has a positive association between LAS and Grit Scale. It has been concluded that Learners 'Autonomy with all its sub-factors positively affects students' academic motivation and grit level.
https://link.springer.com/article/10.1007/s10639-023-11976-2#Abs1

38. **Khalil, M., Naeem, A., Naqvi, R. A., Zahra, K., Muqarib, S. A., & Lee, S. W. (2023). Deep Learning-Based Classification of Abrasion and Ischemic Diabetic Foot Sores Using Camera-Captured Images.** *Mathematics,* **11(17). doi: 10.3390/math11173793. Ahmad Naeem (Computer Science/SST) Date of Publication: September 2023 HJRS: W (Honorable Mention)**

Diabetic foot sores (DFS) are serious diabetic complications. The patient's weakened neurological system damages the tissues of the foot's skin, which results in amputation. This study aims to validate and deploy a deep learning-based system for the automatic classification of abrasion foot sores (AFS) and ischemic diabetic

foot sores (DFS). We proposed a novel model combining convolutional neural network (CNN) capabilities with Vgg-19. The proposed method utilized two benchmark datasets to classify AFS and DFS from the patient's foot. A data augmentation technique was used to enhance the accuracy of the training. Moreover, image segmentation was performed using UNet++. We tested and evaluated the proposed model's classification performance against two well-known pre-trained classifiers, Inceptionv3 and MobileNet. The proposed model classified AFS and ischemia DFS images with an accuracy of 99.05%, precision of 98.99%, recall of 99.01%, MCC of 0.9801, and f1 score of 99.04%. Furthermore, the results of statistical evaluations using ANOVA and Friedman tests revealed that the proposed model exhibited a remarkable performance. The proposed model achieved an excellent performance that assist medical professionals in identifying foot ulcers.
https://www.mdpi.com/2227-7390/11/17/3793

39. **Khalil, M., Naeem, A., Naqvi, R. A., Zahra, K., Muqarib, S. A., & Lee, S. W. (2023). Deep Learning-Based Classification of Abrasion and Ischemic Diabetic Foot Sores Using Camera-Captured Images.** *Mathematics,* **11(17). doi: 10.3390/math11173793. Ahmad Naeem (Computer Science/SST) Date of Publication: September 2023 HJRS: W (Honorable Mention)**
Diabetic foot sores (DFS) are serious diabetic complications. The patient's weakened neurological system damages the tissues of the foot's skin, which results in amputation. This study aims to validate and deploy a deep learning-based system for the automatic classification of abrasion foot sores (AFS) and ischemic diabetic foot sores (DFS). We proposed a novel model combining convolutional neural network (CNN) capabilities with Vgg-19. The proposed method utilized two benchmark datasets to classify AFS and DFS from the patient's foot. A data augmentation technique was used to enhance the accuracy of the training. Moreover, image segmentation was performed using UNet++. We tested and evaluated the proposed model's classification performance against two well-known pre-trained classifiers, Inceptionv3 and MobileNet. The proposed model classified AFS and ischemia DFS images with an accuracy of 99.05%, precision of 98.99%, recall of 99.01%, MCC of 0.9801, and f1 score of 99.04%. Furthermore, the results of statistical evaluations using ANOVA and Friedman tests revealed that the proposed model exhibited a remarkable performance. The proposed model achieved an excellent performance that assist medical professionals in identifying foot ulcers.
https://www.mdpi.com/2227-7390/11/17/3793

40. **Ahmad, M., Shakeel, T., & Shin, S. Y. (2023). Image super resolution based channel estimation for future wireless communication. Computer Networks, 237. doi: 10.1016/j.comnet.2023.110057. Tanzeela Shakeel (Computer Science/SST) Date of Publication: December 2023 HJRS: W (Gold)**
In this paper, a novel image-based Deep Learning (DL) approach for channel estimation for future wireless communications is proposed. The time–frequency response of the fast-fading wireless channel is represented as a 2D image to estimate the unknown values of the channel response using known values at the pilot locations. With given images, both image Super-Resolution (SR) and image Denoising Network (DnN), termed as Super-Resolution and Denoising Network (SRDnN), are combined to estimate the wireless channel. To show the effectiveness, the proposed SRDnN is applied to Massive Multiple-Input Multiple-Output (mMIMO) with Non-Orthogonal Multiple Access (NOMA). The enhanced performances of SRDnN are quantified in terms of Mean Square Error (MSE) and Symbol Error Rate (SER). In addition, the influence of pilot numbers on SRDnN performance for next-generation mMIMO-NOMA networks is presented. The simulation results demonstrate that SRDnN is comparable to the level of Maximum Likelihood (ML) detection for both with and without complete Channel State Information (CSI) at the receiver with less number of pilots.
https://www.sciencedirect.com/science/article/abs/pii/S1389128623005029

41. **Alotaibi, F. M., & Khan, Y. D. (2023). A Framework for Prediction of Oncogenomic Progression Aiding Personalized Treatment of Gastric Cancer. Diagnostics, 13(13). doi: 10.3390/diagnostics13132291. Yaser Daanial Khan (Computer Science/SST) Date of Publication: July 2023 HJRS: X (Honorable Mention)**
Mutations in genes can alter their DNA patterns, and by recognizing these mutations, many carcinomas can be diagnosed in the progression stages. The human body contains many hidden and enigmatic features that humankind has not yet fully understood. A total of 7539 neoplasm cases were reported from 1 January 2021 to 31 December 2021. Of these, 3156 were seen in males (41.9%) and 4383 (58.1%) in female patients. Several machine learning and deep learning frameworks are already implemented to detect mutations, but these techniques lack generalized datasets and need to be optimized for better results. Deep learning-based neural networks provide the computational power to calculate the complex structures of gastric carcinoma-driven gene mutations. This study proposes deep learning approaches such as long and short-term memory, gated recurrent units and bi-LSTM to help in identifying the progression of gastric carcinoma in an optimized manner. This study includes 61 carcinogenic driver genes whose mutations can cause gastric cancer. The mutation information was downloaded from intOGen.org and normal gene sequences were downloaded from asia.ensembl.org, as explained in the data collection section. The proposed deep learning models are validated using the self-consistency test (SCT), 10-fold cross-validation test (FCVT), and independent set test (IST); the IST prediction metrics of accuracy, sensitivity, specificity, MCC and AUC of LSTM, Bi-LSTM, and GRU are 97.18%,

98.35%, 96.01%, 0.94, 0.98; 99.46%, 98.93%, 100%, 0.989, 1.00; 99.46%, 98.93%, 100%, 0.989 and 1.00, respectively.
https://www.mdpi.com/2075-4418/13/13/2291

42. **Ashfaq, M. H., Butt, O. M., Ahmed, R. H., Selvaraj, J. A. L., & Rahim, N. A. (2023). Improved EPS-Based Robust Dynamic Control of Constant Current Source-Based Isolated Dual-Active-Bridge dc–dc Converter with Reduced Current Stress.** *Arabian Journal for Science and Engineering.* **doi: 10.1007/s13369-023-08353-z.** Muhammad Husnain Ashfaq **(Computer Science/SST) Date of Publication: October 2023** HJRS: W (Silver)

Due to its attractive features of bidirectional power flow, zero-voltage switching (ZVS), high power density, and electric isolation, the current source-based isolated dual-active-bridge (IDAB) dc–dc converter is widely employed in various renewable energy applications. Efficacy and sublime dynamic performance are two primary control objectives for IDAB-dc–dc converter. Recently a single-phase shift-based fast current controller (SPS-FCC) was proposed to enhance the dynamic performance of the IDAB-dc–dc converter. However, this control technique suffers from high current stresses when the voltage ratio between two bridges deviates from 1, which can affect the overall efficiency of the converter. A typical extended-phase shift (EPS) control scheme can substantially improve the converter efficiency by minimizing these current stresses, but it cannot meet the robust dynamic response requirements. To overcome the drawbacks of SPS-FCC and EPS, this study proposes a novel EPS-based fast current controller for current source-based IDAB-dc–dc converters (EPS-FCC). The proposed control strategy combines the high efficiency of EPS and the robust dynamic performance of FCC. Thus, the IDAB-dc–dc converter implemented with the proposed control technique has the advantages of excellent dynamic response and high efficiency under light load conditions. Moreover, the proposed controller is cost-effective compared to SPS-FCC as for the same transmission power, the electric equipment with low current ratings can be selected. To confirm the effectiveness of the proposed control scheme, a 300 W IDAB-dc–dc converter prototype is developed. Different test cases are designed, and the proposed control technique is compared in detail with SPS-FCC and EPS control schemes under these test cases. The experimental results have validated the effectiveness of the proposed control technique.
https://link.springer.com/article/10.1007/s13369-023-08353-z#Abs1

43. **Malik, H., Anees, T., Al-Shamaylehs, A. S., Alharthi, S. Z., Khalil, W., & Akhunzada, A. (2023). Deep Learning-Based Classification of Chest Diseases Using X-rays, CT Scans, and Cough Sound Images.** *Diagnostics,* **13(17). doi: 10.3390/diagnostics13172772.** Hassaan Malik **(Computer Science/SST) Date of Publication: August 2023** HJRS: X (Honorable Mention)

Chest disease refers to a variety of lung disorders, including lung cancer (LC), COVID-19, pneumonia (PNEU), tuberculosis (TB), and numerous other respiratory disorders. The symptoms (i.e., fever, cough, sore throat, etc.) of these chest diseases are similar, which might mislead radiologists and health experts when classifying chest diseases. Chest X-rays (CXR), cough sounds, and computed tomography (CT) scans are utilized by researchers and doctors to identify chest diseases such as LC, COVID-19, PNEU, and TB. The objective of the work is to identify nine different types of chest diseases, including COVID-19, edema (EDE), LC, PNEU, pneumothorax (PNEUTH), normal, atelectasis (ATE), and consolidation lung (COL). Therefore, we designed a novel deep learning (DL)-based chest disease detection network (DCDD_Net) that uses a CXR, CT scans, and cough sound images for the identification of nine different types of chest diseases. The scalogram method is used to convert the cough sounds into an image. Before training the proposed DCDD_Net model, the borderline (BL) SMOTE is applied to balance the CXR, CT scans, and cough sound images of nine chest diseases. The proposed DCDD_Net model is trained and evaluated on 20 publicly available benchmark chest disease datasets of CXR, CT scan, and cough sound images. The classification performance of the DCDD_Net is compared with four baseline models, i.e., InceptionResNet-V2, EfficientNet-B0, DenseNet-201, and Xception, as well as state-of-the-art (SOTA) classifiers. The DCDD_Net achieved an accuracy of 96.67%, a precision of 96.82%, a recall of 95.76%, an F1-score of 95.61%, and an area under the curve (AUC) of 99.43%. The results reveal that DCDD_Net outperformed the other four baseline models in terms of many performance evaluation metrics. Thus, the proposed DCDD_Net model can provide significant assistance to radiologists and medical experts. Additionally, the proposed model was also shown to be resilient by statistical evaluations of the datasets using McNemar and ANOVA tests.
https://www.mdpi.com/2075-4418/13/17/2772

44. **Malik, H., Anees, T., Faheem, M., Chaudhry, M. U., Ali, A., & Asghar, M. N. (2023). Blockchain and Internet of Things in smart cities and drug supply management: Open issues, opportunities, and future directions.** *Internet of Things (Netherlands),* **23. doi: 10.1016/j.iot.2023.100860.** Hassaan Malik **(Computer Science\SST)** Tayyaba Anees **(Software Engineering/SST) Date of Publication: October 2023** HJRS: Y (Null)

Blockchain-based drug supply management (DSM) requires powerful security and privacy procedures for high-level authentication, interoperability, and medical record sharing. Researchers have shown a surprising interest in Internet of Things (IoT)-based smart cities in recent years. By providing a variety of intelligent applications, such as intelligent transportation, industry 4.0, and smart financing, smart cities (SC) can improve

the quality of life for their residents. Blockchain technology (BCT) can allow SC to offer a higher standard of security by keeping track of transactions in an immutable, secure, decentralized, and transparent distributed ledger. The goal of this study is to systematically explore the current state of research surrounding cutting-edge technologies, particularly the deployment of BCT and the IoT in DSM and SC. In this study, the defined keywords "blockchain", "IoT", drug supply management", "healthcare", and "smart cities" as well as their variations were used to conduct a systematic search of all relevant research articles that were collected from several databases such as Science Direct, JStor, Taylor & Francis, Sage, Emerald insight, IEEE, INFORMS, MDPI, ACM, Web of Science, and Google Scholar. The final collection of papers on the use of BCT and IoT in DSM and SC is organized into three categories. The first category contains articles about the development and design of DSM and SC applications that incorporate BCT and IoT, such as new architecture, system designs, frameworks, models, and algorithms. Studies that investigated the use of BCT and IoT in the DSM and SC make up the second category of research. The third category is comprised of review articles regarding the incorporation of BCT and IoT into DSM and SC-based applications. Furthermore, this paper identifies various motives for using BCT and IoT in DSM and SC, as well as open problems and makes recommendations. The current study contributes to the existing body of knowledge by offering a complete review of potential alternatives and finding areas where further research is needed. As a consequence of this, researchers are presented with intriguing potential to further create decentralized DSM and SC apps as a result of a comprehensive discussion of the relevance of BCT and its implementation.

https://www.sciencedirect.com/science/article/pii/S254266052300183X

45. **Perveen, G., Ali, S. F., Ahmad, J., Shahab, S., Adnan, M., Anjum, M., & Khosa, I. (2023). Multi-Stream Deep Convolution Neural Network With Ensemble Learning for Facial Micro-Expression Recognition. IEEE Access, 11, 118474-118489. doi: 10.1109/ACCESS.2023.3325108.** Gulnaz Perveen, Syed Farooq Ali, Jameel Ahmad, Muhammad Adnan **(Computer Science/SST) Date of Publication: October 2023** HJRS: W (Silver)

Micro-expression recognition has gained much attention in research communities. Among its proposed solutions, deep learning approaches have shown promising results over the past few years. In this paper, we propose a multi-stream deep convolution neural network with ensemble classification for facial micro-expression recognition. The multi-stream network uses the deep features of a residual network, densely connected convolutional network, and visual geometry group. The features of these aforementioned architectures are extracted from their pooling layers and become very resource-intensive due to their high dimensions. The principal component analysis is applied to these features for their dimensionality reduction. Stacking, an ensemble classification technique, is performed on these deep features with three base learners (random tree, J48, random forest) and a meta learner (random forest). Experiments were performed using publicly available datasets, namely: CASME-II, CASME2, SMIC, and SAMM. The proposed approach (PA) is compared with twelve approaches. The results show that the PA outperformed the existing approaches in terms of accuracy and time efficiency.

https://ieeexplore.ieee.org/abstract/document/10286498

46. **Rashid, A., Farooq, M. S., Abid, A., Umer, T., Bashir, A. K., & Zikria, Y. B. (2023). Social media intention mining for sustainable information systems: categories, taxonomy, datasets and challenges.** *Complex and Intelligent Systems,* **9(3), 2773-2799. doi: 10.1007/s40747-021-00342-9.** Ayesha Rashid, Muhammad Shoaib Farooq & Adnan Abid **(Computer Science/SST) Date of Publication: June 2023** HJRS: W (Bronze)

Intention mining is a promising research area of data mining that aims to determine end-users' intentions from their past activities stored in the logs, which note users' interaction with the system. Search engines are a major source to infer users' past searching activities to predict their intention, facilitating the vendors and manufacturers to present their products to the user in a promising manner. This area has been consistently getting pertinence with an increasing trend for online purchasing. Noticeable research work has been accomplished in this area for the last two decades. There is no such systematic literature review available that provides a comprehensive review in intension mining domain to the best of our knowledge. This article presents a systematic literature review based on 109 high-quality research papers selected after rigorous screening. The analysis reveals that there exist eight prominent categories of intention. Furthermore, a taxonomy of the approaches and techniques used for intention mining have been discussed in this article. Similarly, six important types of data sets used for this purpose have also been discussed in this work. Lastly, future challenges and research gaps have also been presented for the researchers working in this domain.

https://link.springer.com/article/10.1007/s40747-021-00342-9#Abs1

47. **Rafay, A., Asghar, Z., Manzoor, H., & Hussain, W. (2023). EyeCNN: exploring the potential of convolutional neural networks for identification of multiple eye diseases through retinal imagery. International Ophthalmology, 43(10), 3569-3586. doi: 10.1007/s10792-023-02764-5.** Abdul Rafay, Zaeem Asghar, Hamza Manzoor **(Computer Science/SST)** Waqar Hussain **(AI/SST) Date of Publication: June 2023** HJRS: X (Clay)

Background The eyes are the most important part of the human body as these are directly connected to the brain and help us perceive the imagery in daily life whereas, eye diseases are mostly ignored and

underestimated until it is too late. Diagnosing eye disorders through manual diagnosis by the physician can be very costly and time taking. Objective Thus, to tackle this, a novel method namely EyeCNN is proposed for identifying eye diseases through retinal images using EfcientNet B3. Methods A dataset of retinal imagery of three diseases, i.e. Diabetic Retinopathy, Glaucoma, and Cataract is used to train 12 convolutional networks while EfcientNet B3 was the topperforming model out of all 12 models with a testing accuracy of 94.30%. Results After preprocessing of the dataset and training of models, various experimentations were performed to see where our model stands. The evaluation was performed using some well-defned measures and the fnal model was deployed on the Streamlit server as a prototype for public usage. The proposed model has the potential to help diagnose eye diseases early, which can facilitate timely treatment.
https://link.springer.com/article/10.1007/s10792-023-02764-5#Abs1

48. **Raza, R.,** Zulfiqar, F., **Khan, M. O.,** Arif, M., **Alvi, A.,** Iftikhar, M. A., & Alam, T. (2023). Lung-EffNet: Lung cancer classification using EfficientNet from CT-scan images. *Engineering Applications of Artificial Intelligence,* **126. doi: 10.1016/j.engappai.2023.106902.** Rehan Raza, Muhammad Owais Khan, Atif Alvi (Computer Science/SST) Date of Publication: November 2023 **HJRS: W (Gold)**

Lung cancer (LC) remains a leading cause of death worldwide. Early diagnosis is critical to protect innocent human lives. Computed tomography (CT) scans are one of the primary imaging modalities for lung cancer diagnosis. However, manual CT scan analysis is time-consuming and prone to errors/not accurate. Considering these shortcomings, computational methods especially machine learning and deep learning algorithms are leveraged as an alternative to accelerate the accurate detection of CT scans as cancerous, and non-cancerous. In the present article, we proposed a novel transfer learning-based predictor called, Lung-EffNet for lung cancer classification. Lung-EffNet is built based on the architecture of EfficientNet and further modified by adding top layers in the classification head of the model. Lung-EffNet is evaluated by utilizing five variants of EfficientNet i.e., B0–B4. The experiments are conducted on the benchmark dataset "IQ-OTH/NCCD" for lung cancer patients grouped as benign, malignant, or normal based on the presence or absence of lung cancer. The class imbalance issue was handled through multiple data augmentation methods to overcome the biases. The developed model Lung-EffNet attained 99.10% of accuracy and a score of 0.97 to 0.99 of ROC on the test set. We compared the efficacy of the proposed fine-tuned pre-trained EfficientNet with other pre-trained CNN architectures. The predicted outcomes demonstrate that EfficientNetB1 based Lung-EffNet outperforms other CNNs in terms of both accuracy and efficiency. Moreover, it is faster and requires fewer parameters to train than other CNN based models, making it a good choice for large-scale deployment in clinical settings and a promising tool for automated lung cancer diagnosis from CT scan images.
https://www.sciencedirect.com/science/article/pii/S0952197623010862

49. **Riaz, S.,** Naeem, A., Malik, H., **Naqvi, R. A., & Loh, W. K. (2023). Federated and Transfer Learning Methods for the Classification of Melanoma and Nonmelanoma Skin Cancers: A Prospective Study.** *Sensors (Basel, Switzerland),* **23(20). doi: 10.3390/s23208457.** Ahmad Naeem, Hassaan Malik (Computer Science/SST) Date of Publication: October 2023 **HJRS: W (Silver)**

Skin cancer is considered a dangerous type of cancer with a high global mortality rate. Manual skin cancer diagnosis is a challenging and time-consuming method due to the complexity of the disease. Recently, deep learning and transfer learning have been the most effective methods for diagnosing this deadly cancer. To aid dermatologists and other healthcare professionals in classifying images into melanoma and nonmelanoma cancer and enabling the treatment of patients at an early stage, this systematic literature review (SLR) presents various federated learning (FL) and transfer learning (TL) techniques that have been widely applied. This study explores the FL and TL classifiers by evaluating them in terms of the performance metrics reported in research studies, which include true positive rate (TPR), true negative rate (TNR), area under the curve (AUC), and accuracy (ACC). This study was assembled and systemized by reviewing well-reputed studies published in eminent fora between January 2018 and July 2023. The existing literature was compiled through a systematic search of seven well-reputed databases. A total of 86 articles were included in this SLR. This SLR contains the most recent research on FL and TL algorithms for classifying malignant skin cancer. In addition, a taxonomy is presented that summarizes the many malignant and non-malignant cancer classes. The results of this SLR highlight the limitations and challenges of recent research. Consequently, the future direction of work and opportunities for interested researchers are established that help them in the automated classification of melanoma and nonmelanoma skin cancers.
https://www.mdpi.com/1424-8220/23/20/8457

50. **Suleman, M. T., & Khan, Y. D.** (2023). PseU-Pred: An ensemble model for accurate identification of pseudouridine sites. *Analytical Biochemistry,* **676. doi: 10.1016/j.ab.2023.115247.** Muhammad Taseer Suleman & Yaser Daanial Khan (Computer Science/SST) Date of Publication: September 2023 **HJRS: X (Clay)**

Pseudouridine (ψ) is reported to occur frequently in all types of RNA. This uridine modification has been shown to be essential for processes such as RNA stability and stress response. Also, it is linked to a few human diseases, such as prostate cancer, anemia, etc. A few laboratory techniques, such as Pseudo-seq and N3-CMC-

enriched Pseudouridine sequencing (CeU-Seq) are used for detecting ψ sites. However, these are laborious and drawn-out methods. The convenience of sequencing data has enabled the development of computationally intelligent models for improving ψ site identification methods. The proposed work provides a prediction model for the identification of ψ sites through popular ensemble methods such as stacking, bagging, and boosting. Features were obtained through a novel feature extraction mechanism with the assimilation of statistical moments, which were used to train ensemble models. The cross-validation test and independent set test were used to evaluate the precision of the trained models. The proposed model outperformed the preexisting predictors and revealed 87% accuracy, 0.90 specificity, 0.85 sensitivity, and a 0.75 Matthews correlation coefficient. A web server has been built and is available publicly for the researchers at https://taseersuleman-y-test-pseu-pred-c2wmtj.streamlit.app/.
https://www.sciencedirect.com/science/article/abs/pii/S0003269723002129

51. **Tanveer, M.,** Alasmary, H., Kumar, N., & Nayak, A. (2023). SAAF-IoD: Secure and Anonymous Authentication Framework for the Internet of Drones. *IEEE Transactions on Vehicular Technology,* 1-13. doi: 10.1109/TVT.2023.3306813. Muhammad Tanveer (Computer Science/SST) Date of Publication: August 2023 HJRS: W (Platinum)

Internet of Drones (IoD) offers several advantages, such as enabling ground communications in areas with connectivity limitations due to physical obstacles. However, IoD also introduces new security vulnerabilities. For instance, an attacker could launch a drone capture attack to obtain confidential credentials and inject counterfeit information into the IoD network, jeopardizing its smooth operation. In such scenarios, authentication plays a crucial role in ensuring security. Unfortunately, the existing authentication frameworks are insufficient to protect against attacks in the IoD environment. In this article, we propose a secure and anonymous authentication framework called SAAF-IoD for the IoD. SAAF-IoD utilizes a chaotic map in combination with symmetric encryption and hash functions. It allows external users of the IoD network to establish a session key (SK) with the deployed drone by performing mutual authentication with the Ground-Station Server (GS). The proposed SAAF-IoD framework provides resistance against privileged insider attacks and GS bypass attacks. We validate the resilience of SAAF-IoD against various security attacks through both formal and informal analyses. Furthermore, we compare the efficiency of the proposed framework with a benchmark scheme in terms of communication and computational costs. Our results demonstrate that SAAF-IoD requires fewer resources than the relevant schemes while offering enhanced security features.
https://ieeexplore.ieee.org/abstract/document/10229199

52. **Tanveer, M**., Badshah, A., Khan, A. U., Alasmary, H., & Chaudhry, S. A. (2023). CMAF-IIoT: Chaotic map-based authentication framework for Industrial Internet of Things. *Internet of Things (Netherlands),* 23. doi: 10.1016/j.iot.2023.100902. Muhammad Tanveer (Computer Science/SST) Date of Publication: October 2023 HJRS: Y (Null)

The Industrial Internet of Things (IIoT) revolutionizes industrial production using smart devices (SMDs) deployed in IIoT environments. These SMDs collect and transmit information from target fields for analysis and can be controlled remotely. In emergency situations, real-time access to specific SMD information is crucial for prompt actions. However, ensuring secure and reliable communication between users and SMDs in untrusted channels is a significant challenge. Privacy concerns and the limitations of existing authentication frameworks further exacerbate this challenge, necessitating a lightweight cryptography-based authentication framework. This framework is essential to enable secure and reliable communication in the diverse IIoT environment while addressing privacy leakage threats and the computational constraints of IoT devices. Recently, various lightweight cryptography-based authenticated encryption (AE) schemes have been proposed to enable encryption and decryption services for resource-constrained IIoT devices. ASCON, an efficient AE scheme, offers confidentiality, integrity, and authenticity in a single encryption and decryption operation, reducing the number of cryptographic operations required for authentication framework design. This paper presents CMAF-IIoT, a chaotic map and resource-efficient AE scheme (ASCON)-based authentication framework for IIoT, addressing the aforementioned challenges. CMAF-IIoT ensures reliable communication between SMDs and users. The framework begins with user-performed local authentication on their smart devices, followed by the establishment of a session key with the SMD after mutual authentication with the gateway. Using the session key, users securely access real-time information from SMDs deployed in the IIoT environment. The security of CMAF-IIoT is validated through formal and informal security analyses. Additionally, the efficiency of CMAF-IIoT is evaluated in terms of communication, computational, and storage costs. The results indicate that CMAF-IIoT requires [6.67% to 53.33%] low storage cost, [45.13% to 65.87%] low computational cost, and [16.46% to 83.29%] low communication cost compared to contrasted authentication frameworks. These findings highlight the viability of CMAF-IIoT for the IIoT environment, as it provides resource efficiency and enhanced security features.
https://www.sciencedirect.com/science/article/abs/pii/S2542660523002251

53. **Tanveer, M.,** Bhutta, M. N. M., Alzahrani, B. A., Albeshri, A., Alsubhi, K., & Chaudhry, S. A. (2023). CMAP-IoT: Chaotic Map-Based Authentication Protocol for Crowdsourcing Internet of Things. *Arabian Journal for Science and Engineering.* doi: 10.1007/s13369-023-08047-6. **Muhammad Tanveer (Computer Science/SST) Date of Publication: June 2023 HJRS: W (Bronze)**

Crowdsourcing Internet of Things (IoT) applications have resulted in the widespread use of smart mobile devices, such as wearable devices and smartphones. E-healthcare is a significant application of crowdsourcing IoT that enables authorized users (for instance, patients, doctors, and nurses) to access and store medical server data via the public Internet or openly available wireless channels. The public Internet and wireless channel are exposed to eclectic hazards and attacks. Thus, user authentication is paramount for the streamlined usage of these services. The article proposes a new authentication protocol called CMAP-IoT for crowdsourcing IoT, which utilizes chaotic maps and authenticated encryption. This protocol allows for mutual authentication between the user and server and establishes a session key for encrypted transmission. Unlike other protocols, CMAP-IoT effectively prevents attacks that compromise user authentication. The security of CMAP-IoT was validated through ROM-based validation and informal security analysis, which demonstrated its resilience against various malicious security vulnerabilities. Additionally, Scyther-tool-based validation confirmed that CMAP-IoT is secure. Lastly, performance evaluation showed that CMAP-IoT requires [2.63–32.73%] and [66.92–94.85%] lower communication and computational costs compared to other authentication protocols making it suitable for e-healthcare applications.
https://link.springer.com/article/10.1007/s13369-023-08047-6#Abs1

54. **Tanveer, M.,** Khan, A. U., Ahmad, M., Nguyen, T. N., & El-Latif, A. A. A. (2023). Resource-Efficient Authenticated Data Sharing Mechanism for Smart Wearable Systems. *IEEE Transactions on Network Science and Engineering,* 10(5), 2525-2536. doi: 10.1109/TNSE.2022.3203927. **Muhammad Tanveer (Computer Science/SST) Date of Publication: October 2023 HJRS: W (Silver)**

Recent technological developments in the wearable devices (WDs) and smartphones enabled ubiquitous and always-on monitoring of the users' movements. WDs collect the sensitive and personal information associated with a user's health and send the collected information to the user's terminal or smart device (SD). The SD allows the user to store the collected information on the cloud server (CSE) for subsequent sharing with other users, such as doctors. The data storage and sharing process thus performed is prone to various security challenges, which mandate a reliable and authenticated data storage and a secure data sharing mechanism. This article presents an access control scheme based on an authenticated encryption algorithm, called elliptic curve cryptography, and hash function. The scheme allows users to get authenticated and establish a session key (SK) with CSE. The establishment of SK enables users to securely store the data in the storage module of CSE. Additionally, before storing, the user encrypts the data using a secret key derived from the users' bio-metric information. Moreover, the scheme allows a user to share his data with other users without requiring the security constraints implemented by the cloud service providers. The security of the SK established under the scheme is validated formally through Scyther and the random oracle models. Moreover, informal analysis is conducted, which illustrates that the proposed scheme is resilient against various security attacks. Finally, the proposed scheme is compared with the existing scheme to ensure its efficiency and superior security features.
https://ieeexplore.ieee.org/document/9875976

55. **Yousafzai, A.,** Kumar, P. M., & Hong, C. S. (2023). Blockchain-based incentive management framework for desktop clouds. *Cluster Computing,* 26(1), 137-156. doi: 10.1007/s10586-022-03557-8. **Abdullah Yousafzai (Computer Science/SST) Date of Publication: February 2023 HJRS: W (Honorable Mention)**

Desktop clouds connect several desktop computers into a cloud computing architecture to reap the potential of untapped commodity computing power over the Internet. In desktop clouds, what benefit (incentive) a participant will get for sharing its computational resources, and how participants will contribute (pay) after consuming computational resources from other participants. This inexistence of monetary incentives hinders the widespread adoption of desktop clouds as there is no motivation for the participants to join and remain in the desktop cloud environment. In this article, we propose a decentralized escrow approach over the ethereum blockchain for enhancing the expectation of a participating node to join and offer services in desktop cloud networks. We then propose a distributed multi-agent framework for desktop cloud environments. Moreover, we present the agents' full algorithmic behavior with their interaction to the escrow over the ethereum smart contract. The proposed framework provides monetary incentives using blockchain-based cryptocurrencies managed through decentralized escrow over ethereum smart contract to the desktop cloud participants in a trusted manner. Lastly, we present simulation results from a testbed verifying the monetization of desktop cloud participants in the proposed framework.
https://link.springer.com/article/10.1007/s10586-022-03557-8#Abs1

56. **Zulfiqar, F.,** Raza, R., Khan, M. O., Arif, M., Alvi, A., & Alam, T. (2023). Augmented Reality and Its Applications in Education: A Systematic Survey. *IEEE Access,* 1-1. doi: 10.1109/ACCESS.2023.3331218. **Rehan Raza,**

Muhammad Owais Khan, Atif Alvi (Computer Science/SST) Date of Publication: November 2023 HJRS: W (Silver)

The use of technology, especially mobile phones, has significantly increased over the past few decades and has become an essential element in our daily lives. Mobile and desktop applications based on Augmented Reality (AR) proved to be a revolutionary step in different areas, especially in the educational sector. AR provides an improved and extended version of reality with the superimposition of a virtual object in the real-world environment. These objects can be interacted with and visualized in many ways to provide full AR experiences. By interacting with augmented virtual objects, students can visualize and completely understand various difficult concepts during their studies rather than traditional learning, allowing collaborative learning and hence improving learnability, motivation, and focus. This survey paper discusses the concept of AR and its types, the need for AR applications in education, analysis of various state-of-the-art AR applications in terms of platform, augmented virtual content, interactions, usability, usefulness, performance, effectiveness, and ease-of-use under a single taxonomy. Although applications of AR in education for learning, teaching, and simulating have proven quite effective in delivering the concepts via interactive study, there are also several limitations in terms of complexity and availability of hardware, platforms, internet connections, portability, computational, and rendering speed. This study offers insights into potential trends and directions that AR technology might take in education, furnishing readers with a glimpse of forthcoming developments. This comprehensive perspective equips educators, researchers, and practitioners with valuable insights into the pedagogical implications, technological aspects, and practical considerations related to AR.
https://ieeexplore.ieee.org/abstract/document/10311503/authors

Conference Proceeding:

1. **Vistro, D. M., Rehman, A. U., & Hameed, Z. (2023). An Efficient Approach for Resilience and Reliability Against Cascading Failure. Paper presented at the 15th International Conference on Developments in eSystems Engineering, Dec 2023. Attique Ur Rehman (Computer Science/SST) Date of Publication: 09-12 January 2023**
Cloud computing becoming popular now day as, the world is moving towards vitalization and it provide resource to the users depending on their needs by using different resource allocation technique. Resilience and reliability is one of the major issue while dealing with cloud computing. Mitigation failure and migration failure are the issues in cloud resilience and reliability services which cause many service level objective violation. Many work have been done to improve the quality of resilience and reliability. The aim of this paper is to provide a better technique to avoid and recover from mitigation failure and a reliable resource allocation approach at minimum possible cost, for this purpose we used Cascading Failure Resilience System (CSFR) technique. Comparative analyses done to validate our approach and the results shows that our approach handle mitigation failure in an efficient way as well as it provide reliability while providing resources to the users at a comparative low cost.
https://ieeexplore.ieee.org/abstract/document/10100283

2. **Zhou, Z., Kanwal, A., Chaturvedi, K., Raza, R., Prakash, S., Jan, T., & Prasad, M. (2023). Deep Learning-Based Classification of Neurodegenerative Diseases Using Gait Dataset: A Comparative Study. Paper presented at the 2023 International Conference on Robotics, Control and Vision Engineering, RCVE 2023. Rehan Raza (Computer Science/SST) Date of Publication: July 2023**
Neuro-degenerative diseases pose a significant health concern for human society, especially among the elderly population. Given their high prevalence and the limited availability of clinical expertise and services, there is an urgent requirement for the integration of artificial intelligence (AI) systems to support healthcare professionals in addressing this issue. This paper presents a comparative analysis of seven deep learning architectures for neuro-degenerative disease classification by using a gait dynamics dataset. The models used in the analysis include LSTM, GRU, InceptionTime, ResNet, FCN, TST, and PatchTST. The models are extensively evaluated for different classification tasks. The findings of the study suggest that deep learning techniques have the potential to diagnose and classify different neurodegenerative diseases effectively. It can be inferred that ResNet exhibits superior performance compared to other models in tasks involving the classification of healthy controls (HC) and class of individuals with all neuro-degenerative diseases (NDDs), and classification of healthy controls (HC) from individuals with Parkinson's disease (PD). TST demonstrates the highest level of performance among all models in tasks involving distinguishing between Amyotrophic Lateral Sclerosis (ALS) and healthy controls (HC), as well as Huntington's disease (HD) and healthy controls (HC).
https://dl.acm.org/doi/abs/10.1145/3608143.3608154

3. **Zia, M. F., Inayat, U., Noor, W., Pangracious, V., & Benbouzid, M. (2023). Locational Detection of False Data Injection Attack in Smart Grid Based on Multilabel Machine Learning Classification Methods. Paper**

presented at the **2023 IEEE IAS Global Conference on Renewable Energy and Hydrogen Technologies, GlobConHT 2023.** **Usman Inayat, Wafa Noor (Computer Science/SST) Date of Publication: 11-12 March 2023** State estimation is important for the smart grid monitoring and control. Owing to information and communication technologies, smart grid performs efficient management of power system reliability and stability. However, these information and communication technologies also make smart grid vulnerable to cyber threats, particularly false data injection attacks (FDIAs). It is the most threatening attack as it disrupts the operations of the grid and manipulates the reading of the state estimator. In smart grid systems, power measurements are obtained through various advanced metering systems and the location detection of compromised meters is also important besides determining the FDIA attack. This paper propose multilabel machine learning classification methods, binary relevance and classifier chain, to detect FDIA and locate compromised smart meters. Through a comprehensive experiment on IEEE 14 bus system, we showed that the accuracy of binary relevance is 95.1%.
https://ieeexplore.ieee.org/abstract/document/10087717/authors#full-text-header

Department of Informatics and Systems

1. **Naqvi, M. R., Iqbal, M. W.,** **Shahzad, S. K., Ashraf, M. U.,** **Alsubhi, K., & Aljahdali, H. M. (2023). Ontological Model for Cohesive Smart Health Services Management.** *CMC-Computer Materials & Continua*, ***74***(2), 3679-3695. doi: 10.32604/cmc.2023.030340. **Syed Khuram Shehzad (INFS/SST)** **M. Usman Ashraf (Computer Science/KUST) Date of Publication: February 2023** **HJRS: W (Honorable Mention)**
    Health care has become an essential social-economic concern for all stakeholders (e.g., patients, doctors, hospitals etc.), health needs, private care and the elderly class of society. The massive increase in the usage of health care Internet of things (IoT) applications has great technological evolvement in human life. There are various smart health care services like remote patient monitoring, diagnostic, disease-specific remote treatments and telemedicine. These applications are available in a split fashion and provide solutions for variant diseases, medical resources and remote service management. The main objective of this research is to provide a management platform where all these services work as a single unit to facilitate the users. The ontological model of integrated healthcare services is proposed by getting requirements from various existing healthcare services. There were 26 smart health care services and 26 smart health care services to classify the knowledge-based ontological model. The proposed ontological model is derived from different classes, relationships, and constraints to integrate health care services. This model is developed using Protégé based on each interrelated/correlated health care service having different values. Semantic querying SPARQL protocol and RDF query language (SPARQL) were used for knowledge acquisition. The Pellet Reasoner is used to check the validity and relations coherency of the proposed ontology model. Comparative to other smart health care services integration systems, the proposed ontological model provides more cohesiveness.
    https://101.32.70.228/cmc/v74n2/50214

2. **Gondal, F. K.,** **Shahzad, S. K.,** **Jaffar, M. A., & Iqbal, M. W. (2023). A Process Oriented Integration Model for Smart Health Services.** *Intelligent Automation & Soft Computing,* ***35***(2), 1369-1386.doi: 10.32604/iasc.2023.028407. **Syed Khuram Shehzad (INFS/SST) Date of Publication: February 2023** **HJRS: X (Clay)**
    Cities are facing challenges of high rise in population number and con-sequently need to be equipped with latest smart services to provide luxuries of life to its residents. Smart integrated solutions are also a need to deal with the social and environmental challenges, caused by increasing urbanization. Currently, the development of smart services' integrated network, within a city, is facing the barriers including; less efficient collection and sharing of data, along with inadequate collaboration of software and hardware. Aiming to resolve these issues, this paper recommended a solution for a synchronous functionality in the smart services' integration process through modeling technique. Using this integration modeling solution, at first, the service participants, processes and tasks of smart services are identified and then standard illustrations are developed for the better understanding of the integrated service group environment. Business process modeling and notation (BPMN) language based models are developed and discussed for a devised case study, to test and experiment i.e., for remote healthcare from a smart home. The research is concluded with the integration process model application for the required data sharing among different service groups. The outcomes of the modeling are better understanding and attaining maximum automation that can be referenced and replicated.
    https://www.techscience.com/iasc/v35n2/48894

3. **Alyas, T., Tabassum, N., Iqbal, M. W., Alshahrani, A. S., Alghamdi, A., &** **Shahzad, S. K. (2023). Resource Based Automatic Calibration System (RBACS) Using Kubernetes Framework.** *Intelligent Automation & Soft Computing*, ***35***(1), 1165-1179.doi: 10.32604/iasc.2023.028815. **Syed Khuram Shehzad (INFS/SST) Date of Publication: January 2023** **HJRS: X (Clay)**
    Kubernetes, a container orchestrator for cloud-deployed applications, allows the application provider to scale automatically to match the fluctuating intensity of processing demand. Container cluster technology is used to

encapsu-late, isolate, and deploy applications, addressing the issue of low system reliabil-ity due to interlocking failures. Cloud-based platforms usually entail users define application resource supplies for eco container virtualization. There is a constant problem of over-service in data centers for cloud service providers. Higher operating costs and incompetent resource utilization can occur in a waste of resources. Kubernetes revolutionized the orchestration of the container in the cloud-native age. It can adaptively manage resources and schedule containers, which provide real-time status of the cluster at runtime without the user's contribution. Kuber-netes clusters face unpredictable traffic, and the cluster performs manual expansion configuration by the controller. Due to operational delays, the system will become unstable, and the service will be unavailable. This work proposed an RBACS that vigorously amended the distribution of containers operating in the entire Kubernetes cluster. RBACS allocation pattern is analyzed with the Kuber-netes VPA. To estimate the overall cost of RBACS, we use several scientific benchmarks comparing the accomplishment of container to remote node migra-tion and on-site relocation. The experiments ran on the simulations to show the method's effectiveness yielded high precision in the real-time deployment of resources in eco containers. Compared to the default baseline, Kubernetes results in much fewer dropped requests with only slightly more supplied resources.

https://techscience.com/iasc/v35n1/48179/html

4. **Alam, H., Burhan, M., Gillani, A., Haq, I. U., Arshed, M. A., Shafi, M., & Ahmad, S. (2023). IoT Based Smart Baby Monitoring System with Emotion Recognition Using Machine Learning.** *Wireless Communications and Mobile Computing,* **2023. doi: 10.1155/2023/1175450.** Hina Alam, Ihtisham ul Haq, Muhammad Asad Arshed, Saeed Ahmad (INFS/SST) Anusha Gillani (ORIC) Date of Publication: April 2023 HJRS: W (Honorable Mention)

Child care is necessary for parents, but nowadays taking care of a child has become a lot more challenging, especially for working mothers. It has become increasingly difficult for parents to continuously monitor their baby's condition. Thus, a smart baby monitoring system based on IoT and machine learning is implemented to overcome the monitoring issues and provide intimation to parents in real-time. In the proposed system, the necessary monitoring features like room temperature and humidity, cry detection, and face detection were monitored by exploiting different sensors. The sensor data is transferred to the Blynk server via controllers with an Internet connection. The system is also capable of detecting the facial emotions of the registered babies by using a machine learning model. Parents can monitor the live activities and emotions of their child through the external web camera and can swing the baby cradle remotely upon cry detection using their mobile application. They can also check the real-time room temperature and humidity level. In case an abnormal action is detected, a notification is sent to the parent's mobile application to take action thus, making the baby monitoring system a relief for all working parents to manage their time efficiently while taking care of their babies simultaneously.

https://www.hindawi.com/journals/wcmc/2023/1175450/

5. **Bashir, M. N., Haseeb, A. S. M. A., Naher, S., Ali, M. M., Ali Bashir, M. B., Zaidi, A. A., . . . Javed, I. (2023). Effects of cobalt nanoparticle on microstructure of Sn58Bi solder joint.** *Journal of Materials Science: Materials in Electronics, 34*(4). doi: 10.1007/s10854-022-09465-2. Iqra Javed (INFS/SST) Date of Publication: January 2023 HJRS: X (Clay)

Eutectic Sn–Bi alloy is acquiring significant observation in the electronic packaging industry because of its advantageous properties such as ductility, low melting temperature, and mechanical strength. Miniaturization of electronic devices requires solder paste having a low melting temperature for the fabrication of chips on printed circuit board (PCB). Surface mount technology (SMT) is a reliable technique for this purpose. This work focuses to find out the effects of cobalt nanoparticle (NP) addition into the Sn-58Bi solder joint. The reflow process was done on samples of 0%, 0.5%, 1%, and 2% cobalt addition. Then thermal aging of 0% and 0.5% of cobalt addition was done at 70 °C, 85 °C, and 100 °C. To characterize the specimen and determine intermetallic compound (IMC) growth, scanning electron microscopy (SEM) and energy-dispersive X-ray (EDX) spectroscopy were used. After the addition of Co-nanoparticles, the microstructure of Sn-58Bi was refined. The interfacial IMC thickness was also reduced after the addition of cobalt nanoparticles. Cu_6Sn_5 and Cu_3Sn were found in the IMC of Sn-58Bi but only $(Cu, Co)_6Sn_5$ was found in the IMC of Sn-58Bi-xCo nanoparticles. Growth of interfacial IMC of SN-58Bi-xCo was significantly controlled as compared to Sn-58Bi after thermal aging.

https://link.springer.com/article/10.1007/s10854-022-09465-2

6. **Bashir, M. N., Khan, A. F., Bashir, S., Bashir, M. B. A., Jamshaid, M., Javed, I., & Ali, I. (2023). Effect of Zn nanoparticle doped flux on electromigration damages in SAC305 solder joint.** *Journal of Materials Science: Materials in Electronics, 34*(5). doi: 10.1007/s10854-022-09646-z. Iqra Javed (INFS/SST) Date of Publication: February 2023 HJRS: X (Clay)

Downscaling of electronic devices increased the current density in the solder joint. High current density causes the rapid diffusion of Cu atoms which is the root cause of failure in lead-free solder joints. This study aims the investigation of the effects of Zn nanoparticles (NP) doped flux on the microstructure of SAC305 solder joint under high current. Electromigration (EM) test was conducted for SAC305 solder and SAC305 + 2 wt% Zn NP-doped solder joints at different time intervals of 192, 384, 768, and 1128 h under a current density of

1×10^4 A/cm^2. The temperature was maintained at 80 ± 5 °C in the silicon oil bath during the EM test. The results showed that Zn NP-doped reduced the size of the interfacial IMC of the SAC305 solder joint after the reflow process. After the EM test, the cracks and damages were suppressed, and thickness variations at the cathode and anode were significantly controlled by adding Zn NP-doped flux into the SAC305 solder joint.
https://link.springer.com/article/10.1007/s10854-022-09646-z

7. **Hu, J., Zeng, W. W., Jia, N. X., Arif, M., Yu, D. J., & Zhang, G. J. (2023). Improving DNA-Binding Protein Prediction Using Three-Part Sequence-Order Feature Extraction and a Deep Neural Network Algorithm. *Journal of Chemical Information and Modeling, 63*(3), 1044-1057. doi: 10.1021/acs.jcim.2c00943. Muhammad Arif (INFS/SST) Date of Publication: February 2023 HJRS: W (Gold)**
    Identification of the DNA-binding protein (DBP) helps dig out information embedded in the DNA–protein interaction, which is significant to understanding the mechanisms of DNA replication, transcription, and repair. Although existing computational methods for predicting the DBPs based on protein sequences have obtained great success, there is still room for improvement since the sequence-order information is not fully mined in these methods. In this study, a new three-part sequenceorder feature extraction (called TPSO) strategy is developed to extract more discriminative information from protein sequences for predicting the DBPs. For each query protein, TPSO first divides its primary sequence features into N- and C-terminal fragments and then extracts the numerical pseudo features of three parts including the full sequence and these two fragments, respectively. Based on TPSO, a novel deep learning-based method, called TPSO-DBP, is proposed, which employs the sequence-based single-view features, the bidirectional long short-term memory (BiLSTM) and fully connected (FC) neural networks to learn the DBP prediction model. Empirical outcomes reveal that TPSO-DBP can achieve an accuracy of 87.01%, covering 85.30% of all DBPs, while achieving a Matthew's correlation coefficient value (0.741) that is significantly higher than most existing state-of-the-art DBP prediction methods. Detailed data analyses have indicated that the advantages of TPSO-DBP lie in the utilization of TPSO, which helps extract more concealed prominent patterns, and the deep neural network framework composed of BiLSTM and FC that learns the nonlinear relationships between input features and DBPs. The standalone package and web server of TPSO-DBP are freely available at https:// jun-csbio.github.io/TPSO-DBP/.
    https://pubs.acs.org/doi/pdf/10.1021/acs.jcim.2c00943

8. **Kaleem, H., Hassan, M. T., Mahmood, S., & Khalid, M. N. (2023). Deep Learning Algorithms to Predict m7G from Human Genome. *Journal of Computing & Biomedical Informatics*, 4(02), 110-116. https://doi.org/10.56979/402/2023. Hassan Kaleem, Malik Tahir Hassan, Sajid Mahmood (INFS/SST) Date of Publication: March 2023 HJRS: Y (Null)**
    N7-methyl guanosine (m7G) is a common post-transcriptional RNA alteration that plays a role in various biological processes such as gene expression, protein synthesis and cell viability. It is also linked to several illnesses, thus a thorough understanding of the mechanism and biological activities of m7G sites is required. Several machine learning models have been developed to predict m7G from the human genome, but machine learning models require feature extraction from the dataset and model training, which is a complex and time taking process for biologists and biochemists. For the first time, deep learning based algorithm is used to predict m7G. The main benefit of using a deep learning model is it does not require any features extraction from the dataset before passing it to the model, instead it generates features by itself. The LSTM model has outperformed all the other machine learning algorithms and achieved 0.7977 MCC on the independent dataset and after parameter optimization through KerasTuner, the model achieved 0.9934 MCC on independent dataset.
    https://jcbi.org/index.php/Main/article/view/98/75

9. **Nawaz, N. A., Ishaq, K., Farooq, U., Khalil, A., Rasheed, S., Abid, A., & Rosdi, F. (2023). A comprehensive review of security threats and solutions for the online social networks industry. *PeerJ Computer Science*, 9, e1143. https://doi.org/10.7717/peerj-cs.1143. Kashif Ishaq, Amna Khalil, Uzma Farooq, Adnan Abid (INFS/SST) Date of Publication: January 2023 HJRS: W (Bronze)**
    The term "cyber threats" refers to the new category of hazards that have emerged with the rapid development and widespread use of computing technologies, as well as our growing reliance on them. This article presents an in-depth study of a variety of security and privacy threats directed at different types of users of social media sites. Furthermore, it focuses on different risks while sharing multimedia content across social networking platforms, and discusses relevant prevention measures and techniques. It also shares methods, tools, and mechanisms for safer usage of online social media platforms, which have been categorized based on their providers including commercial, open source, and academic solutions.
    https://peerj.com/articles/cs-1143/

10. **Zahid, A. H., Arshad, M. J., Ahmad, M., Soliman, N. F., & El-Shafai, W. (2023). Dynamic S-Box Generation Using Novel Chaotic Map with Nonlinearity Tweaking. *Computers, Materials & Continua*, 75(2). Amjad Hussain Zahid (INFS/SST) Date of Publication: March 2023 HJRS: W (Honorable Mentioned)**

A substitution box (S-Box) is a crucial component of contemporary cryptosystems that provide data protection in block ciphers. At the moment, chaotic maps are being created and extensively used to generate these S-Boxes as a chaotic map assists in providing disorder and resistance to combat cryptanalytical attempts. In this paper, the construction of a dynamic S-Box using a cipher key is proposed using a novel chaotic map and an innovative tweaking approach. The projected chaotic map and the proposed tweak approach are presented for the first time and the use of parameters in their working makes both of these dynamic in nature. The tweak approach employs cubic polynomials while permuting the values of an initial S-Box to enhance its cryptographic fort. Values of the parameters are provided using the cipher key and a small variation in values of these parameters results in a completely different unique S-Box. Comparative analysis and exploration confirmed that the projected chaotic map exhibits a significant amount of chaotic complexity. The security assessment in terms of bijectivity, nonlinearity, bits independence, strict avalanche, linear approximation probability, and differential probability criteria are utilized to critically investigate the effectiveness of the proposed S-Box against several assaults. The proposed S-Box's cryptographic performance is comparable to those of recently projected S-Boxes for its adaption in real-world security applications. The comparative scrutiny pacifies the genuine potential of the proposed S-Box in terms of its applicability for data security.
https://www.techscience.com/cmc/v75n2/52128

11. **Hussain, M., Shahzad, A., Liaquat, F., Arshed, M. A., Mansoor, S., & Akram, Z. (2023). Performance Analysis of Machine Learning Algorithms for Early Prognosis of Cardiac Vascular Disease.** *Technical Journal of University of Engineering & Technology Taxila*, **28(2). Mehmood Hussain, Farrukh Liaquat, Muhammad Asad Arshed, Saman Mansoor (INFS/SST) Date of Publication: June 2023 HJRS: Y (Null)**

Cardiovascular disease, also known as heart disease, is on the rise. It is imperative to anticipate possible illnesses in advance, which is a difficult task that demands precision and efficiency. The main objective of this research paper is to identify patients who are at a higher risk of developing heart disease based on specific medical characteristics. To accomplish this, a heart disease prediction model was created that utilizes a patient's medical history to estimate the probability of a heart condition diagnosis. In this research, heart disease will be predicted using the dataset at hand, which includes 14 key attributes used for analysis. This study evaluates 18 machine learning models on a binary classification task using various performance metrics. The KNeighborsClassifier demonstrated the best performance across all metrics, achieving the highest train and test accuracy, precision, recall, F1-score, and AUC among all models. The ExtraTreesClassifier and GaussianProcessClassifier also performed well, while Gaussian Naïve Bayes, LinearSVC, NuSVC, and LogisticRegressionCV performed the worst. These findings suggest that the KNeighborsClassifier is the most suitable model for the binary classification task in question. This prediction can help clinicians analyze illness risk factors and assess patient scenarios. By focusing more on the condition's risk factors, it can be improved even further.
https://tj.uettaxila.edu.pk/index.php/technical-journal/issue/view/27

12. **i, H., Tian, H., & Rabbi, M. A. (2023). The impact of informatization on the urban-rural income gap: An empirical investigation of China.** *Information Development.* **doi: 10.1177/02666669231210839. Muhammad Ahsan Rabbi (INFS/SST) Date of Publication: June 2023 HJRS: Y (Null)**

Cardiovascular disease, also known as heart disease, is on the rise. It is imperative to anticipate possible illnesses in advance, which is a difficult task that demands precision and efficiency. The main objective of this research paper is to identify patients who are at a higher risk of developing heart disease based on specific medical characteristics. To accomplish this, a heart disease prediction model was created that utilizes a patient's medical history to estimate the probability of a heart condition diagnosis. In this research, heart disease will be predicted using the dataset at hand, which includes 14 key attributes used for analysis. This study evaluates 18 machine learning models on a binary classification task using various performance metrics. The KNeighborsClassifier demonstrated the best performance across all metrics, achieving the highest train and test accuracy, precision, recall, F1-score, and AUC among all models. The ExtraTreesClassifier and GaussianProcessClassifier also performed well, while Gaussian Naïve Bayes, LinearSVC, NuSVC, and LogisticRegressionCV performed the worst. These findings suggest that the KNeighborsClassifier is the most suitable model for the binary classification task in question. This prediction can help clinicians analyze illness risk factors and assess patient scenarios. By focusing more on the condition's risk factors, it can be improved even further.
https://tj.uettaxila.edu.pk/index.php/technical-journal/issue/view/27

Book Chapter

1. **Habib, N., Iqbal, M. W., Arif, M., Rana, T. A., & Shahzad, S. K. (2023). Smart Parking for Smart Drivers Using QR Codes Artificial Intelligence & Blockchain in Cyber Physical Systems: Technologies & Applications (pp. 22-47). Syed Khuram Shahzad (INFS/SST) Date of Publication: January 2023**

Principal Component Analysis is a Dimensionality Reduction technique. In this work, Principal Component Analysis is used for Facial Recognition. PCA is a mathematical approach used for reducing the number of variables in facial recognition. In PCA each image in the training set is represented as eigenfaces, a linear combination of weighted eigenvectors. These eigen vectors are calculated from a covariance matrix of a training image set. Weights are revealed after selecting a set of the most relevant eigenfaces. The faces are identified by projecting the image onto the subspace which is expanded by eigenfaces. Image classification is done by calculating the minimum Euclidean Distance and these features are reduced by selecting the most important principal components, which reduces the computation of training data. This helps in improving the accuracy of detection and also reduces the time for image detection. For this work, the evaluation parameters used are Precision, Recall, F1-Score and support. The accuracy calculated using these parameters of the image detection is satisfactory

https://www.taylorfrancis.com/chapters/edit/10.1201/9781003190301-3/smart-parking-smart-drivers-using-qr-codes-naveed-habib-muhammad-waseem-iqbal-muhammad-arif-toqir-rana-syed-khuram-shahzad

Department of Artificial Intelligence

1. **Habib, S., Akram, M., & Al-Shamiri, M. M. A. (2023). Comparative Analysis of Pythagorean MCDM Methods for the Risk Assessment of Childhood Cancer.** *CMES - Computer Modeling in Engineering and Sciences, 135*(3), 2585-2615. doi: 10.32604/cmes.2023.024551. **Shaista Habib** (AI/SST) Date of Publication: June 2023 **HJRS: X (Clay)**

According to the World Health Organization (WHO), cancer is the leading cause of death for children in low and middle-income countries. Around 400,000 kids get diagnosed with this illness each year, and their survival rate depends on the country in which they live. In this article, we present a Pythagorean fuzzy model that may help doctors identify the most likely type of cancer in children at an early stage by taking into account the symptoms of different types of cancer. The Pythagorean fuzzy decision-making techniques that we utilize are Pythagorean Fuzzy TOPSIS, Pythagorean Fuzzy Entropy (PF-Entropy), and Pythagorean Fuzzy Power Weighted Geometric (PFPWG). Our model is fed with nineteen symptoms and it diagnoses the risk of eight types of cancers in children. We develop an algorithm for each method and calculate its complexity. Additionally, we consider an example to make a clear understanding of our model. We also compare the final results of various tests that prove the authenticity of this study.

https://www.techscience.com/cmes/v135n3/50513

2. **Habib, S., Majeed, A., Akram, M., & Ali Al-Shamiri, M. M. (2023). Floyd-Warshall Algorithm Based on Picture Fuzzy Information.** *CMES - Computer Modeling in Engineering and Sciences, 136*(3), 2873-2894. doi: 10.32604/cmes.2023.026294. **Shaista Habib, Aqsa Majeed (AI/SST) Date of Publication: Sep 2023** **HJRS: X (Clay)**

The Floyd-Warshall algorithm is frequently used to determine the shortest path between any pair of nodes. It works well for crisp weights, but the problem arises when weights are vague and uncertain. Let us take an example of computer networks, where the chosen path might no longer be appropriate due to rapid changes in network conditions. The optimal path from among all possible courses is chosen in computer networks based on a variety of parameters. In this paper, we design a new variant of the Floyd-Warshall algorithm that identifies an All-Pair Shortest Path (APSP) in an uncertain situation of a network. In the proposed methodology, multiple criteria and their mutual association may involve the selection of any suitable path between any two node points, and the values of these criteria may change due to an uncertain environment. We use trapezoidal picture fuzzy addition, score, and accuracy functions to find APSP. We compute the time complexity of this algorithm and contrast it with the traditional Floyd-Warshall algorithm and fuzzy Floyd-Warshall algorithm.

https://www.techscience.com/cmes/v136n3/51810

3. **Shakeel, T., Habib, S., Boulila, W., Koubaa, A., Javed, A. R., Rizwan, M., . . . Sufiyan, M. (2023). Correction to: A survey on COVID-19 impact in the healthcare domain: worldwide market implementation, applications, security and privacy issues, challenges and future prospects (Complex & Intelligent Systems, (2023), 9, 1, (1027-1058), 10.1007/s40747-022-00767-w).** *Complex and Intelligent Systems, 9*(2), 2205. doi: 10.1007/s40747-022-00888-2. **Tanzeela Shakeel, Shaista Habib (AI/SST) Date of Publication: April 2023** **HJRS: X (Null)**

In the recent past, Internet of Things (IoT) plays a significant role in different applications such as health care, industrial sector, defense and research etc.… It provides effective framework in maintaining the security, privacy and reliability of the information in internet environment. Among various applications as mentioned health care place a major role, because security, privacy and reliability of the medical information is maintained in an effective way. Even though, IoT provides the effective protocols for maintaining the information, several intermediate attacks and intruders trying to access the health information which in turn reduce the privacy, security and reliability of the entire health care system in internet environment. As a result and to solve the issues, in this research Learning based Deep-Q-Networks has been introduced for reducing the malware attacks

while managing the health information. This method examines the medical information in different layers according to the Q-learning concept which helps to minimize the intermediate attacks with less complexity. The efficiency of the system has been evaluated with the help of experimental results and discussions.
https://link.springer.com/article/10.1007/s40747-022-00888-2

4. Bilal, M. A., Wang, Y., Ji, Y., Akhter, M. P., & Liu, H. (2023). Earthquake Detection Using Stacked Normalized Recurrent Neural Network (SNRNN). Applied Sciences (Switzerland), 13(14). doi: 10.3390/app13148121. Muhammad Pervez Akhter (AI/SST) Date of Publication: July 2023 HJRS: W (Honorable Mention)
Earthquakes threaten people, homes, and infrastructure. Earthquake detection is a complex task because it does not show any specific pattern, unlike object detection from images. Convolutional neural networks have been widely used for earthquake detection but have problems like vanishing gradients, exploding, and parameter optimization. The ensemble learning approach combines multiple models, each of which attempts to compensate for the shortcomings of the others to enhance performance. This article proposes an ensemble learning model based on a stacked normalized recurrent neural network (SNRNN) for earthquake detection. The proposed model uses three recurrent neural network models (RNN, GRU, and LSTM) with batch normalization and layer normalization. After preprocessing the waveform data, the RNN, GRU, and LSTM extract the feature map sequentially. Batch normalization and layer normalization methods take place in mini-batches and input layers for stable and faster training of the model and improving its performance. We trained and tested the proposed model on 6574 events from 2000 to 2018 (18 years) in Turkey, a highly targeted region. The SNRNN achieves RMSE values of 3.16 and 3.24 for magnitude and depth detection. The SNRNN model outperforms the three baseline models, as seen by their low RMSE values
https://www.mdpi.com/2076-3417/13/14/8121

5. Farooq, M. S., Omer, U., Ramzan, A., Rasheed, M. A., & Atal, Z. (2023). Behavior Driven Development: A Systematic Literature Review. IEEE Access, 11, 88008-88024. doi: 10.1109/ACCESS.2023.3302356. Muhammad Shoaib Farooq (AI/SST), Amna Ramzan, Mansoor Ahmad Rasheed (Computer Science/SST) Date of Publication: August 2023 HJRS: W (Silver)
Behavior Driven Development (BDD) is a widely adopted agile methodology for software development that emphasizes the behavior of an application as a series of test cases, using the keywords, which include "Given," "When," and "Then." It involves writing requirements in a structured and testable format that can be evaluated to ensure compliance with the expected behavior. Although a significant amount of research has been conducted to examine the impact of using BDD on software development process yet rare work is observed to synthesize these studies and identify areas for future exploration. This study presents a review of the state-of-the-art BDD by synthesizing the recent advancements in its uses and applications. It aims to systematically investigate the impact of BDD on software development process as well as on product quality by aiding to bridge the communication gap between the stakeholders. The results reveal that BDD is an effective technique to clarify requirements during the software development process as it helps minimizing the intrinsic ambiguities. This work proposes a taxonomy based on the role and applications of BDD in various contexts. It suggests a framework for applying BDD in software development and defines a workflow for its application in software development. Finally, this work highlights some pertinent future directions for the use of BDD in software development.
https://ieeexplore.ieee.org/abstract/document/10210040

6. Habib, S., Shahzadi, S., & Deveci, M. (2023). Pythagorean fuzzy cognitive analysis for medical care and treatment decisions. Granular Computing, 8(6), 1887-1906. doi: 10.1007/s41066-023-00407-9. Shaista Habib (AI/SST) Date of Publication: August 2023 HJRS: W (Bronze)
The medical industry has employed a variety of decision-making methods to help medical professionals. The use of fuzzy techniques is necessitated by the fact that medical data is often ambiguous. This study desires to show the decision-making application of a novel Pythagorean Fuzzy Cognitive Map (PFCM) in the treatment of pregnant women with heart disease. The PFCM integrates the principles of Pythagorean fuzzy sets with cognitive maps, resulting in a better intuitive model for human understanding. PFCM combines Pythagorean Fuzzy TOPSIS and Fuzzy Cognitive Maps, determining weights for expert opinions and criteria. It yields a fuzzy cognitive map with weighted linkages to visualize relationship strengths. To measure the impact of the PFCM, we conduct a hypothetical case study in which women were assumed to have cardiovascular disease. We gathered input values, diagnosis, and prognosis data and used them to design an algorithm that demonstrates the complete working of the system. After completing the algorithm, we validate the model using some example values and compared the accuracy obtained with other techniques. Our findings show that the PFCM is a highly accurate and effective tool for decision-making in the treatment of pregnant women with heart disease. The present study offers new insights into the use of Pythagorean fuzzy cognitive maps and their potential for improving decision-making in healthcare.
https://link.springer.com/article/10.1007/s41066-023-00407-9

7. Naseem, A., Alturise, F., Alkhalifah, T., & Khan, Y. D. (2023). BBB-PEP-prediction: improved computational model for identification of blood–brain barrier peptides using blending position relative composition specific

features and ensemble modeling. *Journal of Cheminformatics,* **15(1). doi: 10.1186/s13321-023-00773-1. Ansar Naseem (AI/SST) Yaser Daanial Khan (Computer Science/SST) Date of Publication: November 2023 HJRS: W (Platinum)**

BBPs have the potential to facilitate the delivery of drugs to the brain, opening up new avenues for the development of treatments targeting diseases of the central nervous system (CNS). The obstacle faced in central nervous system disorders stems from the formidable task of traversing the blood–brain barrier (BBB) for pharmaceutical agents. Nearly 98% of small molecule-based drugs and nearly 100% of large molecule-based drugs encounter difficulties in successfully penetrating the BBB. This importance leads to identification of these peptides, can help in healthcare systems. In this study, we proposed an improved intelligent computational model BBB-PEP-Prediction for identification of BBB peptides. Position and statistical moments based features have been computed for acquired benchmark dataset. Four types of ensembles such as bagging, boosting, stacking and blending have been utilized in the methodology section. Bagging employed Random Forest (RF) and Extra Trees (ET), Boosting utilizes XGBoost (XGB) and Light Gradient Boosting Machine (LGBM). Stacking uses ET and XGB as base learners, blending exploited LGBM and RF as base learners, while Logistic Regression (LR) has been applied as Meta learner for stacking and blending. Three classifiers such as LGBM, XGB and ET have been optimized by using Randomized search CV. Four types of testing such as self-consistency, independent set, cross-validation with 5 and 10 folds and jackknife test have been employed. Evaluation metrics such as Accuracy (ACC), Specificity (SPE), Sensitivity (SEN), Mathew's correlation coefficient (MCC) have been utilized. The stacking of classifiers has shown best results in almost each testing. The stacking results for independent set testing exhibits accuracy, specificity, sensitivity and MCC score of 0.824, 0.911, 0.831 and 0.663 respectively. The proposed model BBB-PEP-Prediction shown superlative performance as compared to previous benchmark studies. The proposed system helps in future research and research community for in-silico identification of BBB peptides.

https://link.springer.com/article/10.1186/s13321-023-00773-1#Abs1

Book Chapter

1. **Iqbal, M. W., Shahzad, S. K., Aslam, M. W., Rana, T. A., & Arif, M. (2023). Addressing Gestures for One-Handed Mobile Interaction Techniques Artificial Intelligence & Blockchain in Cyber Physical Systems: Technologies & Applications (pp. 197-217). Syed Khuram Shahzad (AI/SST) Date of Publication: 2023**

Touch screen cell phones involve the use of both hands, one to handle the set while the other holds the stylus. It appears like a sharp pencil, and also has benefits for object selection with its tip. Mostly users deploy a finger or thumb for interrelation with their cell phone. Boundaries of using one finger (thumb) have also been observed in cell phone users such that most of them are using only one finger of their hand or their thumb predominately. Escape selects the targets 30% faster than shift. The directions of the gestures which escape uses for selection were not entirely liked by users. Mostly the users employ a thumb to interact with the mobile device. The target generally remains unmatched with the thumb size. Thus, selection of the target seems a bit difficult in most situations. The research provided an effective and efficient method for touchscreen users, this method can also be used by single-handed people, without feeling any difficulty or complexity. The results demonstrated that out of all parameters, the thumb provided an empirical evaluation of interaction with different sizes of devices, suggesting that the thumb tends to impact performance more than the involvement of device size, and it is equally vital for able and disabled persons.

https://www.taylorfrancis.com/chapters/edit/10.1201/9781003190301-11/addressing-gestures-one-handed-mobile-interaction-techniques-muhammad-waseem-iqbal-syed-khuram-shahzad-muhammad-waseem-aslam-toqir-rana-muhammad-arif

Department of Software Engineering

1. **Anjum, M. J., Anees, T., Tariq, F., Shaheen, M., Amjad, S., Iftikhar, F., & Ahmad, F. (2023). Space-Air-Ground Integrated Network for Disaster Management: Systematic Literature Review.** *Applied Computational Intelligence and Soft Computing*, **2023, 6037882. doi: 10.1155/2023/6037882. Tayyaba Anees (Software Engineering/SST) Date of Publication: February 2023 HJRS: X (Clay)**

The occurrence of any kind of natural disaster will eventually lead to the loss of life and property. Countries where such disasters occur make every effort to monitor such disasters and aid as quickly as possible. However, in some cases, a rescue cannot be sent because no information is available to initiate any type of rescue operation. This is usually because common disaster management systems (DMS) use on board or ground networks to route information from the disaster scene to rescue headquarters (HQ), which in most cases cannot provide the information efficiently. One effective approach is to use satellites in conjunction with existing air-to-ground systems. This study provides a comprehensive and systematic overview of the complexities of the space-air-ground integrated network (SAGIN) in disaster management applications, including different architectures and protocols. The main rationale behind this review is to provide an extensive analysis of existing disaster management systems that are making use of SAGIN. This paper also presents the taxonomy for disaster

management systems and challenges. Moreover, this research work also highlights open research issues and challenges for any type of disaster scenario. Our results indicate that several challenges are faced by disaster management systems such as hardware-based challenges, network-based characteristics and communication protocols related challenges, availability and accuracy of imagery data, and security and privacy issues. https://www.hindawi.com/journals/acisc/2023/6037882/

2. **Ali, R. F., Muneer, A., Almaghthawi, A., Alghamdi, A., Fati, S. M., & Ghaleb, E. A. A. (2023). BMSP-ML: big mart sales prediction using different machine learning techniques.** *IAES International Journal of Artificial Intelligence, 12*(2), 874-883. doi: 10.11591/ijai.v12.i2.pp874-883. **Rao Faizan Ali (Software Engineering/SST) Date of Publication: June 2023 HJRS: Y (Null)**

Variations in sales over time is the main issue faced by many retailers. To overcome this problem, we attempt to predict the sales by comparing the previous sales data of different stores. Firstly, the primary task is to recognize the pattern of the factors that help to predict sales. This study helps us understand the data and predict sales using many machines learning models. This process gets the data and beautifies the data by imputing the missing values and feature engineering. While solving this problem, predicting the monthly sales value is significant in the study. In addition, an essential element is to clear the missing data and perform proper feature engineering to better understand them before applying them. The experimental results show that the random forest predictor has outperformed ridge regression, linear regression, and decision tree models among the four machine learning techniques implemented in this study. The performance of the proposed models has been evaluated using root mean square error (RMSE). https://ijai.iaescore.com/index.php/IJAI/article/view/22169/13658

3. **Alwadain, A., Ali, R. F., & Muneer, A. (2023). Estimating Financial Fraud through Transaction-Level Features and Machine Learning.** *Mathematics,* **11(5). doi: 10.3390/math11051184. Rao Faizan Ali (Software Engineering/SST) Date of Publication: March 2023 HJRS: W (Bronze)**

In today's world, financial institutions (FIs) play a pivotal role in any country's economic growth and are vital for intermediation between the providers of investable funds, such as depositors, investors and users. FIs focus on developing effective policies for financial fraud risk mitigation however, timely prediction of financial fraud risk helps overcome it effectively and efficiently. Thus, herein, we propose a novel approach for predicting financial fraud using machine learning. We have used transaction-level features of 6,362,620 transactions from a synthetic dataset and have fed them to various machine-learning classifiers. The correlation of different features is also analysed. Furthermore, around 5000 more data samples were generated using a Conditional Generative Adversarial Network for Tabular Data (CTGAN). The evaluation of the proposed predictor showed higher accuracies which outperformed the previously existing machine-learning-based approaches. Among all 27 classifiers, XGBoost outperformed all other classifiers in terms of accuracy score with 0.999 accuracies, however, when evaluated through exhaustive repeated 10-fold cross-validation, the XGBoost still gave an average accuracy score of 0.998. The findings are particularly relevant to financial institutions and are important for regulators and policymakers who aim to develop new and effective policies for risk mitigation against financial fraud. https://www.mdpi.com/2227-7390/11/5/1184

4. **Anees, T., Habib, Q., Al-Shamayleh, A. S., Khalil, W., Obaidat, M. A., & Akhunzada, A. (2023). The Integration of WoT and Edge Computing: Issues and Challenges.** *Sustainability (Switzerland), 15*(7). doi: 10.3390/su15075983. **Tayyaba Anees, Qaiser Habib (Software Engineering/SST) Date of Publication: April 2023 HJRS: W (Bronze)**

The Web of Things is an improvement on the Internet of Things (IoT) that incorporates smart objects into both the web architecture (application) and the internet (network). WoT applications are inescapable in residential homes and communities. The intent behind WoT applications is to increase sustainable development for reducing resource consumption. The Web of Things (WoT) aims to create a decentralized Internet of Things. Edge computing addresses IoT computing demands by reducing the escalation in resource congestion situations. In edge computing data is placed closed to the end users which diverts computation load from the centralized data centers. Furthermore, the dispersed structure balances network traffic and minimizes traffic peaks in IoT networks. Therefore, resulting in reducing transmission delays between edge servers and end users which improves response times for real-time WoT applications. Low battery supply to nodes with enough power resources can increase the lifespan of the individual nodes by moving processing and communication overhead from the nodes. This paper integrates WoT and edge computing and compares their functionalities. In addition, it demonstrates how edge computing enhances WoT performance and concentrates on transmission, storage, and computation aspects. Furthermore, for performance evaluation it categorizes edge computing based on different architectures. Moreover, the challenges of Web of Things and edge computing have been discussed in terms of bandwidth, latency, energy, and cost. Finally, advantages of the Web of Things and edge computing have been discussed. https://www.mdpi.com/2071-1050/15/7/5983

5. **Kaleem, H., Hassan, M. T., Mahmood, S., & Khalid, M. N. (2023). Deep Learning Algorithms to Predict m7G from Human Genome.** *Journal of Computing & Biomedical Informatics*, **4**(02), 110–116. Retrieved from https://jcbi.org/index.php/Main/article/view/98. Hassan Kaleem, Malik Tahir Hassan, Sajid Mahmood (Software Engineering/SST) Date of Publication: March 2023 HJRS: Y (Null)

   N7-methyl guanosine (m7G) is a common post-transcriptional RNA alteration that plays a role in various biological processes such as gene expression, protein synthesis and cell viability. It is also linked to several illnesses, thus a thorough understanding of the mechanism and biological activities of m7G sites is required. Several machine learning models have been developed to predict m7G from the human genome, but machine learning models require feature extraction from the dataset and model training, which is a complex and time taking process for biologists and biochemists. For the first time, deep learning based algorithm is used to predict m7G. The main benefit of using a deep learning model is it does not require any features extraction from the dataset before passing it to the model, instead it generates features by itself. The LSTM model has outperformed all the other machine learning algorithms and achieved 0.7977 MCC on the independent dataset and after parameter optimization through KerasTuner, the model achieved 0.9934 MCC on independent dataset.
   https://jcbi.org/index.php/Main/article/view/98

6. **Siddiqui, H. U. R., Zafar, K., Saleem, A. A., Raza, M. A., Dudley, S., Rustam, F., & Ashraf, I. (2023). Emotion classification using temporal and spectral features from IR-UWB-based respiration data.** *Multimedia Tools and Applications, 82*(12), 18565-18583. doi: 10.1007/s11042-022-14091-5. Furqan Rustam (Software Engineering/SST) Date of Publication: May 2023 HJRS: W (Bronze)

   Emotions play an important part in our daily lives since they influence our feelings and interactions. Because of the involvement of various response channels, emotion identification is a sophisticated and complex process. Emotion recognition has recently attracted the attention of the research industries as well as the scientific communities in the medical area. A variety of approaches have been explored to detect emotions from facial features, speech, text, and physiological signals. This study focuses on the classification of three basic emotions, i.e. happiness, disgust, and fear using a new set of spectral features extracted from the raw chest signal. We have used previously gathered data and biological signals (respiration rate). A structured dataset of 96810 records and 16 columns is maintained for experiments. The prior study's accuracy was 76%, which served as the baseline. In this investigation, spectral and temporal features are used. Principal component analysis (PCA) is employed to select the best features. Extensive experiments are performed using several machine learning models for different scenarios of using all features, PCA-based selected features, and Chi-square selected features to analyze the efficacy of spectral features, as well as, feature selection approaches. Feature scaling is used to standardize the range of variables. Results indicate that using the PCA-based selective features, an accuracy of 98.52% can be obtained which is competitive with intrusive methods including electroencephalography and galvanic skin response signals while outperforming existing approaches.
   https://link.springer.com/article/10.1007/s11042-022-14091-5

7. **Rukhsar, S., Awan, M. J., Naseem, U., Zebari, D. A., Mohammed, M. A., Albahar, M. A., ... & Mahmoud, A. (2023). Artificial Intelligence Based Sentence Level Sentiment Analysis of COVID-19.** *Computer Systems Science & Engineering*, 47(1). DOI: 10.32604/csse.2023.038384. Sundas Rukhsar, Mazhar Javed (Software Engineering/SST) Date of Publication: May 2023 HJRS: W (Bronze)

   Web-blogging sites such as Twitter and Facebook are heavily influenced by emotions, sentiments, and data in the modern era. Twitter, a widely used microblogging site where individuals share their thoughts in the form of tweets, has become a major source for sentiment analysis. In recent years, there has been a significant increase in demand for sentiment analysis to identify and classify opinions or expressions in text or tweets. Opinions or expressions of people about a particular topic, situation, person, or product can be identified from sentences and divided into three categories: positive for good, negative for bad, and neutral for mixed or confusing opinions. The process of analyzing changes in sentiment and the combination of these categories is known as "sentiment analysis." In this study, sentiment analysis was performed on a dataset of 90,000 tweets using both deep learning and machine learning methods. The deep learning-based model long-short-term memory (LSTM) performed better than machine learning approaches. Long short-term memory achieved 87% accuracy, and the support vector machine (SVM) classifier achieved slightly worse results than LSTM at 86%. The study also tested binary classes of positive and negative, where LSTM and SVM both achieved 90% accuracy.
   https://www.techscience.com/csse/v47n1/53021

8. **Mehmood, E., Anees, T., Al-Shamayleh, A. S., Al-Ghushami, A. H., Khalil, W., & Akhunzada, A. (2023). DHSDJArch: an efficient design of distributed heterogeneous stream-disk join architecture.** *IEEE Access.* Doi: 10.1109/ACCESS.2023.3288284. Erum Mehmood, Tayyaba Anees (Software Engineering/SST) Date of Publication: June 2023 HJRS: W (Silver)

Heterogeneity is the key aspect of complex networks and smart devices for using it as nature of live streams. The heterogeneous stream-disk join is a significant research topic in real-time processing applications because it can directly affect the data analytics. Multiple issues, including stream loss, scalability, disk access cost, and data accuracy, should be considered during heterogeneous stream-disk join transformation. In this work we overcome these issues by introducing a distributed heterogeneous stream-disk join architecture DHSDJArch which can prevent stream data loss as well as maintaining balance between heterogeneous distributed data sources and accuracy of stream-disk join. A four phased distributed architecture is proposed for the multi-objective optimization to transform heterogeneous incomplete stream. To prevent stream loss, configuration of log retention is proposed based on the characteristics of distributed event streaming platform (*DESP*). Specifically, two transformations are proposed to pre-process heterogeneous streams and to join pre-processed stream with distributed disk data by performing real-time disk access while compensating the differences between data sources and streaming application, respectively. We conduct comprehensive experimental study on real datasets to verify the performance of proposed architecture in terms of accuracy, log retention policy, scaling, stability and cloud data storage.
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=10159277

9. **Faheem, M. R., Anees, T., Hussain, M.,** Ditta, A., Alquhayz, H., & Khan, M. A. (2023). Indexing in WoT to Locate Indoor Things. *IEEE* Access. Doi: 0.1109/ACCESS.2023.3272691. **Muhammad Rehan Faheem, Tayyaba Anees, Muzammil Hussain (Software Engineering/SST) Date of Publication: June 2023** HJRS: W (Silver)

The Web of Things (WoT) is an enhanced form of the Internet of Things (IoT) that has changed the trend of life nowadays. Due to IoT, life is transformed into smart life, such as smart buildings, smart vehicles, smart agriculture, smart businesses, etc., by connecting a certain number of things to the internet. Many people are now working on ways to locate indoor things to interact and exchange data between smart things and web services and apps, which is called "WoT," or "Web of Things." To interact and exchange the data, researchers need a search engine on WoT. However, locating indoor things in the Web of Things (WoT) remains a challenge due to the lack of a unified indexing system. In this research, we propose a novel approach to index indoor things in the WoT by leveraging machine learning and web technologies. Our approach includes a data preprocessing step, where we extract relevant features from the sensor data, followed by a clustering algorithm to group similar devices. We then use a semantic model to assign meaning to the clusters and develop a search engine to enable efficient searching of indoor things. Our proposed approach improves the accuracy and efficiency of locating indoor things in the WoT, paving the way for new applications in smart homes, healthcare, and industrial automation.
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=10114802

10. **Farooq, U.,** Mohd Rahim, M.S. & **Abid, A.** (2023). A multi-stack RNN-based neural machine translation model for English to Pakistan sign language translation. *Neural Comput & Applic* 35, 13225–13238. https://doi.org/10.1007/s00521-023-08424-0. **Uzma Farooq (Software Engineering/SST) Adnan Abid (Computer Sciences/SST) Date of Publication: June 2023** HJRS: W (Silver)

Sign languages are gesture-based languages used by the deaf community of the world. Every country has a different sign language and there are more than 200 sign languages in the world. American Sign Language (ASL), British Sign Language (BSL), and German Sign Language (DGS) are well-studied sign languages. Due to their different grammatical structure and word order the deaf people feel difficulty in reading and understanding the written text in natural languages. In order to enhance the cognitive ability of the deaf subjects some translation models have been developed for these languages that translate natural language text into corresponding sign language gestures. Most of the earlier natural to sign language translation models rely on rule-based approaches. Recently, some neural machine translation models have been proposed for ASL, BSL, DGS, and Arabic sign language. However, most of these models have low accuracy scores. This research provides an improved and novel multi-stack RNN-based neural machine translation model for natural to sign language translation. The proposed model is based on encoder–decoder architecture and incorporates attention mechanism and embeddings to improve the quality of results. Rigorous experimentation has been performed to compare the proposed multi-stack RNN-based model with baseline models. The experiments have been conducted using a sizeable translation corpus comprising of nearly 50,000 sentences for Pakistan Sign Language (PSL). The performance of the proposed neural machine translation model for PSL has been evaluated with the help of well-established evaluation measures including Bilingual Evaluation Understudy Score (BLEU), and Word Error Rate (WER). The results show that multi-stacked gated recurrent unit-based RNN model that employs Bahdanau attention mechanism and GloVe embedding performed the best showing the BLEU score of 0.83 and WER 0.17, which outperform the existing translation models. The proposed model has been exposed through a software system that converts the translated sentences into PSL gestures using an avatar. The evaluation of the usability has also been performed to see how effectively the avatar-based output helps compensating the cognitive hearing deficit for the deaf people. The results show that it works well for different granularity levels.
https://link.springer.com/article/10.1007/s00521-023-08424-0#citeas

11. **Adnan, F., Awan, M. J.,** Mahmoud, A., Nobanee, H., Yasin, A., & Zain, A. M. (2023). EfficientNetB3-Adaptive Augmented Deep Learning (AADL) for Multi-Class Plant Disease Classification. *IEEE Access*, 11, 85426-85440. doi: 10.1109/ACCESS.2023.3303131. **Faiqa Adnan, Mazhar Javed Awan** (Software Engineering/SST) Date of Publication: August 2023 HJRS: W (Silver)

Plant diseases can significantly impact agricultural productivity if not promptly identified and treated. Traditional plant disease classification methods are often challenging and time-consuming, making the identification of diseases a challenging task. This paper aims to bridge research gaps and address challenges in existing methodologies by proposing an efficient, effective multi-class plant disease classification approach. The research explores the application of pre-trained deep convolutional neural networks (CNNs) in this classification task, utilizing an open dataset comprising 52 categories of various diseases and healthy plant leaves. This study evaluated the performance of pre-trained deep CNN models, including Xception, InceptionResNetV2, InceptionV3, and ResNet50, paired with EfficientNetB3-adaptive augmented deep learning (AADL) for precise disease identification. Performance assessment was conducted using parameters such as batch size, dropout, and epoch counts, determining their accuracy, precision, recall, and F1 score. The EfficientNetB3-AADL model outperformed the other models and conventional feature-based methods, achieving a remarkable accuracy of 98.71%. This investigation highlights the potential of the EfficientNetB3-AADL model in offering accurate, real-time disease diagnostics in agricultural systems. The findings suggest that transfer learning and augmented deep learning techniques enhance the accuracy and performance of the model.
https://ieeexplore.ieee.org/abstract/document/10210538

12. **Javaid, A., Siddique, M. A., Reshi, A. A., Mui zzud, d., Rustam, F., Lee, E., & Rupapara, V. (2023). Coal mining accident causes classification using voting-based hybrid classifier (VHC).** *Journal of Ambient Intelligence and Humanized Computing,* 14(10), 13211-13221. doi: 10.1007/s12652-022-03779-z. **Furqan Rustam** (Software Engineering/SST) Date of Publication: October 2023 HJRS: X (Clay)

Labor safety at workplaces is a critical human rights concern in all industries around the world. Coal mines are considered one of the most dangerous workplaces and every year thousands of miners around the world die or get severe injuries in mining accidents. To make efficient technology-based accident mitigation plans for such work environments, the analysis of reasons which cause these accidents is of great value. This study contributes to the coal mines domain and proposed an approach using machine learning techniques to identify the reasons for the accidents. In our approach, a dataset containing the causes for accidents in text form that occurred in the past in coal mines has been used. We performed preprocessing to clean text data and then extract features to train the machine learning model using the term frequency-inverse document frequency (TF-IDF) technique. This study proposed the voting-based hybrid classifier (VHC) which is a combination of three individual machine learning models random forest, support vector classifier, and logistic regression using soft voting criteria. Evaluation of the model has been done in terms of accuracy, precision, recall, and f1 score. VHC outperforms all other stat of the art models by achieving the highest 0.96 accuracy score.
https://link.springer.com/article/10.1007/s12652-022-03779-z#Abs1

13. **Alvi, Q., Ali, S. F., Ahmed, S. B., Khan, N. A., Javed, M., & Nobanee, H. (2023). On the frontiers of Twitter data and sentiment analysis in election prediction: a review.** *PeerJ Computer Science,* 9. doi: 10.7717/peerj-cs.1517. **Quratulain Alvi** (Software Engineering/SST) Date of Publication: 2023 HJRS: W (Bronze)

Election prediction using sentiment analysis is a rapidly growing field that utilizes natural language processing and machine learning techniques to predict the outcome of political elections by analyzing the sentiment of online conversations and news articles. Sentiment analysis, or opinion mining, involves using text analysis to identify and extract subjective information from text data sources. In the context of election prediction, sentiment analysis can be used to gauge public opinion and predict the likely winner of an election. Significant progress has been made in election prediction in the last two decades. Yet, it becomes easier to have its comprehensive view if it has been appropriately classified approach-wise, citation-wise, and technology-wise. The main objective of this article is to examine and consolidate the progress made in research about election prediction using Twitter data. The aim is to provide a comprehensive overview of the current state-of-the-art practices in this field while identifying potential avenues for further research and exploration.
https://peerj.com/articles/cs-1517/

14. **Arshed, M. A., Alwadain, A., Faizan Ali, R., Mumtaz, S., Ibrahim, M., & Muneer, A. (2023). Unmasking Deception: Empowering Deepfake Detection with Vision Transformer Network.** *Mathematics,* 11(17). doi: 10.3390/math11173710. **Muhammad Asad Arshed, Rao Faizan Ali** (Software Engineering/SST) Date of Publication: September 2023 HJRS: W (Honorable Mention)

With the development of image-generating technologies, significant progress has been made in the field of facial manipulation techniques. These techniques allow people to easily modify media information, such as videos and images, by substituting the identity or facial expression of one person with the face of another. This

has significantly increased the availability and accessibility of such tools and manipulated content termed 'deepfakes'. Developing an accurate method for detecting fake images needs time to prevent their misuse and manipulation. This paper examines the capabilities of the Vision Transformer (ViT), i.e., extracting global features to detect deepfake images effectively. After conducting comprehensive experiments, our method demonstrates a high level of effectiveness, achieving a detection accuracy, precision, recall, and F1 rate of 99.5 to 100% for both the original and mixture data set. According to our existing understanding, this study is a research endeavor incorporating real-world applications, specifically examining Snapchat-filtered images. https://www.mdpi.com/2227-7390/11/17/3710

15. **Arshed, M. A., Mumtaz, S., Ibrahim, M., Ahmed, S., Tahir, M., & Shafi, M. (2023). Multi-Class Skin Cancer Classification Using Vision Transformer Networks and Convolutional Neural Network-Based Pre-Trained Models.** *Information (Switzerland),* **14(7). doi: 10.3390/info14070415. Muhammad Asad Arshed, Saeed Ahmed (Software Engineering/SST) Date of Publication: July 2023 HJRS: W (Bronze)**

Skin cancer, particularly melanoma, has been recognized as one of the most lethal forms of cancer. Detecting and diagnosing skin lesions accurately can be challenging due to the striking similarities between the various types of skin lesions, such as melanoma and nevi, especially when examining the color images of the skin. However, early diagnosis plays a crucial role in saving lives and reducing the burden on medical resources. Consequently, the development of a robust autonomous system for skin cancer classification becomes imperative. Convolutional neural networks (CNNs) have been widely employed over the past decade to automate cancer diagnosis. Nonetheless, the emergence of the Vision Transformer (ViT) has recently gained a considerable level of popularity in the field and has emerged as a competitive alternative to CNNs. In light of this, the present study proposed an alternative method based on the off-the-shelf ViT for identifying various skin cancer diseases. To evaluate its performance, the proposed method was compared with 11 CNN-based transfer learning methods that have been known to outperform other deep learning techniques that are currently in use. Furthermore, this study addresses the issue of class imbalance within the dataset, a common challenge in skin cancer classification. In addressing this concern, the proposed study leverages the vision transformer and the CNN-based transfer learning models to classify seven distinct types of skin cancers. Through our investigation, we have found that the employment of pre-trained vision transformers achieved an impressive accuracy of 92.14%, surpassing CNN-based transfer learning models across several evaluation metrics for skin cancer diagnosis. https://www.mdpi.com/2078-2489/14/7/415

16. **Awan, M. J., Rahim, M. S. M., Salim, N., Nobanee, H., Asif, A. A., & Attiq, M. O. (2023). MGACA-Net: a novel deep learning based multi-scale guided attention and context aggregation for localization of knee anterior cruciate ligament tears region in MRI images.** *PeerJ Computer Science,* **9. doi: 10.7717/peerj-cs.1483. Mazhar Javed Awan, Ahsen Ali Asif, Muhammad Ozair Attiq (Software Engineering/SST) Date of Publication: 2023 HJRS: W (Bronze)**

Anterior cruciate ligament (ACL) tears are a common knee injury that can have serious consequences and require medical intervention. Magnetic resonance imaging (MRI) is the preferred method for ACL tear diagnosis. However, manual segmentation of the ACL in MRI images is prone to human error and can be time-consuming. This study presents a new approach that uses deep learning technique for localizing the ACL tear region in MRI images. The proposed multi-scale guided attention-based context aggregation (MGACA) method applies attention mechanisms at different scales within the DeepLabv3+ architecture to aggregate context information and achieve enhanced localization results. The model was trained and evaluated on a dataset of 917 knee MRI images, resulting in 15265 slices, obtaining state-of-the-art results with accuracy scores of 98.63%, intersection over union (IOU) scores of 95.39%, Dice coefficient scores (DCS) of 97.64%, recall scores of 97.5%, precision scores of 98.21%, and F1 Scores of 97.86% on validation set data. Moreover, our method performed well in terms of loss values, with binary cross entropy combined with Dice loss (BCE_Dice_loss) and Dice_loss values of 0.0564 and 0.0236, respectively, on the validation set. The findings suggest that MGACA provides an accurate and efficient solution for automating the localization of ACL in knee MRI images, surpassing other state-of-the-art models in terms of accuracy and loss values. However, in order to improve robustness of the approach and assess its performance on larger data sets, further research is needed. https://peerj.com/articles/cs-1483/

Conference Proceeding

1. **Arshed, M. A., Mumtaz, S., Hussain, M., Alamdar, R., Ali, R.F., Hassan, M. T., & Tanveer, M. (2023).** *DeepFinancial Model for Exchange Rate Impacts Prediction of Political and Financial Statements.* **Paper presented at the 3rd IEEE International Conference on Artificial Intelligence, ICAI 2023. Muhammad Asad Arshed, Rao Faizan Ali, Malik Tahir Hassan, Muhammad Tanveer (Software Engineering/SST) Mehmood Hussain (AI/SST) Date of Publication: 22-23 February 2023**

The extensive use of social media led people to share emotions and opinions on social sites. Currently, the prediction of the exchange rate with the content of social sites, specifically Twitter, is an active research and challenge. In this study, we have proposed a deep learning model for the prediction of the exchange rate fluctuation with political and financial statements sentiments. In this study, we have considered USD dollar rates in terms of PKR currency rates for experiments as well as collective sentiment technique (positive, negative, and neutral for each day) considered after data preprocessing with natural language processing techniques. The Adaptive Synthetic (ADASYN) technique is used in this study for data balancing to avoid the overfitting of the machine and deep learning models. Deep learning based proposed model named "Deep Financial" is effective with the highest accuracy of 87.54% as compared to Support Vector Machine, K-Nearest Neighbor and Logistic Regression, for the prediction of exchange rate fluctuation with political and financial statements sentiments.

https://ieeexplore.ieee.org/abstract/document/10136658

School of Engineering (SEN)

Department of Civil Engineering

1. **Ali, H., & Abdullah, M.** (2023). Exploring the perceptions about public transport and developing a mode choice model for educated disabled people in a developing country. *Case Studies on Transport Policy*, *11*, 100937.doi: 10.1016/j.cstp.2022.100937. Hassan Ali, Mohammad Abdullah (Civil Engineering/SEN) Date of publication: March 2023 HJRS: X (Honorable Mention)

   People with disabilities are an important part of every community. However, they often face problems while using public transport, which results in several negative consequences including social exclusion. This study aims at exploring the problems faced by persons with disabilities (PWDs) while using public transport along with their mode choice in Lahore, Pakistan. This study uses a questionnaire-based approach to collect the data. Exploratory factor analysis is conducted to extract the underlying factors describing the perceptions of the PWDs about the issues with public transportation. It also uses non-parametric tests such as Kruskal Wallis and Mann Whitney U tests to determine the effects of demographic variables on the underlying factors. In addition, it estimates a binary logit model to determine the mode choice of PWDs in Lahore, Pakistan. The non-parametric tests on underlying factors indicated that females declared higher level of agreement with spatial and financial inequity and infrastructural inaccessibility as compared to males. Furthermore, those traveling with wheel chairs showed significantly higher level of agreement with service inadequacy as compared to those without any mobility aids. The binary logit model indicated that female PWDs are less likely to use public transport relative to other modes when compared to the male respondents. The respondents belonging to the higher income categories are less likely to use public transport relative to other modes when compared to the lowest-income category. The respondents who do not own a vehicle are more likely to use public transport relative to other modes when compared to those who own a vehicle. In the logit model, gender, household income, use of mobility aids, primary purpose of traveling, vehicle ownership, and infrastructural inaccessibility were found to be significant predictors of mode choice. Although transport-related policies exist for PWDs, more specific policies and stricter implementation is required to improve the accessibility and public transport ridership of PWDs.

   https://www.sciencedirect.com/science/article/pii/S2213624X22002371

2. **Yang, Y., Tu, S., Ali, R. H., Alasmary, H., Waqas, M., &** Amjad, M. N. (2023). Intrusion detection based on bidirectional long short-term memory with attention mechanism. *CMC-Computer Material and Continua*, *74*(1), 801-815. doi: 10.32604/cmc.2023.031907. Muhammad Nouman Amjad (Civil Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)

   With the recent developments in the Internet of Things (IoT), the amount of data collected has expanded tremendously, resulting in a higher demand for data storage, computational capacity, and real-time processing capabilities. Cloud computing has traditionally played an important role in establishing IoT. However, fog computing has recently emerged as a new field complementing cloud computing due to its enhanced mobility, location awareness, heterogeneity, scalability, low latency, and geographic distribution. However, IoT networks are vulnerable to unwanted assaults because of their open and shared nature. As a result, various fog computing-based security models that protect IoT networks have been developed. A distributed architecture based on an intrusion detection system (IDS) ensures that a dynamic, scalable IoT environment with the ability to disperse centralized tasks to local fog nodes and which successfully detects advanced malicious threats is available. In this study, we examined the time-related aspects of network traffic data. We presented an intrusion detection model based on a two-layered bidirectional long short-term memory (Bi-LSTM) with an attention mechanism for traffic data classification verified on the UNSW-NB15 benchmark dataset. We showed that the

suggested model outperformed numerous leading-edge Network IDS that used machine learning models in terms of accuracy, precision, recall and F1 score.
https://www.techscience.com/cmc/v74n1/49832

3. **Amjad Raja, M. N., Abbas Jaffar, S. T.,** Bardhan, A., & Shukla, S. K. (2023). **Predicting and validating the load-settlement behavior of large-scale geosynthetic-reinforced soil abutments using hybrid intelligent modeling.** *Journal of Rock Mechanics and Geotechnical Engineering***, 15(3), 773-788. doi: 10.1016/j.jrmge.2022.04.012. Muhammad Nouman Amjad, Syed Taseer Abbas Jaffar** (Civil Engineering/SEN) **Date of Publication: March 2023 HJRS: W (Gold)**

Settlement prediction of geosynthetic-reinforced soil (GRS) abutments under service loading conditions is an arduous and challenging task for practicing geotechnical/civil engineers. Hence, in this paper, a novel hybrid artificial intelligence (AI)-based model was developed by the combination of artificial neural network (ANN) and Harris hawks' optimisation (HHO), that is, ANN-HHO, to predict the settlement of the GRS abutments. Five other robust intelligent models such as support vector regression (SVR), Gaussian process regression (GPR), relevance vector machine (RVM), sequential minimal optimisation regression (SMOR), and least-median square regression (LMSR) were constructed and compared to the ANN-HHO model. The predictive strength, relalibility and robustness of the model were evaluated based on rigorous statistical testing, ranking criteria, multi-criteria approach, uncertainity analysis and sensitivity analysis (SA). Moreover, the predictive veracity of the model was also substantiated against several large-scale independent experimental studies on GRS abutments reported in the scientific literature. The acquired findings demonstrated that the ANN-HHO model predicted the settlement of GRS abutments with reasonable accuracy and yielded superior performance in comparison to counterpart models. Therefore, it becomes one of predictive tools employed by geotechnical/civil engineers in preliminary decision-making when investigating the in-service performance of GRS abutments. Finally, the model has been converted into a simple mathematical formulation for easy hand calculations, and it is proved cost-effective and less time-consuming in comparison to experimental tests and numerical simulations.
https://www.sciencedirect.com/science/article/pii/S1674775522001093

4. **Anwar, Z., Siddique, I., Irfan-ul-Hassan, M., Akmal, U., Sahar, U. U.,** & Qureshi, H. J. (2023). **Shear response evaluation of sustainable self-compacting concrete made up of recycled steel fibers of waste tyres.** *Structural Concrete, 24***(2), 2965-2978. doi: 10.1002/suco.202200582. Iffat Siddique, Muhammad Irfan-Ul-Hassan, Usman Akmal, Umbreen-Us Sahar** (Civil Engineering/SEN) **Date of Publication: April 2023 HJRS: W (Bronze)**

Use of rapidly increasing waste tyres can fetch the demand of green construction as well as prevent priceless land from becoming land dumps. The idea of using heavy traffic vehicle end-of-life tyres (HTV-ELT) steel fibers is implemented to investigate the shear crack propagation and corresponding shear strength evolution of steel fiber-reinforced green self-compacting concrete (SFRGSCC). Three different average aspect ratios (25,35,45) mm were employed in two dosages (0.125% and 0.25% of total volume of matrix) in this work. It was determined that with the addition of end-of-life tyres steel fibers the rheological properties of SFRGSCC were decreased up to some extent but lies within the limiting value of the European Federation of National Associations Representing for Concrete (EFNARC). The addition of end-of-life tyres steel fibers showed a positive impact on postcracking behavior in shear. Interestingly, the experimental results indicated that the addition of end-of-life tyres steel fibers increased the ultimate shear strength of SFRGSCC beams as well as the compressive strength and splitting tensile strength of SFRGSCC. Whereas the crack width opening was significantly decreased besides controlling the deflection.
https://onlinelibrary.wiley.com/doi/full/10.1002/suco.202200582

5. **Naseem, M. A., Tariq, A., Zulfiqar, T., Ilyas, U.,** & Jehanzeb, M. (2023). **Prevalence of Work-Related Musculoskeletal Discomfort in Office Employees During Covid-19 in Punjab Pakistan.** *Journal of Natural and Applied Sciences Pakistan, 5***(1), 1212-1221. Usman Ilyas** (Civil Engineering/SEN) **Date of Publication: April 2023 HJRS: Y (Null)**

COVID-19 has disturbed the lifestyle and economic activities of the entire world. This pandemic has led to an overall decrease in physical activity and economic operations. The economic shutdown has led to downsizing, while for others it has led to increased work hours. Lack of physical activity and increased working hours form major risk factors for musculoskeletal discomfort in office employees. Therefore, it is assumable that musculoskeletal discomfort in office employees has also increased. This study was conducted to determine the prevalence of work-related musculoskeletal discomfort in office employees during COVID-19. A "Cornell Musculoskeletal Discomfort Questionnaire (CMDQ)" based method was used for examining the incidence and intensity of pain and its symptoms, as well as the extent of discomfort in different body parts. Additionally, an association between risk factors and total discomfort rate was also analysed. A total of 233 office employees

participated in the study. The discomfort percentage was 37.39%, 10.97%, 28.73%, and 11.82%, for the lower back, upper back, neck, and shoulders, respectively. Neck (87.21%), lower back (90.97%), upper back (60.15%), and shoulders (66.16%) were most commonly reported body parts where office employees frequently experienced discomfort once or more than once in a week. The neck, shoulders, lower back, and upper back were the body parts where employees frequently reported discomfort and pain. Regular yoga, aerobic exercises, ergonomics training, online employee safety awareness programs, and short stretch breaks are some of the efficient ways to manage these problems during COVID-19.
https://jnasp.kinnaird.edu.pk/online-v4-i2-2-2-2/

6. **Nawab, M. S., Ali, T., Qureshi, M. Z., Zaid, O., Ben Kahla, N., Sun, Y., . . . Ajwad, A. (2023). A study on improving the performance of cement-based mortar with silica fume, metakaolin, and coconut fibers.** *Case Studies in Construction Materials,* **19. doi: 10.1016/j.cscm.2023.e02480. Ali Ajwad (Civil Engineering/SEN) Date of Publication: December 2023 HJRS: X (Clay)**

Cement mortar is the primary choice for construction due to its widespread usage. However, certain applications demand high-performance cement mortar. In this pioneering study, we explore using agriculture waste products, industrial by-products, and naturally occurring kaolinite clay as potential additives in composite cement. Our research aims to assess these materials' physical and mechanical attributes to ascertain their efficacy in elevating cement performance. To achieve this, we replaced 20% of the cement in the composite with silica-fume and metakaolin, following a precise mix design fraction of 1:1 (binding materials: sand) for the mortar composites. We successfully identified the optimum combination of metakaolin and silica fume through systematic experimentation that maximizes compression strength. Subsequently, we introduced various proportions of coir fibers (ranging from 3% to 15% by weight) into the cement composite to enhance its structural support capabilities. We carefully calibrated the ratio of the water-to-binding material (ranging from 0.35 to 0.6) to maintain the workability of the cement mixtures. Next, we subjected the cement composites to meticulous curing in water for 7 days, 14 days, and 28 days, respectively, to observe their performance over time. Our comprehensive study encompassed the investigation of critical parameters, including moisture content, density, and water absorption, as well as essential mechanical properties such as compressive strength and modulus of rupture. A total of 270 specimens underwent rigorous testing, yielding compelling results. The composite featuring a combination of 10% silica fume, 10% metakaolin, and 6% coconut fibers showcased superior mechanical and physical properties. SEM and EDX studies also showed dense and packed microstructure of mortar samples. These findings showcase the remarkable potential of this specific composite composition as an environmentally conscious and sustainable alternative to enhance cement performance in construction applications. This research advances eco-friendly construction practices by harnessing the strength of waste-derived materials and naturally occurring resources, supporting a more sustainable and resilient approach to infrastructure development.
https://www.sciencedirect.com/science/article/pii/S2214509523006605

7. **Nawaz, M. N., Nawaz, M. M., Awan, T. A., Jaffar, S. T. A., Jafri, T. H., Oh, T. M., . . . Azab, M. (2023). A sustainable approach for estimating soft ground soil stiffness modulus using artificial intelligence.** *Environmental Earth Sciences,* **82(23). doi: 10.1007/s12665-023-11193-7. Syed Taseer Abbas Jaffar (Civil Engineering/SEN) Date of Publication: November 2023 HJRS: W (Bronze)**

Soft soils pose significant challenges to the environment and construction of infrastructure on them owing to their distinct characteristics such as low bearing strength, high water content, low permeability, and high void ratio. The stiffness modulus of soft ground soils (G_s) is one of the major considerations while designing geo-structures. The determination of the stiffness modulus of soft ground materials such as soils requires expensive machinery, more skilled labor, and consumption of time which is contrary to the current trends of sustainable development. Therefore, this paper presents the artificial intelligence (AI)-based sustainable solutions for the estimation of G_s using artificial neural network (ANN), gene expression programming (GEP), and multiple linear regression (MLR) techniques. In this regard, 199 samples of soft soil from different locations were retrieved and tested to determine basic soil attributes such as sand content (S), fine content (FC), liquid limit (LL), plastic limit (PL), water content (w), and bulk density (d) which were used as potential indicators for computing soft ground stiffness modulus. Many statistical tests, including R-square (R^2), root means square error (RMSE), and mean absolute error (MAE), were used to further substantiate the performance efficiency of computed prediction models. The findings show that the proposed models meet all accuracy-related acceptance requirements. However, ANN outperforms GEP and MLR. Further, to evaluate the specific impact of input factors, sensitivity and parametric tests were also executed.
https://link.springer.com/article/10.1007/s12665-023-11193-7#Abs1

8. **Rashid, M. U.,** Miqdad, H., Saad Ul Hassan, M., Haseeb, A., & Asad, M. (2023). **Evaluation of sediment management strategies for Tarbela reservoir.** *Dams and Reservoirs,* 33(3), 106-115. doi: 10.1680/jdare.22.00119. Muhammad Usman Rashid (Civil Engineering/SEN) Date of Publication: September 2023 HJRS: Y (Null)

    Globally, multipurpose large dams play significant roles by providing water for irrigation, flood control and hydropower. This study aims to evaluate different strategies for the evacuation of deposited sediments in Tarbela reservoir by using Hydrologic Engineering Center-River Analysis System. Sediment flushing from existing power tunnels was found infeasible due to the downstream constraints and the loss of hydropower. New sediment bypass tunnels on the right-side bank of the dam to overcome the constraints were analysed. The sediment balance ratio, long-term capacity ratio and economic analysis were computed along with sediment modelling for different scenarios. The most technically viable scenario was 90 days flushing at 390 m drawdown level with a discharge of 5000 m^3/s. This scenario was not economically feasible in terms of net present value, internal rate of return and the benefit cost ratio. The upstream under construction Diamer Basha dam was also evaluated. The results suggested a large volume of sediment would be trapped in the upstream reservoir, which would ultimately lead to a significant reduction in the inflow of sediment and the delta movement in the Tarbela reservoir. This option was recommended due to its multiple benefits and potential capacity to enhance Tarbela reservoir's life.
    https://www.icevirtuallibrary.com/doi/epdf/10.1680/jdare.22.00119

9. **Raja, M. N. A.,** Abdoun, T., & El-Sekelly, W. (2023). **Smart prediction of liquefaction-induced lateral spreading.** *Journal of Rock Mechanics and Geotechnical Engineering.* doi: 10.1016/j.jrmge.2023.05.017. Muhammad Nouman Amjad Raja (Civil Engineering/SEN) Date of Publication: September 2023 HJRS: W (Gold)

    The prediction of liquefaction-induced lateral spreading/displacement (Dh) is a challenging task for civil/geotechnical engineers. In this study, a new approach is proposed to predict Dh using gene expression programming (GEP). Based on statistical reasoning, individual models were developed for two topographies: free-face and gently sloping ground. Along with a comparison with conventional approaches for predicting the Dh, four additional regression-based soft computing models, i.e. Gaussian process regression (GPR), relevance vector machine (RVM), sequential minimal optimization regression (SMOR), and M5-tree, were developed and compared with the GEP model. The results indicate that the GEP models predict Dh with less bias, as evidenced by the root mean square error (RMSE) and mean absolute error (MAE) for training (i.e. 1.092 and 0.815; and 0.643 and 0.526) and for testing (i.e. 0.89 and 0.705; and 0.773 and 0.573) in free-face and gently sloping ground topographies, respectively. The overall performance for the free-face topology was ranked as follows: GEP > RVM > M5-tree > GPR > SMOR, with a total score of 40, 32, 24, 15, and 10, respectively. For the gently sloping condition, the performance was ranked as follows: GEP > RVM > GPR > M5-tree > SMOR with a total score of 40, 32, 21, 19, and 8, respectively. Finally, the results of the sensitivity analysis showed that for both free-face and gently sloping ground, the liquefiable layer thickness (T15) was the major parameter with percentage deterioration (%D) value of 99.15 and 90.72, respectively.
    https://www.sciencedirect.com/science/article/pii/S1674775523002226

10. **Usman, M.,** Shahid, S., Ali, S., & Ullah, M. K. (2023). **Numerical simulations of turbulent and flow characteristics of complex river reach in Pakistan.** *Environmental Engineering Research,* 28(1). doi: 10.4491/eer.2021.369. Muhammad Usman (Civil Engineering/SEN) Date of Publication: February 2023 HJRS: X (Honorable Mention)

    The study included the numerical simulation of a curved open channel flow of Chashma Barrage for different velocities along left & right river banks, and water depths downstream of the river reach. The physical model was constructed in one of the experimental trays at the Irrigation Research Institute. Different trials were carried out at low, medium, and high discharges after the calibration of the physical model. A 2D computational fluid dynamics ANSYS FLUENT software was used to simulate various turbulences and flow properties for various discharges (500,000, 800,000, and 957,289 cusecs) using two different turbulent models: k-epsilon and Reynolds's stress. The simulation findings were compared to the physical modeling results in terms of velocities and water depths for verification. In both velocity (18–27%) and water depth (18–36%) measurements, the k-model had a lower average percentage error than the RS model. On verification using physical modeling, the total average percentage difference from the k-model for all discharges was less than 25%. Numerical simulations based on computational fluid dynamics can be used to better understand turbulence and flow parameters, as well as to assess and develop barrier engineering.
    https://www.dbpia.co.kr/Journal/articleDetail?nodeId=NODE11077654

11. **Zhang, G., Jaffar, S. T. A., Israr, J., Atta, M., & Jafri, T. (2023a). Corrigendum: Laboratory modeling of thermal and temporal cracking in swelling clays.** *Frontiers in Earth Science,* **(2023), 11, (1192406), 10.3389/feart.2023.1192406). Frontiers in Earth Science, 11. doi: 10.3389/feart.2023.1282776. Syed Taseer Abbas Jaffar, Muneeb Atta (Civil Engineering/SEN) Date of Publication: June 2023 HJRS: W (Silver)**

Crack development in a changing environment is the controlling factor for the stability and strength of expansive soils. Expansive soils exhibit large volumetric changes with changes in their moisture conditions that may occasionally lead to reduced bearing capacity and foundation failures. This study purports to model crack initiation and its spatial progression in relation to the moisture content and drying period, respectively. Volumetric soil shrinkage is determined using high-definition digital camera imaging and Vernier scale methods, while the soil settlement under vertical shrinkage deformation could be captured through a tensile stress model for soils. It was revealed that a small change in suction could trigger crack initiation, which would propagate further under different environmental conditions. Furthermore, it was observed that the crack volume increased rapidly at specific moisture content and could penetrate as deep as 1 m after nearly 1.5 months that is fully consistent with the current model predictions. A comparison between the performance of the model proposed in this study and that of two existing models shows that the former predicts the vertical shrinkage strain values in closer agreement with those observed experimentally and is less conservative than those predicted by both models. Nevertheless, the findings from this study could be used to quantify the detrimental behavior of expansive soil present in pavement subgrades and shallow foundations for lightweight structures.

https://www.frontiersin.org/articles/10.3389/feart.2023.1192406/full

Department of Industrial Engineering

1. **Usman, M., Ishfaq, K., Rehan, M., Raza, A., & Mumtaz, J. (2023). An in-depth evaluation of surface characteristics and key machining responses in WEDM of aerospace alloy under varying electric discharge environments.** *The International Journal of Advanced Manufacturing Technology***, 124, 2437-2449. doi: 10.1007/s00170-022-10608-2. Abbas Raza (Industrial Engineering/SEN) Date of Publication: February 2023 HJRS: W (Silver)**

Titanium and its alloys (especially Ti6Al4V) are widely employed in aerospace and biomedical industry. Wire electric discharge machining is common in practice to machine this difficult-to-cut material. But owing to the thermo-electric nature of the process, it is challenging to have adequate level of surface integrity. This primary concern needs to be addressed as it mainly influences the surface mechanical characteristics. Therefore, the present research aims to address the aforesaid issues using well-known multipass strategy. Understanding the multipass process dynamics and requirements, the potentiality of brass wire diameters was comprehensively examined and explored during WEDM of Ti6Al4V. Considering higher cost, unavailability, environmental hazards, and straightness issues of novel zinc-coated wire electrodes, readily available brass wires provide a cheaper and widely acceptable solution to enhance surface integrity of machined parts if equivalent results can be somehow made possible. For that sake, three different brass wire diameters; 0.15 mm, 0.2 mm, and 0.25 mm have been considered to evaluate their impact on surface roughness, recast layer thickness, overcut, machined surface microhardness, and cutting speed using multipass cutting technique. Experimental results revealed that 0.15 mm uncoated brass wire can produce white layer result equivalent to Topas Plus X wire (Cu core-double Zn-rich layer coating) which outperformed among all zinc-coated wires used in previously published research. Moreover, among different diameter brass wires, surface roughness is improved by 25% using multipass cutting with 0.15 mm diameter in comparison to its counterparts. Scanning electron microscope (SEM) analysis depicts that the said combination reduces recast layer thickness from 39.04 μm to 14.6 μm (~ 1.5 times lesser value). In addition to that, smaller diameter (0.15 mm) provides the maximum cutting rate in rough cuts (which consume maximum machining time) and dimensional accuracy.

https://link.springer.com/article/10.1007/s00170-022-10608-2

2. **Mughal, K., Mughal, M. P., Farooq, M. U., Qaiser Saleem, M., & Haber Guerra, R. (2023). Helical Milling of CFRP/Ti6Al4V Stacks Using Nano Fluid Based Minimum Quantity Lubrication (NF-MQL): Investigations on Process Performance and Hole Integrity.** *Materials***, 16(2), 566.doi: 10.3390/ma16020566. Mohammad Pervez Mughal (Industrial Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)**

The structural components in the aeronautical industry require CFRP/Ti6Al4V stacks to be processed together, which results in poor hole integrity due to the thermal properties of the materials and challenges related to processability. These challenges include quality variation of the machined holes because of the limitations in process properties. Therefore, a novel solution through helical milling is investigated in the study using nano

fluid based minimum quantity lubrication (NF-MQL). The analysis of variance shows, for Ti6Al4V, eccentricity (PCR = 28.56%), spindle speed (Ti) (PCR = 42.84%), and tangential feed (PCR = 8.61%), and for CFRP, tangential feed (PCR = 40.16%), spindle speed (PCR = 28.75%), and eccentricity (PCR = 8.41%) are the most significant parameters for diametric error. Further on, the rise in the circularity error is observed because of prolonged tool engagement at a higher value of tangential feed. Moreover, the surface roughness of Ti was reduced with an increasing percentage of MoS2 in the lubricant. The spindle speed (37.37%) and lubricant (45.76%) have a potential influence on the processing temperature, as evident in the analysis of variance. Similarly, spindle speed Ti (61.16%), tangential feed (23.37%), and lubrication (11.32%) controlled flank wear, which is critical to tool life. Moreover, the concentration of MoS2 decreased edge wear from ~105 μm (0.5% concentration) to ~70 μm (1% concentration). Thorough analyses on process performance in terms of hole accuracy, surface roughness, processing temperature, and tool wear are carried out based on the physical science of the process for cleaner production. The NF-MQL has significantly improved process performance and hole integrity.
https://www.mdpi.com/1996-1944/16/2/566

3. **Ehsan, S., Rehman, M., Mughal, M. P., Farooq, M. U., & Ali, M. A. (2023). Correction: Machinability investigations through novel controlled flushing characteristics in wire electric discharge machining of M42 high-speed steel (The International Journal of Advanced Manufacturing Technology, (2022), 120, 1-2, (1315-1332), 10.1007/s00170-022-08786-0).** *International Journal of Advanced Manufacturing Technology,* **128(9-10), 4717-4719. doi: 10.1007/s00170-023-12294-0.** Mohammad Pervez Mughal (Industrial Engineering/SEN) Date of Publication August 2023 HJRS: W (Platinum)

The industry anticipates technological advancements for productivity improvement, and this can be accomplished by improving the machining performance in the areas where machinability challenges exist. The machinability and productivity of wire electric discharge machining (WEDM), which is a popular non-conventional cutting process, can be improved while having comparable surface integrity. Previously the non-conventional machining literature is focused on the machinability investigations of various industrial materials and process optimization. However, no extensive research on the study of flushing parameters optimization to improve machinability in non-conventional machining is known. In this research, WEDM of M42 HSS using controlled flushing is performed resulting in improved machinability in terms of material removal rate (MRR), surface roughness (Ra), and kerf width (KW). The findings indicate that the nozzle diameter (76.85%) has a substantial influence on total machining performance. Nozzle diameter, nozzle-workpiece distance, servo voltage, and flushing pressure all had a substantial influence on MRR, with percentage contributions of 34.50%, 26.02%, 22.94%, and 14.21%, respectively. Furthermore, multi-response optimization is also performed and depicts the possibility of achieving optimized values of MRR, Ra, and KW simultaneously. The flush-controlled machining improved work quality in terms of accurate production, increased productivity by lowering process time, and improved surface integrity of the machined piece thus can be a possible process advancement in the aerospace and automotive industries.
https://link.springer.com/article/10.1007/s00170-022-08786-0#Abs1

4. **Mughal, K., Mughal, M. P., Farooq, M. U., Anwar, S., & Ammarullah, M. I. (2023). Using Nano-Fluids Minimum Quantity Lubrication (NF-MQL) to Improve Tool Wear Characteristics for Efficient Machining of CFRP/Ti6Al4V Aeronautical Structural Composite.** *Processes,* **11(5). doi: 10.3390/pr11051540.** Mohammad Pervez Mughal (Industrial Engineering/SEN) Date of Publication: May 2023 HJRS: X (Clay)

The aeronautical industry constantly strives for efficient technologies to facilitate hole-making in CFRP/Ti6Al4V structural components. The prime challenge in this direction is excessive tool wear because of the different engineering properties of both materials. Nanofluid minimum quantity lubrication (NF-MQL) is the latest technology to provide synergistic improvement in tool tribological properties and lubrication function during machining. In the current study, an MoS_2-based NF-MQL system was applied during helical milling using a FIREX-coated tool. In-depth analysis of wear, a scanning electron microscope (SEM), and electron deposition spectroscopy (EDS) were used to evaluate workpiece elemental transfer and tool wear mechanisms. Experimental findings showed that 1% nanoparticles concentration in lubricant resulted in low tool wear of 13 μm after 10 holes. The SEM and EDS analyses depicted formation of tribo-film on the surface, resulting less severe wear and a reduced degree of adhesion. However, a low nanoparticle concentration of 0.5% resulted in 106 μm tool wear after 10 holes with slight evidence of tribo-film. Parametric analysis based on eccentricity, spindle speeds (individual for CFRP and Ti6Al4V), axial pitch, and tangential feed showed correlations with mechanical damage. An extended study of up to 200 holes showed diffusion of C element at a high rate as compared to metal elements such as W and Co. The lowest tool wear was observed using eccentricity level 1, spindle speed Ti6Al4V 1000 rpm, spindle speed CFRP 7500 rpm, tangential feed 0.01 mm/tooth, axial pitch 1.5 mm, and 1% of MoS_2 nanoparticles.

https://www.mdpi.com/2227-9717/11/5/1540

Conference Proceeding

1. Ling, Z., Zongxin, M., MingYu, Y., Wenchao, J., & Muhammad. (2023) An Eye-Gaze Tracking Method Based on a 3D Ocular Surface Fitting Model. *Vol. 13656 LNCS. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (pp. 370-381). Muhammad (Industrial Engineering/SEN) Date of Publication: January 2023

   Nowadays gaze tracking systems have several common drawbacks: low suitability, high complexity and low accuracy. To solve these problems, this paper presents a novel gaze tracking method, which improves the performance of gaze tracking system in two aspects. A 3D ocular quadratic surface model is constructed with eyeball's point cloud data, which are collected by a pair of binocular cameras in a free space, allowing head movement and without any wearable devices. Geometrical features of ocular surface, including principal direction, Gaussian curvature and radius are exploited to calculate ocular optical axis direction and person-specific parameters, and then to estimate ocular visual axis direction, i.e. gaze direction without any personal calibration procedures. For this purpose, two person-specific parameters, the radius of cornea curvature and the distance between the center of cornea curvature and the pupil on the ocular model, are inputted into a GRNN network to estimate the value of kappa angle, which is an angle between ocular optical axis and visual axis and has important effect on estimation accuracy of the ocular visual axis direction by the ocular optical axis direction. Compared with the pupil center cornea reflection method, the following experimental results show that the method presented in this paper is effective and accurate in kappa angle estimating and gaze tracking. https://link.springer.com/chapter/10.1007/978-3-031-20099-1_31

2. Kamal, M. S., Ahmad, H. M., Murtaza, M., Rana, A., Hussain, S. M. S., Patil, S., . . . Al Shehri, D. (2023). *Smart Drilling Fluids Formulations for Sensitive Shale Formations Using Surfactants and Nanoparticles.* Paper presented at the 2023 SPE Western Regional Meeting, WRM 2023. Hafiz Mudaser Ahmad, Azeem Rana (Industrial Engineering/SEN) Date of Publication: May 2023

   The demand for oil and gas is continuing to rise with a growing population and worldwide industrialization. Surfactants are considered excellent additives for drilling formulations because of their unique properties and chemical structure. The surface-modified nanoparticles in the drilling fluids (DFs) help to improve the rheological and filtration properties of water-sensitive shale formations. The water-sensitive shale formations in the wellbore often result in swelling after interacting with water-based DFs. The swelling of shale formation impacts the rheological and filtration properties of DFs. The aim of this study is to formulate DFs with cationic surfactants and surface-modified nanoparticles to minimize shale swelling and improve the rheological and filtration properties. Various drilling fluid formulations were prepared with bentonite as a basic constituent of DFs while Gemini surfactant and graphene nanoparticles were added with concentrations of 0.5%. The rheological and filtration properties were determined at room temperature. The shale inhibition tests were performed to analyze the swelling inhibition properties of DFs. The surface-modified nanoparticles along with the cationic surfactant make a stable dispersion of DFs. The presence of nanoparticles in the DFs enhances the rheological and filtration properties. The filtrate loss has been significantly reduced by incorporating graphene nanoparticles and Gemini surfactant-modified graphene nanoparticles. The rheological properties such as plastic viscosity, yield stress, and gel strengths have been improved by the combined addition of surfactant-modified nanoparticles. The reduction of filtrate loss was due to the clogging effect of small passages in the filter cake while long alkyl chains of surfactant molecules spread over the filter cake making a hydrophobic film that minimizes the contact of water with the filter cake. Moreover, the swelling inhibition test such as the linear swelling test showed that the presence of nanoparticles and cationic surfactants significantly enhanced the shale swelling inhibition and reduced the percentage of swelling compared to the DI water. The cationic surfactant interacts with the negatively charged clay particles through electrostatic forces and surfactant along alkyl chains wraps around the clay particles which leads to the minimum swelling of shale formations. This study reveals that the formulations based on surface-modified nanoparticles and surfactants in water-based DFs can inhibit shale swelling and improves the borehole stability for water-sensitive shale formations. https://onepetro.org/SPEWRM/proceedings-abstract/23WRM/2-23WRM/519670

3. Murtaza, M., Tariq, Z., Kamal, M. S., Rana, A., Patil, S., Mahmoud, M., & Al-Shehri, D. (2023). *Application of a Novel Green and Biocompatible Clay Swelling Inhibitor in Fracturing Fluid Design.* Paper presented at the 2023 SPE Western Regional Meeting, WRM 2023. Azeem Rana (Industrial Engineering/SEN) Date of Publication: May 2023

   Clay swelling and dispersion in tight sandstones can have an influence on the formation's mechanical properties and productivity. Hydraulic fracturing is a typical stimulation technique used to increase the production of sandstone formations that are too compact. The interaction of clay in sandstone with a water-based fracturing fluid causes the clays to disperse and swell, which weakens the rock and reduces its productivity. Several swelling inhibitors, including inorganic salts, silicates, and polymers, are regularly added to fracturing fluids.

Concerns linked with these additions include a decrease in production owing to formation damage and environmental concerns associated with their disposal. In this study, we introduced naturally existing material as a novel green swelling inhibitor. The performance of the novel green inhibitor was examined by its impact on the mechanical properties of the rock. Acoustic strength and scratch tests were conducted to evaluate rock mechanical parameters such as unconfined compressive strength. Further inhibition potential was evaluated by conducting linear swell and capillary suction timer tests. The contact angle was measured on a sandstone surface for wettability change. The results showed the novel green additive provided strong inhibition to clays. The reduction in linear swelling and rise in capillary suction time showed the inhibition potential and water control potential of the biomaterial. Furthermore, mechanical properties were lower than DI-treated rock sample tested under dry conditions. With all these benefits, using green novel additive makes rock more stable and reduces damage to the formation. The green additive is economical and an environment-friendly solution to clay swelling. It is an effective recipe for reducing the formation damage caused by clay swelling.
https://onepetro.org/SPEWRM/proceedings-abstract/23WRM/3-23WRM/519639

Department of Electrical Engineering

1. **Alharbi, A. R., Tariq, H., Aljaedi, A., & Aljuhni, A. (2023). Latency-Aware Accelerator of SIMECK Lightweight Block Cipher.** *Applied Sciences*, *13*(1), 161.doi: 10.3390/app13010161. **Hassan Tariq (Electrical Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)**
This article presents a latency-optimized implementation of the SIMECK lightweight block cipher on a field-programmable-gate-array (FPGA) platform with a block and key lengths of 32 and 64 bits. The critical features of our architecture include parallelism, pipelining, and a dedicated controller. Parallelism splits the digits of the key and data blocks into smaller segments. Then, we use each segmented key and data block in parallel for encryption and decryption computations. Splitting key and data blocks helps reduce the required clock cycles. A two-stage pipelining is used to shorten the critical path and to improve the clock frequency. A dedicated controller is implemented to provide control functionalities. For the performance evaluation of our design, we report implementation results for two different cases on Xilinx 7-series FPGA devices. For our case one, the proposed architecture can operate on 382, 379, and 388 MHz frequencies for Kintex-7, Virtex-7, and Artix-7 devices. On the same Kintex-7, Virtex-7, and Artix-7 devices, the utilized Slices are 49, 51, and 50. For one encryption and decryption computation, our design takes 16 clock cycles. The minimum power consumption is 172 mW on the Kintex-7 device. For the second case, we targeted the same circuit frequency of 50 MHz for synthesis on Kintex-7, Virtex-7, and Artix-7 devices. With minimum hardware resource utilization (51 Slices), the least consumed power of 13.203 mW is obtained for the Kintex-7 device. For proof-of-concept, the proposed SIMECK design is validated on the NEXYS 4 FPGA with the Artix-7 device. Consequently, the implementation results reveal that the proposed architecture is suitable for many resource-constrained cryptographic applications.
https://www.mdpi.com/2076-3417/13/1/161

2. **Ijaz, K., Adnan, M., Toor, W. T., Butt, M. A., Idrees, M., Ali, U., . . . Ashraf, S. R. (2023). A New Noise Shaping Approach for Sigma-Delta Modulators Using Two-Stage Feed-Forward Delays and Hybrid MASH-EFM.** *Electronics,* 12(3), 740. **Khalid Ijaz (Electrical Engineering/SEN) Muhammad Adnan (Computer Science\SST) Syed Rehan Ashraf (Industrial Engineering/SEN) Date of Publication: February 2023 HJRS: W (Honorable Mention)**
Sigma-delta modulators use a noise-shaping technique to curtail the noise power in the band of interest during digital-to-analog conversion. Error feedback modulator employs an efficient noise transfer function for time varying inputs than any other sigma-delta modulators. However, the efficiency of the conventional noise transfer function degrades and the quantizer saturation issue provokes when the input signal reaches to full scale. This work proposes a new noise transfer function which is a combination of transfer functions of two-stage Feed-forward delays and a novel Hybrid multi-stage noise shaping-error feedback sigma-delta modulator. The noise transfer function of two-stage Feed-forward delays mitigates the concern of quantizer saturation. The noise transfer function offered by the Hybrid multi-stage noise shaping-error feedback architecture provides sustainable solutions to limit cycles and idle tones. The simulation concludes that the proposed noise-shaping approach obtains comparatively high signal-to-quantization noise ratio than the conventional error feedback modulators. Other performance parameters like spurious-free dynamic range, effective number of bits and signal-to-noise plus distortion ratio are also significantly improved.
https://www.mdpi.com/2079-9292/12/3/740

3. **Iqbal, W., Ullah, I., & Shin, S. (2023). Nonimaging High Concentrating Photovoltaic System Using Trough.** *Energies,* 16(3), 1336. **Waseem Iqbal, Irfan Ullah (Electrical Engineering/SEN) Date of Publication: January 2023 HJRS: W (Bronze)**

Solar energy is a long-established technology, which has zero CO_2 emissions, and provides low-cost energy for a given area of land. The concentrator photovoltaic (CPV) has been given preference over the photovoltaic due to its high efficiency. In a CPV system, most of the solar cell area has been replaced with an optical concentrator. Various parabolic trough based CPV systems have been presented where a concentration of <300 is achieved. In the current research, a design is presented to achieve a high concentration of 622×. The design consists of two stages of concentration including parabolic trough as a main concentrator and nonimaging reflective grooves as a secondary concentrator. The trough reflects the incident light towards the secondary reflector where the light is redirected over the solar cell. Design of the two-stage concentrator, ray-tracing simulation, and results are presented. The system achieved an optical efficiency of 79%. The system would also be highly acceptable in solar thermal applications owing to its high concentration.
https://www.mdpi.com/1996-1073/16/3/1336

4. **Ali, A., Muqeet, H. A., Khan, T., Hussain, A., Waseem, M., & Niazi, K. A. K. (2023). IoT-Enabled Campus Prosumer Microgrid Energy Management, Architecture, Storage Technologies, and Simulation Tools: A Comprehensive Study.** *Energies,* **16(4). doi: 10.3390/en16041863. Asif Hussain (Electrical Engineering/SEN) Date of Publication: February 2023 HJRS: W (Bronze)**

Energy is very important in daily life. The smart power system provides an energy management system using various techniques. Among other load types, campus microgrids are very important, and they consume large amounts of energy. Energy management systems in campus prosumer microgrids have been addressed in different works. A comprehensive study of previous works has not reviewed the architecture, tools, and energy storage systems of campus microgrids. In this paper, a survey of campus prosumer microgrids is presented considering their energy management schemes, optimization techniques, architectures, storage types, and design tools. The survey is comprised of one decade of past works for a true analysis. In the optimization techniques, deterministic and metaheuristic methods are reviewed considering their pros and cons. Smart grids are being installed in different campuses all over the world, and these are considered the best alternatives to conventional power systems. However, efficient energy management techniques and tools are required to make these grids more economical and stable.
https://www.mdpi.com/1996-1073/16/4/1863

5. **Mehmood, R. S., Hussain, A., Ali, U., & Mahmood, M. T. (2023). Novel Double-Damped Tuned AC Filters in HVDC Systems.** *Computers, Materials and Continua, 75***(1), 1467-1482. doi: 10.32604/cmc.2023.033280. Rana Shaheer Mehmood (Electrical Engineering/SEN) Date of Publication: April 2023 HJRS: W (Bronze)**

This paper presents a performance analysis of novel double-damped tuned alternating current (AC) filters in high voltage direct current (HVDC) systems. The proposed double-damped tuned AC filters offer the advantages of improved performance of HVDC systems in terms of better power quality, high power factor, and lower total harmonic distortion (THD). The system under analysis consists of an 878 km long HVDC transmission line connecting converter stations at Matiari and Lahore, two major cities in Pakistan. The main focus of this research is to design a novel AC filter using the equivalent impedance method of two single-tuned and double-damped tuned AC filters. Additionally, the impact of the damping resistor on the AC channel is examined. The THD of the HVDC system with and without current AC filters was also compared in this research and a double-damped tuned AC filter was proposed. The results of the simulation represent that the proposed double-damped tuned AC filter is far smaller in size, offers better power quality, and has a much lower THD compared to the AC filters currently in place in the converter station. The simulation analysis was carried out utilizing power systems computer-aided design (PSCAD) software.
https://www.techscience.com/cmc/v75n1/51440

6. **Qureshi, M. M., & Kaleem, M. (2023). EEG-based seizure prediction with machine learning.** *Signal, Image and Video Processing,* **17(4), 1543-1554. doi: 10.1007/s11760-022-02363-4. Muhammad Mateen Qureshi, Muhammad Kaleem (Electrical Engineering/SEN) Date of Publication: June 2023 HJRS: X (Honorable Mention)**

Epilepsy is a well-recognized neurological illness which affects millions of people worldwide. This illness has long been considered important in biomedical research because of the threats it poses to the quality of human life. This paper presents a novel methodology that combines signal processing and machine learning techniques for patient-specific seizure prediction. The electroencephalogram (EEG) data per patient is first segmented, followed by wavelet packet decomposition to decompose the segmented data into the delta, theta, alpha and beta EEG bands. Four features are then extracted from each of these bands. The feature matrix thus obtained is fed into the support vector machine (SVM) classifier to classify the pre-ictal and inter-ictal seizure phases. Once the pre-ictal state has been detected by the SVM classifier, an alarm is generated using the Kalman filtering technique. False-positive rate, sensitivity and accuracy were measured as performance indicators, with achieved values of 0.138/h, 94.9%, 97.43%, respectively. The proposed method uses only 1 h of EEG data from one to two channels, thereby resulting in a computationally efficient technique.
https://link.springer.com/article/10.1007/s11760-022-02363-4

7. Riffat, A., **Ahmad, N.,** Ahmad, M. S. A., & Alvi, A. K. (2023). Sulfur: A macronutrient having potential to improve salinity tolerance in plants. *Pakistan Journal of Botany, 55*(4), 1321-1333. doi: 10.30848/PJB2023-4(33). **Nauman Ahmad (Electrical Engineering/SEN) Date of Publication: April 2023 HJRS: X (Clay)**

Salinity causes disturbance in osmotic potential, imbalance in nutritional composition, and reduction in photosynthesis that reduces whole-plant growth and development. Amongst different strategies to overcome salt-induced toxicity, external application of mineral nutrients is a cost-effective and smart method. Sulfur (S) has substantial significance in relieving the toxic impacts of salt stress by increasing plant nutrients, water uptake, protein contents, and plant productivity. It is an essential constituent of different coenzymes, vitamins, and plant hormones. Various S metabolites are involved in developing salt tolerance by modulating various physiological and biochemical processes in plants. In the case of saline conditions, S helps in ionic homeostasis, optimizing water stress, regulation of mineral uptake, protection of photosynthetic apparatus, activating antioxidant machinery, reduction of electrolytic leakage and membrane stabilization. This review focuses on the significance of S in improving salt tolerance potential of plants by modulating various growth, physiological and biochemical processes. Moreover, the significance of various S metabolites and S salts with respect to salt tolerance has also been described.

https://www.pakbs.org/pjbot/papers/1675244147.pdf

8. Gardazi, S. F. A., Chattha, J. N., & Uppal, M. (2023). Latency-Optimum NOMA With RF Energy Harvesting and Finite Battery Capacity. *IEEE Communications Letters,* 27(10), 2832-2836. doi: 10.1109/LCOMM.2023.3292931. **Jawwad Nasar Chattha (Electrical Engineering/SEN) Date of Publication: July 2023 HJRS: W (Gold)**

We consider an uplink non-orthogonal multiple access (NOMA) setup in which two nodes rely on a radio-frequency energy harvester with a finite-capacity battery for their transmissions. We investigate the effect of the harvester's battery capacity on the average latency required for the successful delivery of messages in a Rayleigh faded environment. Under a successive interference cancellation decoding strategy with an automatic-repeat request protocol, we formulate the average latency as a function of both the battery "charging time" and the successful "decoding time". We derive a closed-form expression for the probability of outage and identify that the battery capacity induces a trade-off between the charging and the successful decoding time. Finally, we minimize the latency by iteratively optimizing the battery capacity and the energy allocation between the two transmitting nodes.

https://ieeexplore.ieee.org/abstract/document/10180027

9. **Hussain, A.,** Arif, A., Bukhari, S. S. H., **Baig, Z.,** Yazdan, T., & **Shoaib, M.** (2023). Novel Double Mode Dual-Stator Wound Rotor Synchronous Machine for Variable Speed Applications*. World Electric Vehicle Journal,* 14(8). doi: 10.3390/wevj14080217. **Asif Hussain, Zafar Baig, Muhammad Shoaib (Electrical Engineering/SEN) Date of Publication August 2023 HJRS: X (Clay)**

his paper offers a novel dual-mode double stator wound rotor synchronous machine for variable speed applications. The proposed motor integrates the benefits of both the traditional wound rotor synchronous machine (WRSM) and brushless wound rotor synchronous machine (BL-WRSM). A constant torque can be attained in the maximum torque per ampere region by operating the proposed machine as a traditional WRSM in Mode I, and a constant power can be attained in the field-weakening region by operating it as a BL-WRSM in Mode II. Moreover, due to the dual-stator structure, the proposed machine exhibits improved performance in terms of high torque density as compared to the existing single stator BL-WRSM. By using a special stator winding arrangement to achieve the sub-harmonic component of the stator magnetomotive force, the brushless operation of the proposed machine is achieved. The additional sub-harmonic component induces a voltage in the harmonic winding placed on the rotor, which is then rectified and provided a DC current to field winding for brushless excitation. In order to validate the effectiveness of the proposed machine, a two-dimensional finite element analysis (FEA) is carried ou

https://www.mdpi.com/2032-6653/14/8/217

10. Iqbal, W., Ullah, I., & Shin, S. (2023). Optical Developments in Concentrator Photovoltaic Systems—A Review. *Sustainability (Switzerland),* 15(13). doi: 10.3390/su151310554. **Waseem Iqbal, Irfan Ullah (Electrical Engineering/SEN) Date of Publication: July 2023 HJRS: W (Silver)**

Energy needs have increased with global advancements and industrial revolutions. Electrical energy utilization shares a huge amount of energy with residential and industrial loads. Traditional energy resources are expensive and polluting, producing greenhouse gasses, which is a major environmental concern. Solar energy utilization is a cost-effective, sustainable, and green solution to meet the ongoing energy demand. Concentrator photovoltaic (CPV) systems are developed for energy conversion by providing high efficiency using multi-junction solar cells. This paper provides an overview of the recent optical developments in CPV systems and emerging technologies that are likely to shape the future of CPV systems. The objective of this article is to provide an overview of the issues that need to be resolved to improve the geometrical concentration,

acceptance angle, uniformity, and optical efficiency of CPV systems. A comprehensive comparison is also presented on different types of solar concentrators. In addition, future research directions are presented to facilitate the continued growth and success of CPV systems. Furthermore, this review article gives an up-to-date and widespread overview of CPV technology, assesses its potential for various applications, and distinguishes the challenges and opportunities for future research and development.
https://www.mdpi.com/2071-1050/15/13/10554

11. **Ahmed, S., Siddiqi, M. R., Ali, Q., Yazdan, T., Hussain, A., & Hur, J. (2023). Brushless Wound Rotor Synchronous Machine Topology Using Concentrated Winding for Dual Speed Applications.** *IEEE Access*, 11, **119560-119567. doi: 10.1109/ACCESS.2023.3327525. Asif Hussain (Electrical Engineering/SEN) Date of Publication: 2023 HJRS: W (Silver)**

Permanent magnet (PM) machines have broad applicability and a rapid output rise due to their good power factor, high efficiency, and power density. However, with the recent high cost, unavailability, and demagnetization issues of PMs, the wound rotor synchronous machine (WRSM) is a better substitute for permanent magnet machines for various applications in terms of price value and controllability. While the WRSM contains issues such as regular maintenance and replacement of brushes and slip rings, this paper introduces a brushless WRSM (BL-WRSM)with concentrated winding having 36 slots and 48 poles, which generates fundamental component and a dominant sub-harmonic component of magneto motive force (MMF). To achieve the brushless operation, the rotor has an additional winding called excitation winding that is connected with the main field winding via a rectifier. This additional winding is used to induce the electromotive force (EMF) by the sub-harmonic MMF component of the stator. The EMF is converted to DC by the rectifier and fed to the main field winding. This BL-WRSM has been developed for dual-speed applications such as washing machines. The machine has been tested for 46 rpm and 1370 rpm. The low-speed mode is for washing and the high-speed mode is for drying clothes. To validate the performance and feasibility, an outer rotor BL-WRSM is designed. The performance was compared with the conventional WRSM (C-WRSM). 2-D finite element analysis (FEA) simulation was conducted using ANSYS Electromagnetic.
https://ieeexplore.ieee.org/abstract/document/10295473

Department of Mechanical Engineering

1. **Toor, Z. S., Baluch, A. H., Wadood, A., Rehman, A. U., Saleem, M., Butt, M. S., & Hayat, K. (2023). Impact based characterization of composites using a computational framework.** *Acta Astronautica*, *202*, **705-714.doi: 10.1016/j.actaastro.2022.11.011. Khazar Hayat (Mechanical Engineering/SEN) Date of Publication: January 2023 HJRS: W (Silver)**

This article has employed a computational method to evaluate the dynamic response of Carbon fiber reinforced polymers composite material. Three Dimensional Computational Shell and Two Dimensional modelling of a protective system has been conducted by the authors using Finite Element Method. In order to simulate the influence of space debris impacts on carbon epoxy composites, velocity variation in high and hyper speed range has been conducted. Rigid elements were utilized to model the projectile, while three dimensional stress elements, Continuum Shell elements and Plane stress elements were used for three dimensional, Continuum Shell and two dimensional modelling of the plate. The computational results indicated a good convergence with the available experimental results with variation less than 10%. It was observed that the generated stresses, energy absorbed, damaged area as well as the computation time of the models increased with the subsequent increase in impacting velocity. An increase of 75% in the energy absorbed, 86% increase in the generated stress and 93% increase in the deformation was observed against an increase in the impact velocity from 150 m/s to 1674 m/s. A maximum increase of 12% in the overall damage area, 41% increase in delamination of plies and 95% enhanced computation time was also observed against the above mentioned velocity variation.
https://www.sciencedirect.com/science/article/pii/S009457652200618X

2. **Haseeb, S. A., Ahmad, Z., Dief, T. N., Alnuaimi, S. K., Sultan, T., Hayat, K., . . . Zoppi, M. (2023). Fixture Layout Optimization of Sheet Metals by Integrating Topology Optimization into Genetic Algorithm.** *Applied Sciences (Switzerland), 13*(7). **doi: 10.3390/app13074395. Shah A. Haseeb, Zeshan Ahmad, Tipu Sultan, Khazar Hayat (Mechanical Engineering/SEN) Date of Publication: April 2023 HJRS: W (Bronze)**

Manufacturing process accuracy is obtained by proper arrangement of fixture elements known as fixture layout. A N-3-2-1 method is used for sheet metals which requires (N + 3) fixture elements to constrain deformation normal to surface. Genetic Algorithm (GA) is used for fixture layout optimization, but it requires high computational effort due to large number of populations. A new method for fixture layout optimization is proposed by integrating topology optimization into GA. In this method, topology optimization reduces the population for GA. The objective function is to reduce the population for GA and minimize total deformation normal to the plane of workpiece. The proposed approach comprised three stages. In the first stage, the initial number of clamps are determined. In the second stage, the population is reduced for GA and the feasible area

of clamps are identified using the topology optimization technique. In the third stage, the number and position of clamps, earlier identified in stage one, are optimized using GA. Two different case studies are solved by varying applied load position and magnitude. The proposed method results 47.5% and 65% decreases in the population for subcase 1 and subcase 2, respectively. However, in subcase 3 and subcase 4 the population reduced was 90% and 80%, respectively. The 25% of reduced population is used as the convergence criteria. Similarly, total deformation normal to the plane is reduced in each subcase, with the highest reduction of 86.31% in subcase 1 and lowest of 59.85% in subcase 4. The experiment is performed on the first case study to validate results. This concludes that the proposed method is valid and that optimal results are found.
https://www.mdpi.com/2076-3417/13/7/4395

3. **Sadaf, S., Munir, N., Saeed, A., Hassan, K., & Ahmad, Z. (2023). Antimicrobial activity of comfort related properties of silk treated with herbal extracts in making of reusable masks.** *Bioscience Journal, 39*. **doi: 10.14393/BJ-v39n0a2023-65193.** Zeeshan Ahmad (Mechanical Engineering/SEN) Date of Publication: March 2023 HJRS: Y (Null)

The study was aimed at divulging an eco-friendly antimicrobial finish on 100 % silk woven fabric. The leaves' extract of Azadirachata indica, Butea monospermaand Litche chinensiswere used as the development of eco-friendly antimicrobial finish. The antimicrobial property and comfort related property were checked before and after applying antimicrobial finish. In comfort related property absorbency & air permeability were checked.The ASTEM E2149 Shake Flask method was used to check antimicrobial finish and AATCC method was used for checking fabric property. One way ANOVA statistical test was applied for analysis of results. The FTIR and SEM results showed the presences of finish on fabrics. In comfort related property, absorbency and air permeability was increased. The results showed that antimicrobial finish made 100% reduction against microorganism up to 25 washes which can be used in making reusable masks fight against COVID-19.
https://seer.ufu.br/index.php/biosciencejournal/article/view/65193

4. **Hasan, S. W., Mehdi, M., Ali, A., Qadir, R. A., Mateen, A., & Shamshad, F. (2023). Improved Thermal Gradients in Diffuser-/Nozzle-Shaped Thermally Driven Electrochemical Cells for Enhanced Output Power Density.** *Arabian Journal for Science and Engineering.* **doi: 10.1007/s13369-023-08409-0.** Rana Abdul Qadir, Abdul Mateen & Faisal Shamshad (Mechanical Engineering/SEN) Date of Publication: November 2023 HJRS: W (Silver)

Efficiently transforming thermal energy into electricity through inexpensive and ecofriendly devices can address energy shortage while reducing global warming. Thermally driven electrochemical cells (TECs) convert thermal gradient (ΔT) into open-circuit voltage (V_{oc}) through reduction–oxidation (redox) reactions. For TECs, it is essential to maintain the integrity of thermal disequilibrium throughout energy transformation. However, the natural convection occurring in TEC electrolytes reduces ΔT, thus adversely affecting output power. It is necessary to design and fabricate TECs that are capable of providing and maintaining higher thermal gradients. This paper demonstrates that higher ΔT can be achieved by fabricating TECs in nozzle- and diffuser-shaped geometries rather than traditional cylindrical-shaped formations. We experimentally compared the performance of our proposed designs: (a) nozzle-shaped TECs (n-TECs) and (b) diffuser-shaped TECs (d-TECs) against the traditional cylindrical-shaped TECs (c-TECs). We found that variations in mechanical features of the cell structures completely change heat flow across the cells. According to our observations, c-TECs attain ΔT of only 3.9 °C once placed between temperature source (90 °C) and sink (28 °C), representing a very high thermal flow across the cell. On the contrary, n-TECs and d-TECs significantly resisted the thermal leakage, consequently attaining higher ΔT of 4.8 and 8.6 °C, respectively. The higher ΔT in d-TECs resulted in power density of 5.8 mWm^{-2} which is 83% higher than the traditional c-TECs.
https://seer.ufu.br/index.php/biosciencejournal/article/view/65193

5. **Ali, Z., Sheikh, M. F., Al Rashid, A., Arif, Z. U., Khalid, M. Y., Umer, R., & Koç, M. (2023). Design and development of a low-cost 5-DOF robotic arm for lightweight material handling and sorting applications: A case study for small manufacturing industries of Pakistan.** *Results in Engineering,* 19. **doi: 10.1016/j.rineng.2023.101315.** Zain Ali, Muhammad Fahad Sheikh, Zia Ullah Arif (Mechanical Engineering/SEN) Date of Publication: September 2023 HJRS: W (Bronze)

Due to the ever-increasing demand for higher production rates and the shortage of skilled labor in small industries, material handling and sorting have become extremely tedious and challenging. Industrial automation-led effective material-handling solutions like robotic arms have gained immense importance as they provide an alternative to human involvement, contribute to higher sorting accuracy, and provide enhanced safety. However, the adaptability of these robotic arms in small manufacturing industries in Pakistan is mainly hindered due to their higher costs and concerns with their structural durability. This paper presents the development of a low-cost 5-DOF robotic arm with a designed payload limit of 1 kg and automatically sorts objects fed through a conveyer belt. Catering to the compact sizing, high strength, and lower payload requirements of small industries, aluminum was selected as the material of the robotic arm due to its superior

strength-to-weight ratio while being lightweight. Arm geometry was developed using SOLIDWORKS® software, which was further processed in ANSYS® software to perform the static structural analysis of the robotic arm using Finite Element Analysis (FEA). The fine meshing of the robotic arm assembly was done using triangular elements with the total number of elements and total nodes 52134 and 89104, respectively. A single point load was applied on the end effector, and the force was kept downward with an incremental loading of 1 kg starting from 100 g. These FEA simulations show that the robotic arm can hoist considerable weight while maintaining its structural integrity and directionality. The proposed robotic arm is also well-suited for manipulating objects in tight spaces due to its compact size and customizable range of motion, making it an ideal choice for applications that require precise manipulation of light loads.
https://seer.ufu.br/index.php/biosciencejournal/article/view/65193

6. **Noroozi, R., Arif, Z. U., Taghvaei, H., Khalid, M. Y., Sahbafar, H., Hadi, A., . . . Chen, X. (2023). 3D and 4D Bioprinting Technologies: A Game Changer for the Biomedical Sector?** *Annals of Biomedical Engineering,* **51(8), 1683-1712. doi: 10.1007/s10439-023-03243-9. Zia Ullah Arif (Mechanical Engineering/SEN) Date of Publication: June 2023 HJRS: W (Silver)**
Bioprinting is an innovative and emerging technology of additive manufacturing (AM) and has revolutionized the biomedical sector by printing three-dimensional (3D) cell-laden constructs in a precise and controlled manner for numerous clinical applications. This approach uses biomaterials and varying types of cells to print constructs for tissue regeneration, e.g., cardiac, bone, corneal, cartilage, neural, and skin. Furthermore, bioprinting technology helps to develop drug delivery and wound healing systems, bio-actuators, bio-robotics, and bio-sensors. More recently, the development of four-dimensional (4D) bioprinting technology and stimuli-responsive materials has transformed the biomedical sector with numerous innovations and revolutions. This issue also leads to the exponential growth of the bioprinting market, with a value over billions of dollars. The present study reviews the concepts and developments of 3D and 4D bioprinting technologies, surveys the applications of these technologies in the biomedical sector, and discusses their potential research topics for future works. It is also urged that collaborative and valiant efforts from clinicians, engineers, scientists, and regulatory bodies are needed for translating this technology into the biomedical, pharmaceutical, and healthcare systems.
https://link.springer.com/article/10.1007/s10439-023-03243-9#Abs1

7. **Talib, I., Yasin, M., Hussain, J., & Uwamahoro, R. (2023). Performance Evaluation and Parametric Optimization of Coal-Fired Water Tube Boiler Using the Grey-Taguchi Method.** *International Journal of Energy Research,* **2023. doi: 10.1155/2023/4203176. Irsa Talib, Muzammil Yasin (Mechanical Engineering/SEN) Date of Publication: September 2023 HJRS: W (Bronze)**
Industries, district heating companies, and public institutions that use boilers for heating, processing, or power production find it challenging to run at peak efficiencies due to rising fuel prices. Insufficient heat energy production and distribution through boilers contribute to an overall increase in energy expenditure. The performance of a boiler is affected by various controlling parameters, including specific fuel consumption capacity, load, and heat losses. The current study was conducted to evaluate the performance of the coal-fired water tube boiler at D.G. Khan Cement Company Limited, Pakistan. The experimental results were validated with artificial neural network- (ANN-) based predictions, which were observed to have an error of 14% in the regression plot. In this study, the performance parameters of the boiler, including steam temperature (ST), steam pressure (SP), and specific steam flow rate (SSFR), were optimized against fuel consumption (FC) and load using the Grey-Taguchi method. The best-performing parameters, with the best criteria, were observed at an overall grey relational grade (OGRG) of 0.891 and a load of 66%. The findings indicated that the overall performance of the boiler was optimized with an FC of 3.09 kg/s, a load of 66%, ST of 532°C, SP of 9.93 MPa, and SSFR of 21.38 kg/s.
https://www.hindawi.com/journals/ijer/2023/4203176/

School of Social Science & Humanities (SSSH)

Department of Education

1. **Asghar, M. Z., Barbera, E., Rasool, S. F., Seitamaa-Hakkarainen, P., & Mohelská, H. (2023). Adoption of social media-based knowledge-sharing behaviour and authentic leadership development: evidence from the educational sector of Pakistan during COVID-19.** *Journal of Knowledge Management,***27(1), 59-83. doi: 10.1108/JKM-11-2021-0892. Muhammad Zaheer Asghar (Education/SSSH) Date of Publication: January 2023 HJRS: W (Gold)**
This research paper aims to explore the influence of social media–based knowledge-sharing intentions (SMKI) on prospective authentic leadership development (ALD) to deal with the future crisis. In the existing literature, to the best of the authors' knowledge, there is no significant empirical evidence to test the relationship between

SMKI and ALD. Thus, this study contributes to the growing literature regarding the role of SMKIs, ALD, social media–based knowledge-sharing behavior (SMKB) and facilitating conditions (FCs). However, in this study, the authors developed a conceptual framework based on technology adoption and leadership theory. It was used to identify preservice educational leaders' SMKIs and their effect on ALD to deal with an educational crisis during the COVID-19 pandemic. Furthermore, SMKIs are strengthening ALD, directly and indirectly, using SMKB and FCs. Design/methodology/approach: In this study, the higher education students are considered preservice leaders who were enrolled in educational leadership and management programs. However, this study's target population and sample are students enrolled in educational leadership and management programs. Therefore, higher education students are considered preservice educational leaders. Therefore, a multilevel questionnaire survey approach was adopted to collect data from preservice educational leaders (n = 451 at Time 1 and n = 398 at Time 2) enrolled in education departments in the selected universities in Pakistan. A total of 398 survey questionnaires were finalized with a return ratio of 89%. The partial least square structural equation modeling with SmartPLS 3.2.8 was used for the data analysis. Findings: This research found that SMKIs are positively and significantly connected with ALD. This study also confirms that SMKB significantly and positively mediates the relationship between SMKIs and ALD. Therefore, this study concludes that preservice educational leaders were ready to adopt SMKB. Practical implications: Social media–based knowledge sharing can be helpful to develop authentic leadership among preservice educational leaders during a crisis. Preservice educational leaders as authentic leaders can prove to be an asset in dealing with the COVID-19 pandemic crisis. Originality/value: This research integrated the technology adoption model and leadership theory to provide empirical evidence of SMKIs' direct and indirect influence on ALD through social media–based knowledge-sharing actual use behavior by preservice educational leaders during the COVID-19 pandemic. Moreover, the moderated mediating effect of the FCs was also studied in the relationship between SMKIs and actual user behavior as well as ALD.
https://www.emerald.com/insight/content/doi/10.1108/JKM-11-2021-0892/full/html

2. **Jabeen, S., Gul, F., & Bashir, I. (2023). Effect of Workplace Bullying on Job Satisfaction and Job Performance at School Level.** *Global Sociological Review,* **VIII(I), 21-39 p. Sadaf Jabeen, Fariha Gul, Irfan Bashir (Education/SSSH) Date of Publication: January 2023 HJRS: Y (Null)**
This study sought to determine the workplace bullying, job satisfaction, job performance and their effects on teachers. This quantitative study aims to highlight the issue of bullying which badly affects teachers. The sample was comprised of all schools in Lahore. A stratified random sampling strategy was used. Four hundred teachers were selected from all schools in Lahore. The questionnaire consisted of 115 items. It was designed at a Likert. Data was analyzed through SPSS. The findings show a strong relationship between workplace bullying and job satisfaction and job performance. The findings highlight that demographic variables vary among teachers. The finding of this study that workplace bullying is increasing speedily, that suggests that organizational bullying might make teachers feel uncomfortable in their jobs, causing stress. These findings may be utilized to design successful solutions for not just preventing and managing bullying; but also for making schools safer for teachers.
https://www.gsrjournal.com/papers/ENv0bZdUxA.pdf

3. **Abid, N., Aslam, S., Alghamdi, A. A., & Kumar, T. (2023). Relationships among students' reading habits, study skills, and academic achievement in English at the secondary level.** *Frontiers in psychology,* **14, 1020269-1020269. doi: 10.3389/fpsyg.2023.1020269. Nisar Abid (Education/SSSH) Date of Publication: January 2023 HJRS: W (Silver)**
Introduction: Reading is an attempt to comprehend the writer's message for personal growth and success in the relevant fields. Thus, psychologists consider it a multifaceted cognitive process of constructing meanings from texts. The present study was conducted to determine the relationships among students' reading habits, study skills, and academic achievement in English at the secondary level in Punjab, Pakistan. Methods: The (n = 1614) students enrolled in the science section for the academic year 2019–2020 participated in this descriptive correlational survey, selected from 40 high schools in Lahore, Punjab, Pakistan, through a non-proportionate stratified random sampling technique. The Reading Habits Questionnaire (RHQ) and the Study Skills Scale (SSS) were used to collect data about students' reading habits and study skills. At the same time, academic achievement was the students' grades obtained in the ninth class in the subject of English that were determined by the Board of Intermediate and Secondary Education (BISE) Lahore in 2019. Students' responses were analyzed through descriptive and inferential statistics. Results: The results indicated that students have competent reading habits and study skills. The correlational findings showed a strong positive relationship among reading habits, study skills, and academic achievement in English, while moderate positive relationships between reading habits and academic achievement in English. However, regression analysis results were significant, while reading habits and study skills moderately predicted academic achievement. Discussion: It is implicated that teachers should plan such assignments and tasks based on reflective thinking by considering the role of study skills in academic achievement. Moreover, teachers and school administrators could mutually create timetables for library lessons to build reading habits and study skills among learners.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9912844/pdf/fpsyg-14-1020269.pdf

4. **Zaki, K. A., Rafiq, S., & Afzal, A. (2023). Impact of teacher-student favoritism on students' learning outcomes at university level.** *Journal of Social Research Development,* **4(1), 01–14. https://doi.org/10.53664/JSRD/04-01-2023-01-01-14. Ayesha Afzal (Education/SSSH) Date of Publication: March 2023 HJRS: Y (Null)**
This study aimed to explore teacher favoritism's impact on students' learning outcomes at university level. Favoritism is a common trend in classrooms as teachers give special treatment to a few students despite not providing their best work, instead because of other reasons, like the personal preferences and liking/disliking. This research focuses on how students think about teacher-student favoritism and how it impacts students' learning outcomes. To answer these questions positivism paradigm was adhered to. The research followed a quantitative approach, and the survey method was considered best suited for this study. Population of this study consisted of all public sector universities of Lahore. The sample was collected from five general category public sector universities of Lahore. The descriptive and inferential statistics were used to conclude. Therefore, it was found that favoritism significantly impacts student learning outcomes at the university level. It causes insecurity, dissatisfaction, conflicts, and revengeful emotions among students, that directly affect their learning of students. Favoritism also causes less self-confidence in students. Favoritism impacts classroom environment, which is directly related to lousy learning outcomes.
http://www.jsrd.ard.org.pk/index.php/jsrd/article/view/132

5. **Afzal, A. Rafiq, S., Kanwal, A. (2023). The influence of teacher-student relationships on students' academic achievement at university level.** *Gomal University Journal of Research,* **39(1), 55–68. Ayesha Afzal (Education/SSSH) Date of Publication: March 2023 HJRS: Y (Null)**
The primary goal of this research was to investigate relationship between teachers and students and its impact upon students' academic success. As students spend significant amount of time with their teachers, collaborative and close relationship between them has a critical and meaningful effect on students. This study aimed to answer two key questions: How do students perceive their relationships with their teachers? And how does relationship amid teachers and students affect academic achievement? To address these questions, the study employed a positivist paradigm and a quantitative approach. The survey method was used to collect data, and a structured questionnaire was used as instrument. The study population comprised all public and private universities in Lahore, and a convenient sampling technique was used to select eight universities, four public and four private. Collected data were analyzed using SPSS-V-27, & descriptive and inferential statistics were used to draw conclusions. The study findings revealed that strong relationship between teachers and students existed, and it had a significant impact upon students' academic achievement. The study also found that students' perceptions of their relationships with their teachers were positive and had positive effect on their grades & academic achievements.
http://www.gujr.com.pk/index.php/GUJR/article/view/1604

6. **Samuel, A., Abid, N., Azeem, A., & Bashir, R. (2023). Exploring gender-wise, sector-wise, and grade-wise difference among secondary school students' reading habits.** *International Journal of Evaluation and Research in Education, 12***(2), 579-585. doi: 10.11591/ijere.v12i2.22771. Nisar Abid, Asmaa Azeem (Education/SSSH) Date of Publication: June 2023 HJRS: X (Clay)**
This study was conducted to examine students' perceptions regarding reading habits and to explore gender-wise, sector-wise, and grade-wise differences in secondary school students' reading habits. The students (N=538) who participated in this cross-sectional survey were selected through a non-proportional stratified random sampling technique from district Lahore. The researchers developed a questionnaire comprised of four subscales (perceptions, purpose, preferences, and problems in reading) to measure students reading habits. They ensured the validity of the instrument from experts and calculated the reliability that was Cronbach's alpha=0.802. Data were analyzed by using different statistical techniques (mean, standard deviation, and independent samples t-tests). The results of descriptive statistics indicated that students gave more preferences to reading than perceptions about reading, the purpose of reading, and problems in reading. However, the least contributing factor was problems in reading. Whereas the findings of independent samples t-tests showed a significant difference in students' perceptions about reading habits based on gender and class. However, an insignificant difference was found in students' perception of reading habits based on sector-wise (public and private) schools. Books of students' interests may be provided in libraries to encourage them to read. Moreover, teachers may also arrange more reading activities to enhance students' reading skills.
https://ijere.iaescore.com/index.php/IJERE/article/view/22771

7. **Nasreen, S., Shah, M., & Naeem, M. (2023). Differences in Principals' Instructional Supervisory Practices in Private Secondary Schools of Lahore based on Selected Demographic Variables.** *Research Journal of Social Sciences and Economics Review, 4***(1), 141-152. https://doi.org/10.36902/rjsser-vol4-iss1-2023(141-152). Shahida Nasreen, Madiha Shah, Maimoona Naeem (Education/SSSH) Date of Publication: March 2023 HJRS: Y (Null)**

Pakistan Economic Survey Reports (2018-2019; 2019-2020; 2020-2021) have continuously indicated better academic performance of private school students as compared to their counterparts in public schools. One contributing factor to the success of the private schools is their approach to quality instructions and instructional monitoring (Amin, Amin, & Rashid, 2022; Nasreen & Shah, 2019). This quantitative study is intended to find out the differences in teachers' perceptions regarding their principals' instructional supervisory practices in private secondary schools of Lahore based on certain demographic variables such as gender, age, academic qualification, and professional experience. The study uses survey method in which a questionnaire entitled Instructional Supervisory Practices Scale (ISPS) was administered to 530 teachers in around 24 private secondary schools of Lahore. The level of participants' perception regarding their principals' instructional supervisory practices in their respective schools was determined by using frequencies, percentages, mean, and standard deviation. To analyze the differences in teachers' perceptions regarding principals' instructional supervisory practices in their respective schools, independent sample t-test and One-way ANOVA were applied. Furthermore, post hoc tests were executed to determine where the differences occurred between groups. The results of the present study highlighted that the differences exist in the teachers' perceptions regarding their principal's instructional supervisory practices with reference to their gender and professional experience while no significant differences were observed when compared by their age and academic qualification groups. The instructional supervisors were perceived using effective leadership skills quite frequently in private secondary schools.
https://rjsser.org.pk/ojs/index.php/rjsser/article/view/594

8. **Kanwal, A., Rafiq, S., & Afzal, A. (2023). Impact of workload on teachers'efficiency and their students'academic achievement at the university level.** *Gomal University Journal of Research, 39*(2), 131-146. **Ayesha Afzal (Education/SSSH) Date of Publication: June 2023 HJRS: Y (Null)**
This study explores the impact of workload on teachers' efficiency and their students' academic achievement at the public sector university in Lahore, Pakistan. The research design was a qualitative case study approach, which allows for an in-depth exploration of the experiences and perceptions of teachers and students about affiliation between workload and academic achievement. Total of 30 semi-structured interviews were conducted with 15 teachers and 15 students, and qualitative content analysis was used to analyze data. Themes were generated by using the NVivo-14 software. The findings reveal that teacher workload has a significant impact on student academic achievement, and teacher efficiency and effectiveness. Heavy workloads can lead to stress, burnout, and decreased engagement, which negatively impact student learning outcomes. The teachers who effectively manage their workload are better able to provide support and guidance to their students, resulting in improved the academic achievement. The study concludes that reducing the teachers' workload and providing support to manage workload effectively can have positive impact upon both teacher and student outcomes.
http://www.gujr.com.pk/index.php/GUJR/article/view/1630

9. **Kamran, F., Afzal, A., & Rafiq, S. (2023). Examining the impact of private tutoring as an extra burden on the parents in Punjab Pakistan.** *Gomal University Journal of Research, 39*(2), 169-186. **Ayesha Afzal (Education/SSSH) Date of Publication: June 2023 HJRS: Y (Null)**
The private tutoring has become a widespread phenomenon in Punjab, Pakistan. The study examines the growth of private tutoring in Punjab, Pakistan, and its impact on parents' financial burden and credibility of the education system. Study followed an interpretive paradigm. The research design used for this study was phenomenological approach The research involves semi-structured interviews with 50 parents, and qualitative content analysis was used to analyze data. NVivo-14 software was used to identify the themes form data. The findings show that private tutoring is driven by the inadequacies of the public education system, peer pressure, and the perception of private tutoring as competitive advantage. However, parents perceive the financial burden of private tutoring as a significant concern. The results offered significant information for reaching the desired leading conclusion followed by certain recommendations. The study recommends that the government address the inadequacies of the public education system, regulate private tutoring, and enhance professional development of teachers.
http://www.gujr.com.pk/index.php/GUJR/article/view/1631

10. **Khan, I., Muhammad, Y., & Masood, S. (2023). Secondary School Teachers' Beliefs about the Cultivation of Values in Students: A Qualitative Study Conducted in Narowal, Pakistan.** *Journal of Educational Research and Social Sciences Review (JERSSR), 3*(2), 154-165. **Sajid Masood (Education/SSSH) Date of Publication: June 2023 HJRS: Y (Null)**
This qualitative research aims to investigate teachers' beliefs about the instillation of values in secondary school students. For this purpose, a multiple case study approach was used, and twenty teachers from diverse secondary schools in Punjab were recruited using criteria sampling. For data collection, in-depth semi-structured interviews were done. Interview transcripts were analysed using qualitative content analysis supported by NVivo 12 software. The results suggest that teachers in the area of values education are

dissatisfied with the curriculum, methodology, and continuous professional development they receive. In addition, they voiced concerns about the lack of parental support, societal pressures, and administrative obstacles that impeded their attempts to instil values in students. They believed that values education should be taught via role modelling, debate, and reflection and should be interwoven into all academic areas. This research suggests training and resources for teachers to enhance their competence and self-efficacy for the instillation of values in secondary school students.

https://ojs.jerssr.org.pk/index.php/jerssr/article/view/214

11. **Shah, S. R. A., Ubaid, U. U., Bashir, I., & Malik, A. (2023). ESL Leaners' Perceptions of the Use of Product Writing Approach: A Mixed-Methods Study.** *Resmilitaris, 13*(2), 5925-5938. **Irfan Bashir (Education/SSSH) Abdul Malik (ORIC) Date of Publication: June 2023 HJRS: Y (Null)**

The English as a second language (ESL) learners' ability to write a well-structured and cohesive piece of work is the ultimate goal of every English language pedagogy across the globe. To help teachers achieve the learning outcomes, the linguists and researchers have introduced several writing approaches. Among them, the product writing approach is the oldest and most commonly used method to teach writing skills in ESL contexts. However, researchers mainly overlooked to investigate the learners' perceptions of the use of the product writing approach in ESL contexts. Thus, the current study aims to investigate the ESL learners' perceptions of the use of the product writing approach and identify factors that impact the ESL learners' writing in the Pakistani ESL context. It employs a mixed-method approach by combining both quantitative and qualitative research designs. The quantitative data was collected from 200 ESL intermediate level (Grade-12) learners enrolled in five different colleges. As part of the qualitative data, semi-structured interviews were conducted with five ESL learners. The findings from both quantitative and qualitative data reveal that the ESL learners prefer to write on a given topic after developing familiarity with the topic through a model text. Moreover, they prefer to show their written tasks to their teacher for feedback rather than to their friends. The qualitative data indicates some additional factors, such as lack of motivation, L1 interference, lack of writing practice, memorisation, weakness in spelling, and lack of vocabulary that influence the learners' writing practice in the Pakistani ESL context.

https://resmilitaris.net/menu-script/index.php/resmilitaris/article/view/3288/2585

12. **Khan, Z., Saeed, S., & Naseem, A. (2022). Exploring the Teacher Empowerment Strategies of School Heads at Secondary Level in Punjab, Pakistan.** *JCTE, 6*(1). https://doi.org/10.58444/jcte.v6i1.729. **Afshan Naseem (Education/SSSH) Date of Publication: March 2023 HJRS: Y (Null)**

Teacher empowerment strategies are essential for a positive organizational identity. School heads are expected to use a variety of empowerment techniques to maximize the potential of their faculty members, inspire them in various ways, and motivate them to work. The current study intends to investigate the teacher empowerment strategies of secondary school heads in Punjab, Pakistan. A study was based on a qualitative research design. The semi-structured interview protocol was used to collect data. A purposive sampling technique was used. The sample was comprised of 57 secondary school teachers. Data were analyzed through the thematic analysis technique. The findings show that school heads have given their staff members greater autonomy by fostering opportunities for group decision-making, praising employees for good work, increasing self-efficacy, and promoting effective teacher collaboration. However, school heads have less focus on professional growth opportunities, supporting teachers' autonomy, and improving their status.

https://ojs.aiou.edu.pk/index.php/jcte/article/view/729

13. **Munir, F., Shuja, A., & Saeed, I. (2023). The Mediating Role of Psychological Resilience Between Domestic Psychological Abuse Against Working Women and Burnout.** *Performance Improvement Quarterly.* **https://doi.org/10.56811/PIQ-21-0002 . Farhat Munir(Education\SSS&H) Aleena Shuja(Management\HSM) Iqra Saeed(SMCS) Date of Publication: March 2023 HJRS: X (Clay)**

Psychological abuse as a form of domestic violence against working women is prevalent but underreported almost all over the world. The present study was conducted to examine the relationship between domestic psychological abuse and burnout, and how psychological resilience mediates between them. One thousand married teachers from private secondary schools were selected through purposive sampling. Study results demonstrated that there is a relationship between domestic psychological abuse against working women and burnout, and that psychological resilience has a positive supportive effect in overcoming depersonalization among these women, yet the study also showed a lack of significant intervention in the relationship between psychological abuse and depersonalization of working women. This study confirms the absence of total or partial mediation to address psychological abuse and depersonalization of working women.

https://meridian.allenpress.com/piq/article-abstract/doi/10.56811/PIQ-21-0002/491678/THE-MEDIATING-ROLE-OF-PSYCHOLOGICAL-RESILIENCE

14. **Ali, Z. R., Kanwal, A., & Ishrat, G. (2023). Factors Affecting the Uniformity of Sign Language: Perceptions of Teachers of Students with Hearing Impairment.** *Annals of Human and Social Sciences, 4*(1), 12-24.

https://doi.org/10.35484/ahss.2023(4-I)02 . **Ghazala Ishrat (Education/SSSH) Date of Publication: January 2023 HJRS: Y (Null)**

The main purpose of this study was to examine the perception of teachers of students with hearing impairment (SWHI) about the factors affecting the uniformity of the sign language. The nature of study was quantitative. The population of the study was teachers of SWHI. Sample of the study teachers was 100 (M= 52, F= 48) of students with hearing impairment selected through convenient sampling techniques from different special education institutions. Survey method was used to collect data through self-developed questionnaire with reliability coefficient (α= 0.72). statistical measures were used to analyse the data. The result of the study highlight. This study used to find the variation in sign language which effect on teachers and students. There is no professional development for teachers per-service and in service. The study showed that teachers of students with hearing impairment faced many issues due to the variation of the sign language when students use different signs in the classroom and teachers also learned different signs. And the school did not pay attention on the professional development of the teachers that teachers can use same standard sign language. School and government should pay attention on the development of per-service and in-service teachers in accordance with Pakistan sign language.
https://ojs.ahss.org.pk/journal/article/view/86

15. **Ishrat, G., Anis, F., & Kanwal, A. (2023). Perception of Parents About Higher Education for their Children with Hearing Impairment.** *Annals of Human and Social Sciences, 4*(2), 142-156. **https://doi.org/10.35484/ahss.2023(4-II)14 . Ghazala Ishrat (Education/SSSH) Date of Publication: April 2023 HJRS: Y (Null)**

This research aimed to explore the perception of the parents of children with hearing impairment (CWHI) for higher education. They have to face many problems in selecting the pathway for CWHI. There are limited opportunities for the students with hearing impairment after secondary education. That's why it is very important to know about their perception regarding future concerns of their children. In this quantitative research, the descriptive methodology was used in designing a self-made questionnaire to assess the parent's perception. Convenient sampling was used to collect the data from the parents of intermediate class students who were about to decide the future field of their children. Data were collected from 115 parents from colleges of Punjab and then analyzed by using descriptive as well inferential analysis. Response of a majority of the parents was positive towards Higher Education of their children for the better life. This research highlighted a new direction for arranging Higher education programs for hearing impaired students.
https://ojs.ahss.org.pk/journal/article/view/195

16. **Ishrat, G., Anis, F., & Rafaqat, I. (2023). Parental Perceptions about Further Education for their Children with Hearing Impairment.** *Pakistan Languages and Humanities Review, 7*(2), 104-126. **https://doi.org/10.47205/plhr.2023(7-II)10 . Ghazala Ishrat (Education/SSSH) Date of Publication: April 2023 HJRS: Y (Null)**

This research aimed to explore the perception of the parents of children with hearing impairment for further education. Further Education covers education and training after secondary level education. The researcher takes this term as higher education and vocational training. Keeping in view limited career opportunities for these students. Parents are confused to select the career for their special children. That's why it is very important to know about their perception regarding future concerns of their children. In this quantitative research, the descriptive methodology was used for survey by using self-made questionnaire. 324 parents have participated for research. Response of a majority of the parents was positive towards Vocational Training of their children for the better social and economic adjustments. This research highlighted a new direction for arranging and starting vocational and skill-oriented programs for hearing impaired students and such initiatives will encourage them to live an independent life.
https://ojs.plhr.org.pk/journal/article/view/402

17. **Ahmad, A., Abid, N., Azeem, A., Sikandar, F., Bashir, R., & Aslam, S. (2023). Foreign-educated academics: Assessing teaching quality and exploring teaching-related challenges.** *Psychology in the Schools.* **doi: 10.1002/pits.23091. Nisar Abid, Asmaa Azeem, Fatima Sikandar (Education/SSSH) Date of Publication: September 2023 HJRS: W (Silver)**

Returned academics who have doctoral education abroad, a fast-growing group in developing countries, are seen favorably in producing quality academic outcomes. However, academic performance and barriers are also important to learning mobility benefits and ensuring optimal outcomes motivated by the absence of research in the native context. The explanatory sequential embedded mixed-methods study aimed to evaluate the teaching quality of returned doctorates compared with their local compatriots and explore teaching-related challenges at public sector universities in Punjab, Pakistan. A multilevel sequential mixed-methods sampling design was used to select 814 students and six academics from the six universities (three top and three medium-ranked higher education institution) of central Punjab. The researchers developed two research instruments: (a) Student Evaluation of Teaching Quality Scale (SETQS) and (b) Semi-Structured Interviews

Protocol for Returnees (SSIP-R). The psychometric properties of quantitative measure (SETQS) were ensured through factor analysis, while an expert panel review validated the qualitative measure (SSIP-R). Inferential statistics were applied to quantitative data, while a thematic analysis technique was applied to qualitative data to find complementarity among results. The findings revealed that returnees and non-returnees were similar in a few teaching aspects. However, returnees performed relatively better in interpersonal behavior, subject mastery, instruction, and learning resources. Teaching performance differed slightly by discipline and largely by university ranking. Further, returnees' capacity to perform was impacted by various academic challenges. Explored challenges and relevant solutions correspond to Bronfenbrenner system theory's microsystem, exosystem, and macrosystem levels. Higher education authorities and universities need to address academic challenges. In turn, this may lead to smooth, professional reintegration of the returnees into the local system, leading to enhanced teaching performance.

https://onlinelibrary.wiley.com/doi/full/10.1002/pits.23091

18. **Aslam, S., Abid, N., & Parveen, K. (2023). Academic arena and survival: INSIGHTS on remote working and learning in higher education during the recurrence of COVID-19.** *Educacion Medica,* **24(5). doi: 10.1016/j.edumed.2023.100838. Nisar Abid (Education/SSSH) Date of Publication: October 2023 HJRS: X (Null)**

Introduction: Rapid outbreaks, wide spreads, and severe damage have characterized events in public health in China. Several significant challenges have faced the global community in the 21st century, including COVID-19, resulting in uncertainty about the future of current and future generations. In the wake of the COVID-19 Pandemic, remote working and learning (RWL) have gained more importance. Material and methods: Two objectives were pursued in this study. To analyze how Higher Education Academician (HEA) and students used RWL during COVID-19 and how they handled RWL challenges. This research used a quantitative approach to achieve its objectives. A total of 480 students and 394 HEA were recruited through random sampling. Data collection was carried out using two self-developed questionnaires. Results: RWL arrangements are satisfactory to both HEA and students. HEA and students agree that RWL relieves work stress and maximizes family time. Considering the survey results, it is evident that RWL practices are strongly supported in the era of COVID-19. Conclusion: RWL is essential to work during the COVID-19 pandemic recurrence phase. It provides non-stop working and learning to HEA and students. HEA and students highly accept RWL and favor it during the particular reoccurrence period of COVID-19. Transitioning from face-to-face instruction to a fully functional virtual (RWL) environment will require time and experience. Therefore, it is recommended that the government make a proper plan for future turmoil by drawing lessons from this unanticipated crisis and providing training programs for RWL preparation.

https://www.sciencedirect.com/science/article/pii/S1575181323000487

19. **Aslam, S., Alghamdi, A. A., Abid, N., & Kumar, T. (2023). Challenges in Implementing STEM Education: Insights from Novice STEM Teachers in Developing Countries.** *Sustainability (Switzerland),* **15(19). doi: 10.3390/su151914455. Nisar Abid (Education/SSSH) Date of Publication: October 2023 HJRS: W (Silver)**

Economic growth has been attributed to STEM education in many countries. It is widely recognized as crucial to improve science, technology, engineering, and mathematics (STEM) education, especially for traditionally disadvantaged groups. In this age of the fourth Industrial Revolution, we are going through a rapid change. Several difficulties have been associated with STEM's implementation, particularly troubling developing countries. In this article, we investigated STEM teachers' unique challenges in their classroom experiences and how these factors influence their instructional practices and students' learning outcomes. STEM teachers' teaching reflections at the secondary level were examined in this qualitative study. A purposive sampling method was used to recruit ten novice STEM teachers. The data were analyzed using NVivo11. Despite their disciplinary expertise and the variety of teaching methods they employed, the teachers faced numerous challenges. Teachers faced difficulties managing classrooms, developing curriculums, and recognizing practical constraints in STEM education. Teacher beliefs about effective STEM education, the tension between these beliefs and the teaching goals of the teachers were closely linked to the teachers' beliefs about effective STEM education and the educational system's expectations. For STEM teachers, the mastery of content knowledge is critical. A regular exchange of experience is of significant help to teaching. Teachers' pedagogy and professional development in STEM education are discussed concerning underdeveloped countries' contexts. Researchers and educators in developing countries might not understand STEM education's significance. The reason may also be that STEM education in developing countries faces several challenges.

https://www.mdpi.com/2071-1050/15/19/14455

20. **Masood, S., Khawaja, F., & Waqar, Y. (2023). The Road to Doctoral Success: A Model for High-Quality PhD Supervision in Education.** *Global Educational Studies Review,* **VIII (II), 660-672. https://doi.org/10.31703/gesr.2023(VIII-II).59. Sajid Masood, Fareeha Khawaja, Yasira Waqar (Education/SSSH) Date of Publication: June 2023 HJRS: Y (Null)**

This paper explores effective PhD supervision pedagogies in Education through qualitative interviews with 5 current doctoral students and 3 faculty supervisors in Pakistan. The findings reveal key best practices including dual supervision in theory and methodology, regular student-supervisor meetings, collaborative publishing and conference participation, multifaceted written and verbal feedback, and an open supervisory relationship balancing mentorship with professionalism. These experientially derived insights contribute localized empirical guidance on optimizing Education PhD training, affirming, and extending established models. The paper argues that supervised implementation of these contextualized practices can enrich mentoring relationships and outcomes. It concludes with implications for reforming supervision policies, supervisory self-auditing, and student self-advocacy.
https://www.humapub.com/admin/alljournals/gesr/papers/JmmYyJlhp1.pdf

21. **Jamil, M., Mahmood, A., & Masood, S. (2023). Fostering Critical Thinking in Pakistani Secondary School Science: A Teacher's Viewpoint.** *Global Educational Studies Review,* **VIII(II),645-659. https://doi.org/10.31703/gesr.2023(VIII-II).58. Sajid Masood (Education/SSSH) Date of Publication: June 2023 HJRS: Y (Null)**

This qualitative narrative study explored a science teacher's perceptions and lived experiences regarding developing critical thinking skills among secondary school students in Pakistan. An in-depth interview was conducted with a 45-year-old physics teacher with 18 years of teaching experience. The findings revealed that although the teacher recognized the importance of developing Critical Thinking (CT) skills for quality education and lifelong learning, the current teaching practices and examination system focused more on rote learning and passing exams. The teacher suggested using questioning techniques, relating concepts to daily life examples, group work, and hands-on practical activities to promote CT skills. However, large class sizes, lack of training, and pressure to produce good exam results were barriers. The study recommends revamping the exam system to assess CT skills, providing quality teacher training, and creating a supportive school environment. The findings contribute to understanding grassroots-level issues in developing CT skills in Pakistan.
https://www.humapub.com/admin/alljournals/gesr/papers/4SJ3CiJHwS.pdf

22. **Waqar, Y., Mahmood, A. & Masood, S. (2023). Collaboration, Frustration, and Exhilaration: A Qualitative Exploration of Team Presentation Experiences.** *Global Sociological Review,* **VIII (I), 338-349. https://doi.org/10.31703/gsr.2023(VIII-I).34. Sajid Masood (Education/SSSH) Date of Publication: March 2023 HJRS: Y (Null)**

Group presentations are commonly used in higher education for developing transferable skills among students. However, the complexities of teamwork also lead to varied challenges. This study aimed to explore students' experiences of undertaking group presentations using a descriptive qualitative approach. Fifteen reflective accounts of graduate students about a team presentation task were analysed using framework analysis. The findings revealed four major themes–preparation, emotional experiences, perceived learning outcomes, and recommendations. Preparation involved dividing work, planning meetings, and gathering content. Emotions like nervousness, excitement, and frustration were experienced at different phases. Key learning outcomes were presentation skills, research abilities, and appreciating diversity, but time management needed improvement. Better planning, role clarity, and anxiety management were suggested for future presentations. The findings largely resonate with existing literature while also providing contextual insights into the real-world experiences of learners. Results can inform instructional design and learning support for enhancing team-based presentation competencies.
https://www.humapub.com/admin/alljournals/gsr/papers/0IH8cCiBDM.pdf

23. **Khalid, T., Urooj, T., & Yousaf, A. (2023). Teachers' Perspectives and Experiences in Integrating Global Citizenship Education into their Classroom Practice: A Qualitative Case Study.** *International Review of Basic and Applied Sciences,* **11 (3), 95-107. Amna Yousaf (Education/SSSH) Date of Publication: September 2023 HJRS: Y (Null)**

This qualitative case study explores the perceptions and experiences of teachers in integrating global citizenship education into their classroom practice. Global citizenship education has emerged as a response to the need for individuals to navigate a rapidly changing and interconnected world. However, limited research has been conducted on teachers' perspectives and experiences in implementing global citizenship education. This study aims to fill this research gap by investigating the challenges, strategies, and outcomes associated with integrating global citizenship education. The study utilizes semi-structured interview with a teacher to gather rich and detailed data. Thematic analysis is employed to identify key themes and patterns in the data. The findings reveal the complexities and opportunities that teachers encounter in integrating global citizenship education and shed light on the strategies they employ to foster global citizenship competencies among students. The study contributes to a deeper understanding of global citizenship education and provides valuable insights for educators, policymakers, and researchers seeking to enhance its integration and impact within educational settings. By addressing the perspectives and experiences of teachers, this research bridges

the gap between theory and practice, informing future initiatives aimed at promoting global citizenship education.
https://irbas.academyirmbr.com/papers/1701670490.pdf

24. **Kamran, F., Afzal, A., & Rafiq, S. (2023). Harmony with Nature: Islamic Education's Role in Cultivating Environmental Ethics and Sustainability.** *International Journal of Human and Society,* **3(4), 58-71.https://ijhs.com.pk/index.php/IJHS/article/view/264. Ayesha Afzal (Education/SSSH) Date of Publication: December 2023 HJRS: Y (Null)**

This research paper embarks on an exploration of the integration of environmental ethics into Islamic education curricula and its impact on students' environmental awareness and attitudes within the Pakistani context. Employing a qualitative research paradigm grounded in interpretivism, the study conducts semi-structured interviews with teachers and students in the Islamic Studies departments of public and private sector universities located in Lahore, Pakistan. The purposeful sampling technique is employed to ensure diverse representation, with data collection continuing until thematic saturation is achieved. Thematic analysis is then applied to the interview data, allowing for the identification of recurring themes and patterns regarding the integration of environmental ethics into Islamic education, its influence on students, and the challenges and opportunities encountered. The study's findings offer valuable insights into the harmony between faith, education, and environmental stewardship, guiding recommendations for enhancing environmental education within the Islamic context in Pakistan, encompassing curriculum enhancement, resource allocation, cultural engagement, policy support, teacher training, community involvement, holistic education, research, and interfaith dialogue.
https://ijhs.com.pk/index.php/IJHS/article/view/264

25. **Afzal, A., Kamran, F., & Naseem, A. (2023). The Role of Teachers in Fostering Critical Thinking Skills at the University Level.** *Qlantic Journal of Social Sciences and Humanities*, **4(3), 202-214. https://doi.org/10.55737/qjssh.409505257. Ayesha Afzal, Afshan Naseem (Education/SSSH) Date of Publication: September 2023 HJRS: Y (Null)**

This study delves into the pivotal role of educators in nurturing critical thinking skills within Lahore's higher education landscape. By examining pedagogical approaches, cultural influences, assessment practices, and faculty readiness, it offers insights that hold significance for educational practitioners and administrators. Employing a quantitative research design with a sample of 370 teachers selected through stratified random sampling, data collected through structured survey questionnaires is analyzed using statistical techniques, including regression analysis, ANOVA, and correlation analysis. Faculty training emerges as a central finding, emphasizing the critical importance of equipping educators with effective pedagogical strategies to stimulate critical thinking. Cultural diversity, though beneficial, presents nuanced challenges in communication and understanding. Thus, universities must balance leveraging diverse perspectives with proactive mitigation of potential hurdles. This research provides actionable insights for educational institutions aiming to cultivate critical thinking among their students in an era where these skills are highly valued in academia and the workforce.
https://submissions.qlantic.com/index.php/qjssh/article/view/82

26. **Afzal, A., Rafaqat, I., & Sami, A. (2023). Teachers' Perception on Integrating Flipped Classroom Models in Higher Education Courses.** *Journal of Asian Development Studies,* **12(3), 239-255. Ayesha Afzal, Aisha Sami (Education/SSSH) Date of Publication: September 2023 HJRS: Y (Null)**

This study investigates the implementation of the Flipped Classroom Model (FCM) in Lahore, Pakistan's higher education landscape. Through an exploration of teachers' perceptions and an assessment of the impact of cultural and contextual factors, this research contributes valuable insights into the dynamics of pedagogical innovation. While employing a quantitative approach, data was collected from a sample of 350 teachers across private universities in Lahore using survey questionnaires. The study reveals generally positive perceptions of FCM among educators in Lahore, in line with international discourse on its potential to enhance student engagement and active learning. It identifies technological access and practical professional development opportunities as crucial factors influencing these perceptions. Additionally, the research highlights the significant role of cultural and contextual factors, including cultural diversity, local pedagogical practices, and alignment with cultural preferences, in shaping FCM adoption. Language barriers are recognized as a particular challenge within this context. This study underscores the relevance of FCM in Lahore's higher education context and the importance of tailoring strategies to address cultural and contextual influences. The study advocates for greater attention to language diversity and equitable access to technology resources. As educators and institutions continue to explore innovative approaches such as FCM, they are better poised to provide an inclusive, effective, and culturally responsive education.
https://poverty.com.pk/index.php/Journal/article/view/113

27. **Kanwal, A., Zahid, A., & Afzal, A., (2023). Investigating the Benefits and Challenges of Blended Learning Approaches at the University Level.** *Qlantic Journal of Social Sciences and Humanities,* **4(3), 76-89. https://doi.org/10.55737/qjssh.546834164.** Aroob Zahid, Ayesha Afzal (Education/SSSH) Date of Publication: September 2023 HJRS: Y (Null)

This research paper investigates the benefits and challenges of implementing blended learning approaches at the university level in Pakistan. Blended learning, characterized by the integration of traditional classroom instruction and digital resources, has gained prominence as a potential solution to educational disparities. The study employs a mixed-methods research design to offer a nuanced understanding of this educational paradigm. The research draws upon a diverse population, encompassing educators from both public and private universities in Lahore, Pakistan. A sample of 400 university teachers was selected to represent this population, enabling a comprehensive examination of their perceptions and experiences with blended learning. Quantitative data from a Likert-scale survey assessed educators' views on blended learning benefits and challenges. Statistical analyses included correlation analysis, t-tests, chi-square tests, and logistic regression to explore relationships, differences between public and private university educators, and predictors of challenges in blended learning experiences. The findings of this study reveal a complex landscape. Blended learning is perceived as a promising avenue for reducing educational disparities and enhancing access to quality education, especially in underserved regions. This research underscores the importance of targeted support mechanisms for disadvantaged students and the need for meticulous planning and robust support systems to maximize the potential of blended learning.
https://submissions.qlantic.com/index.php/qjssh/article/view/43

28. **Rafiq, S., Kahdim, M., & Afzal, A. (2023). The assessment and impact of 360-degree leadership performance appraisal at university level.** *Journal of Social Sciences Development,* **2(2), 189-203.** Ayesha Afzal (Education/SSSH) Date of Publication: December 2023 HJRS: Y (Null)

This research paper investigates the benefits and challenges of implementing blended learning approaches at the university level in Pakistan. Blended learning, characterized by the integration of traditional classroom instruction and digital resources, has gained prominence as a potential solution to educational disparities. The study employs a mixed-methods research design to offer a nuanced understanding of this educational paradigm. The research draws upon a diverse population, encompassing educators from both public and private universities in Lahore, Pakistan. A sample of 400 university teachers was selected to represent this population, enabling a comprehensive examination of their perceptions and experiences with blended learning. Quantitative data from a Likert-scale survey assessed educators' views on blended learning benefits and challenges. Statistical analyses included correlation analysis, t-tests, chi-square tests, and logistic regression to explore relationships, differences between public and private university educators, and predictors of challenges in blended learning experiences. The findings of this study reveal a complex landscape. Blended learning is perceived as a promising avenue for reducing educational disparities and enhancing access to quality education, especially in underserved regions. This research underscores the importance of targeted support mechanisms for disadvantaged students and the need for meticulous planning and robust support systems to maximize the potential of blended learning.
https://jssd.org.pk/index.php/jssd/article/view/42

29. **Kahdim, M., Rafiq, S., & Afzal, A. (2023). Aligning Curriculum With The Philosophy Of Progressivism: A Comprehensive Analysis.** *Journal of Social Sciences Development,* **2(2), 152-162.** Ayesha Afzal (Education/SSSH) Date of Publication: December 2023 HJRS: Y (Null)

The pedagogical principles of progressivism, characterized by a dedicated emphasis on the cultivation of critical thinking societal improvement, and interactive pedagogy, hold substantial potential for the augmentation of Pakistan's educational framework. Thus, this expository article undertakes thorough and all-encompassing inquiry into the prospective alignment of the Pakistani curriculum with the foundational principles of progressivism. 10-year research studies were selected for analysis so as to capture relevant research within a recent time frame. The thematic technique was used for data analysis. Findings show that using hands-on learning methods that are interactive and engaging. It involves connecting vital societal problems to what students learn, making education more relevant. The progressivism approach focuses upon students and their interests, and it values different viewpoints to create welcoming and open-minded environment. Besides, it creates ways for the students to pursue career goals. By combining these vital ideas into way, we teach, Pakistan has a great opportunity to create a learning environment that effectively readies students to be responsible and involved citizens.
https://jssd.org.pk/index.php/jssd/article/view/41

30. **Kamran, F., Kanwal, A., Afzal, A., & Rafiq, S. (2023). Impact of interactive teaching methods on students learning outcomes at university level.** *Journal of Positive School Psychology,* **7(7), 89-105.** Ayesha Afzal (Education/SSSH) Date of Publication: March 2023 HJRS: X (Clay)

This study investigates the impact of interactive teaching methods on student learning outcomes at the university level in Lahore, Pakistan. The research objectives focus on exploring the relationship between interactive teaching methods and student learning outcomes, assessing the extent of usage of these methods by teachers, and understanding students' perceptions about these methods. The study adopts a positivist paradigm and utilizes a survey design to collect quantitative data from the undergraduate students from two universities in Lahore. Data analysis involves descriptive and inferential statistics, including correlation and regression analyses. The findings suggest that incorporating interactive teaching methods promotes critical thinking skills, collaboration, active engagement, and self-efficacy. The study emphasizes the importance of implementing interactive teaching methods in higher education and provides insights for instructors to create supportive learning environments. Proper planning, facilitation, and training are essential for effective implementation. The study contributes to the literature on interactive teaching methods and student learning outcomes, particularly in the context of Lahore, Pakistan.
https://spe-jpsp.com/wp-content/uploads/2023-1-8-1.pdf

31. **Atia Ur-Rehman, Munir, F.,** **Saqulain, G. (2023). Modes of social media & academic performance of hearing-impaired students- segregated and inclusive education systems perspective: a thematic analysis.** *International Journal of Multicultural Education,* **25 (2), 203-223.** Atia Ur-Rehman, Farhat Munir **(Education/SSSH) Date of Publication: June 2023** HJRS: X (Clay)

Hearing impaired face social isolation due to poor communication skills. Social media, a modern invention for effective communication which can also enhance the communication skills& academic performance of the hearing impaired in segregated and inclusive education systems. With a literature gap in the field, current study endeavored to identify the common modes of social media being utilized as learning tools among hearing-impaired in the segregated and inclusive education system. This exploratory descriptive study investigated teachers' perspectives about the academic performance of hearing-impaired students in a segregated and inclusive education system by using social media. The study utilized semi-structured interviews of ten purposively selected teachers from both education systems fulfilling the selection criteria. Data was transcribed, and thematic analyses were drawn which revealed eight themes including Technology Entertainment Design, Ease of access to Visual Learning, Academic interaction, Academic Assistance, User-Friendly Expression for educational Interaction, Usage of social media as academic provisions, Socialization/Academic purpose & minimizes the communication barriers. Study concludes that hearing impaired in inclusive education mostly used social media for academic support and to share academic and social views like their hearing peers, while those in segregated education systems mostly used social media for entertainment.
https://ijmejournal.org/ijme/index.php/ijme/article/view/v25-2-14.html

32. **Tufail, S., & Bashir, I.** (2023). Leadership Evaluation Using Baldrige Quality Framework: A Case of M. Phil Special Education Programs. *Pakistan Languages and Humanities Review,* 7(3), 911–922. **https://doi.org/10.47205/plhr.2023(7-III)79.** Sunaila Tufail, Irfan Bashir (Education/SSSH) Date of Publication: September 2023 HJRS: Y (Null)

The study intends to assess the leadership practices of MPhil special education programs' by applying Baldrige Quality, and to identify strengths and weaknesses as opined by HoDs, faculty and students. Leadership is pivotal for excellence and continuous improvement. The Baldrige Quality Framework has become a recognized approach for evaluating leadership practices. However, research examining leadership in Special Education Programs aligned using the Baldrige Quality Framework is lacking. A qualitative research approach using narrative study for program evaluation was employed. Purposive sampling technique was used to sample program leadership, faculty, and students. Data collection was trough semi structured interviews and document analysis. The study found general moderate alignment between leadership practices and the Baldrige Quality Framework, with fair strengths in alignment with organizational goals, communication, continuous improvement, and inclusivity. Areas for improvement include refining success metrics, enhancing student support systems, and placing greater emphasis on benchmarking. The study recommends that leadership should focus on refining success metrics, enhancing student support systems, and placing greater emphasis on benchmarking.
https://ojs.plhr.org.pk/journal/article/view/787

33. **Nisar, A., Bashir, I., & Ahmad, A. (2023). Experience of Academia with Artificial Intelligence as Adaptive Pedagogy. Pakistan Social Sciences Review, 7(3), 657–669. https://doi.org/10.35484/pssr.2023(7-III)53.** Aiza Nisar, Irfan Bashir **(Education/SSSH) Date of Publication: September 2023** HJRS: Y (Null)

This qualitative research investigates the experiences, perceptions, and challenges associated with the integration of artificial intelligence (AI) into teacher education. Through semi-structured interviews with a diverse group of educators, this study investigates teachers' experiences, perceptions, and challenges associated with the adoption of artificial intelligence (AI). The research aims to explore the potential influence of AI on teaching practices, student learning, and the overall effectiveness of teaching practices through

narrative inquiry method. The findings reveal that teachers generally perceive AI positively, with many expressing enthusiasms for its potential to enhance teaching practices and individualize instruction for students. Teachers' experiences in implementing AI-powered tools vary. While some teachers have successfully integrated AI tools into their teaching practices. However, others face challenges such as difficulties using the tools or providing adequate support for differentiated instruction. Some teachers express concerns about the potential for AI to dehumanize education and exacerbate existing biases. The research suggests both the potential of AI to positively impact teacher education, student learning, and engagement, alongside challenges associated with its implementation. Addressing these challenges is crucial to ensuring effective AI integration into the field of teacher education.
https://ojs.pssr.org.pk/journal/article/view/440

34. **Bano, S., Bashir, I., Naseem, A., & Akhter, M. (2023). Effect of Principal's Emotional Intelligence Practices on Teachers' Organizational Commitment in Pakistan.** *Journal of Asian Development Studies,* **12(4), 426-437. Sidra Bano, Irfan Bashir, Afshan Naseem, Mumtaz Akhter (Education/SSSH) Date of Publication: December 2023 HJRS: Y (Null)**
This research examines the emotional intelligence (EI) of school principals, the organizational commitment of teachers and the effect of the emotional intelligence of principals on the commitment of teachers in Lahore, Pakistan. It was hypothesized that principals generally practice using emotional intelligence behavior committed to the schools. A quantitative research design using ex-post facto/causal-comparative research is used. The population of the study included all high school principals and teachers of the Lahore district. A total of 105 principals and 300 teachers were sampled using a random sample technique. Emotional Intelligence scale and organizational commitment scales were used. Both the scales were borrowed with permission and have < .90 alpha reliability in Pakistan. The study hypothesized that high school leaders' emotional intelligence practices do not significantly affect teachers' organizational commitment. The study found no significant effect of principals' emotional intelligence on teachers' organizational commitment.
https://poverty.com.pk/index.php/Journal/article/view/68

35. **Nisar, A., Bashir, I., & Naseem, A. (2023). Special Needs Students' Lived Experiences of Support Practices in Higher Educational Institutes in Pakistan.** *Journal of Asian Development Studies,* **12(3), 1487-1497. Aiza Nisar, Irfan Bashir, Afshan Naseem (Education/SSSH) Date of Publication: September 2023 HJRS: Y (Null)**
This narrative study investigates the lived experiences of special needs students regarding the support practices provided by higher education institutes. Through in-depth interviews with four participants, we unveil the intricate relationship between these practices and the student's educational experiences and overall well-being. The findings illustrate the empowering potential of effective support practices, with participants highlighting the crucial role of dedicated teachers who demonstrate understanding and embrace diverse teaching styles. Equal opportunities, including access to scholarships, internships, and job placements, emerge as crucial factors fostering a sense of belonging and empowering students to pursue their aspirations. The cooperative and inclusive environment, encompassing inclusive classrooms, disability resource centers, and assistive technologies, positively impacts students' academic success and emotional well-being. However, the research also sheds light on the detrimental consequences of inadequate support practices, revealing how a lack of understanding and resources can lead to discouragement, demotivation, and educational barriers. These findings underscore the need for higher education institutions to assess and enhance their support structures for special needs students, promoting equitable access to education. This study emphasizes the crucial role of comprehensive support practices in creating an inclusive and empowering educational landscape, advocating for the full participation of all students, irrespective of their abilities.
https://poverty.com.pk/index.php/Journal/article/view/220

Conference Proceedings

1. **Munir, F., (2023). Online Learning at Higher Education, The Mediating Role of the Fear of COVID-19 Between Students' Sustainable Engagement and Their Social Presence.** *Proceedings of the International Conference on Communication and Media 2022 (i-COME 2022).* **Farhat Munir (Education/SSSH) Date of Publication: August 2023**
Students' engagement and social presence are the most critical components for effective online learning. Despite all technological advancements online teaching and learning is still a challenge, especially during emergencies. The pandemic COVID-19 situation has unlocked new dimensions of research in online teaching and learning to explore better engagement and interaction strategies, especially at higher education. Therefore, keeping in consideration the significance of the area this cross-sectional quantitative study was conducted through simple random sampling of a total of 422 university students by using the explanatory research design to explore the relationships between student engagement (SE) and social presence. The findings of this study revealed that the six dimensions of students' engagement is significantly associated with

the social presence in online learning. Teacher-student interaction enhances social presence and student engagement, accumulates trust and associations, and communication through teachers' answers in online learning. While fear of COVID-19 has insignificant mediated effects on students' engagement as well as on their social presence in online learning.
https://www.atlantis-press.com/proceedings/i-come-22/125990550

Department of Islamic Thoughts and Civilization

1. **Bano, N., Ahmad, H., Hassan, J., & Razaq, R. (2023). Principles of Religious Pluralism. *Religions*, *14*(1), 20. doi: 10.3390/rel14010020. Humaira Ahmad (ITC/SSSH) Date of Publication: January 2023 HJRS: W (Silver)**
Religious pluralism is growing in significance because of increasing religious diversity and increasing religious conflicts, which cause unrest in contemporary society. Muslim perennialists represent one of many groups advocating for the common goals of religious pluralism and the reaffirmation of perennial wisdom, which lies at the heart of all primordial religious traditions. The purpose of the study is to explore the principles of religious pluralism advocated by Muslim perennialist philosophers. Using the discourse analysis methodology, this study analyzed the theological validity of the Muslim perennialist perspective for articulating interfaith dialogue and co-existence in multicultural societies. By conducting this critical analysis, the study concludes that the principles of religious pluralism advocated by Muslim perennialists are the means of bringing interfaith peaceful co-existence to society.
https://www.mdpi.com/2077-1444/14/1/20

2. **Shah, H. S., Kamal, A., & Tayyab, M. (2023). Impact of Foreign Direct Investment, Official DevelopmentAssistance, and Financial Development on Economic Growth: An Empirical Analysis in Selected Asian Countries. *Global Social Sciences Review (GSSR), Vol. VIII*(I), 116 – 123. doi: http://dx.doi.org/10.31703/gssr.2023(VIII-I).11. Hassan Shakeel Shah (ITC/SSSH) Asghar Kamal (Banking and Finance/HSM) Date of Publication: March 2023 HJRS: Y (Null)**
This research analyses the role of foreign direct investment (FDI) and official development assistance with financial development in determining the economic growth (EG) of selected Asian countries by using data from 2003 to 2018. In this research, we investigate the important role of official development assistance (ODA) and foreign direct investment along with other variables affecting GDP in selected Asian countries. By using panel data, a random effect technique is used to highlight the impact of ODA and FDI on GDP in selected Asian countries. The study results showed that official development assistance, urban population growth, and financial development have increased GDP in these countries. Findings suggest that a stable economic and political environment must be provided for further foreign aid and foreign direct investment. More credit facilities must be provided to the general public for more investment and economic growth.
https://www.gssrjournal.com/jadmin/Auther/31rvIolA2LALJouq9hkR/Rq3xhQ44iB.pdf

3. **Khattak, I. U., Shah, H. S., & Iqbal, Z. (2023). Impacts of Islamic Accounting System on Society: Accounting System in the ERA of Hazrat Abu Bakar and Hazrat Umar Farooq. *Global Economics Review (GER), Vol. VIII*(I), 28 – 35. doi: 10.31703/ger.2023(VIII-I).03. Hassan Shakeel Shah (ITC/SSSH) Date of Publication: March 2023 HJRS: Y (Null)**
During the time of Hazrat Abu Bakr and Hazrat Umar Farooq, the Islamic accounting system had a considerable impact on society. This system is founded on the values of transparency, responsibility, and moral behaviour, which support justice, fairness, and social welfare. In the era of Hazrat Abu Bakr and Hazrat Umar Farooq, the Islamic accounting system was crucial in preserving the social order's economic stability. The system made sure that financial transactions were carried out accurately, honestly, and reliably, which contributed to a rise in public confidence. As a result, a society that was richer and more stable allowed both businesses and people to prosper. The Islamic accounting system's emphasis on responsibility was one of its most notable effects. The Islamic accounting system's emphasis on social welfare had a significant impact as well. This made society more just and egalitarian as everyone had access to basic needs. To sum up, the Islamic accounting system has had a significant influence on society, especially during the time of Hazrat Abu Bakr and Hazrat Umar Farooq.
https://www.gerjournal.com/jadmin/Auther/31rvIolA2LALJouq9hkR/u6oJwzh0nv.pdf

4. **Khattak, I. U., Shah, H. S., & Iqbal, Z. (2023). Impacts of Islamic Accounting System on Society: Accounting System in the ERA of Hazrat Abu Bakar and Hazrat Umar Farooq. *Global Economics Review, VIII*(I), 28-35. https://doi.org/10.31703/ger.2022(VIII-I).03. Hassan Shakeel Shah (ITC\SSS&H) Date of Publication: March 2023 HJRS: Y (Null)**
During the time of Hazrat Abu Bakr and Hazrat Umar Farooq, the Islamic accounting system had a considerable impact on society. This system is founded on the values of transparency, responsibility, and moral behaviour, which support justice, fairness, and social welfare. In the era of Hazrat Abu Bakr and Hazrat Umar Farooq, the

Islamic accounting system was crucial in preserving the social order's economic stability. The system made sure that financial transactions were carried out accurately, honestly, and reliably, which contributed to a rise in public confidence. As a result, a society that was richer and more stable allowed both businesses and people to prosper. The Islamic accounting system's emphasis on responsibility was one of its most notable effects. The Islamic accounting system's emphasis on social welfare had a significant impact as well. This made society more just and egalitarian as everyone had access to basic needs. To sum up, the Islamic accounting system has had a significant influence on society, especially during the time of Hazrat Abu Bakr and Hazrat Umar Farooq. https://www.gerjournal.com/article/impacts-of-islamic-accounting-system-on-society-accounting-system-in-the-era-of-hazrat-abu-bakar-and-hazrat-umar-farooq

5. **Ahmad, H.** (2023). Mapping Neo-Modern and Postmodern Qur'ānic Reformist Discourse in the Intellectual Legacy of Fazlur Rahman and Mohammed Arkoun. *Religions, 14*(5), 595. https://doi.org/10.3390/rel14050595. Humaira Ahmad (ITC\SSS&H) Date of Publication: March 2023 HJRS: Y (Null)

Renewal and Reform have been the most discussed and dominant themes of Muslim intelligentsia, as they lived through the subjection of the greater part of the Muslim world by the Western colonial powers during the 18th and 19th centuries. The intellectual discourse on reform by the early Muslim reformers pivoted to the adoption of Western science and values and to the struggle of developing a new ilm al kalām (theology) complementary to modern science and western ideologies. The subsequent reformers, however, were more critical of Western ideas of civilization. Fazlur Rahman and Mohammed Arkoun belonged to the later wave of Muslim reformist movement of the 20th century and are the most well-known trail blazers of this reformist discourse, which centered on the Qur'ān. This article provides insight into the reform strategies of Dr. Fazlur Rahman and Mohammed Arkoun by mapping out key concepts in their discourses and their influence on later generations of reformers. Fazlur Rahman identified the stagnant intellectual legacy as the sole cause of the downfall of Muslim Civilization, caused by the absence of Ijtihād (independent legal reasoning). In his opinion, blind imitation based on precedence and consensus has only created a new hierarchy of traditional ulama (religious scholar) whose retrogressive mindset monopolized the interpretation of the Qur'ān. Making the Qur'ān as the center point for reform, he advocated its rereading based on the comprehension of the élan (spirit) of the Qur'ān. Similarly, Mohammed Arkoun, being trained in postmodern literary theory, adopted post structural methods for re-reading the Qur'ānic text. Arkoun's critique and approach is interwoven with complex terminologies. He advocated desacralizing the text and the radical rethinking of Islam as a cultural and religious system. This appraisal promotes a philosophical perspective in combination with an anthropological and historical approach. Both these reformers have their own set of advocates and detractors. Undeniably, however, as this paper argues, Arkoun's approach of understanding the Qur'ān can disturb the conventional prevalent belief system.
https://www.mdpi.com/2077-1444/14/5/595

6. **Yusuf, J. B., & Shah, H. S.** (2023). Eternity of the Word of God: Exploring a Common Theme in Judeo-Christian and Muslim Theological Discourse. *Journal of Islamic Thought and Civilization,* 13(2), 335-353. https://doi.org/10.32350/jitc.132.22. Hassan Shakeel Shah (ITC/SSSH) Date of Publication: December 2023 HJRS: Y (Null)

Emerging religions typically lack an established theology initially. Their theology develops gradually; and Islam exhibits traces of influence from earlier belief systems. Therefore, some novel concepts in Muslim theology emerged through the contributions of converts from other faiths. The second and third centuries AH were the formative periods, after which thought degenerated into a split of hairs. Religion was in a ferment, which brought in many strange ideas. Nonetheless, some Muslim scholars disagree that even Judaism and Christianity had some influence on certain Muslim worldviews. Focusing on the doctrine of eternity of the Qur'ān, this paper finds out the extent to which not only Judaism and Christianity but even Greek philosophical principles had some influence on certain Muslim beliefs. The methodology was historical reasoning and analysis of facts in Greek, Judaism, Christianity, and Islam. The aim is to go beyond the semantic surface into the inner reaches of these traditions to see exactly where the notion of scriptural eternity is anchored. The paper draws attention to the fact that examining the theories about theQur'ān in the light of inter-textual reasoning with the bible and pre-biblical literature produces interesting data for the Islamic theology of inclusivism although cross-cultural nexus with certain theories about the Qur'ān and Islam in general is rejected by Muslim researchers. The paper revisits the debate and traces the origin of the doctrine arguing that it has possible connections with Greek and Judeo-Christian beliefs. It also appraises some of the arguments of the principal theological groups that defended or refuted the doctrine, respectively.
https://journals.umt.edu.pk/index.php/JITC/article/view/5051/2158

7. **Shah, H. S., Tauqeer, S. R., & Ali, B.** (2023). Challenges of Islamic Education in the Changing World. *GUMAN,* 6(3), 1-11. Hassan Shakeel Shah (ITC/SSSH) Date of Publication: September 2023 HJRS: Y (Null)

Islamic education, deeply rooted in the teachings of Islam, has evolved over centuries to cater to the spiritual, moral, intellectual, and societal needs of Muslims. This article explores the historical foundations of Islamic education, its core objectives, and the challenges it faces in the modern era. The challenges include striking a balance between tradition and modernization, addressing gender equity, promoting critical thinking, countering extremism, and integrating technology. The recommendations presented emphasize curricular reform, teacher training, quality assurance, and the incorporation of critical thinking and digital integration. The conclusion underscores the dynamic nature of Islamic education, emphasizing its role in shaping well-rounded individuals who are rooted in their faith while navigating contemporary realities. The continued collaboration among educators, scholars, and community leaders is essential to ensure that Islamic education remains a transformative force for future generations of Muslims.

https://guman.com.pk/index.php/GUMAN/article/view/614

Department of Sociology

1. **Tahir, A., Rahat, R., &** Amjad, U. **(2023). Clean Hands, Dirty Truths: A Qualitative Study of Healthcare Professionals' Hand Hygiene in Public Hospitals of Lahore before and During COVID-19.** *Research Journal for Societal Issues*, *5*(1), 211–223. https://doi.org/10.56976/rjsi.v5i1.84. Uzair Amjad (Sociology/SSSH) Date of Publication: March 2023 HJRS: Y (Null)

   This qualitative research investigates the hand hygiene knowledge and practices of healthcare professionals in public hospitals, as well as how the COVID-19 pandemic affected their knowledge and practices in this area. The study conducted 20 in-depth interviews with medical staff working in public tertiary care facilities in Lahore, Pakistan. The results show that while healthcare workers possess a basic understanding of hand hygiene, they exhibit lower compliance with hand-washing practices, which is attributed to inadequate hand hygiene facilities and a heavy workload. Despite increased funding to hospitals during the pandemic, the findings suggest that the COVID-19 pandemic increased healthcare practitioners' awareness of hand hygiene and its importance, but it did not lead to a significant improvement in hygiene practices due to increased workload and inadequate facilities.

   https://rjsi.org.pk/index.php/Research/article/view/84

2. **Iqbal, S., Maqsood, S., Zakar, R., & Fischer, F.** (2023). **Trend analysis of multi-level determinants of maternal and newborn postnatal care utilization in Pakistan from 2006 to 2018: Evidence from Pakistan Demographic and Health Surveys.** *BMC Public Health, 23*(1), 642. doi: 10.1186/s12889-023-15286-7. Sarosh Iqbal, Sidra Maqsood, Rubeena Zakar (Sociology/SSSH) Date of Publication: April 2023 HJRS: W (Gold)

   Background Postnatal care (PNC) is crucial for maternal and newborn health. Healthcare-seeking practices within the postpartum period help healthcare providers in early detection of complications related to childbirth and postdelivery period. This study aims to investigate trends of PNC utilization from 2006 to 2018, and to explore the effects of multi-level determinants of both maternal and newborn PNC in Pakistan. Methods Secondary data analysis of the last three waves of the nationally representative Pakistan Demographic and Health Surveys (PDHSs) was conducted Analysis was limited to all those women who had delivered a child during the last 5 years preceding each wave of PDHS Bivariate and multivariate logistic regression was applied to determine the association of maternal and newborn PNC utilization with multi-level determinants at individual, community, and institutional levels. Results In Pakistan, an upward linear trend in maternal PNC utilization was found, with an increase from 43.5 to 63.6% from 2006 to 2018. However, a non-linear trend was observed in newborn PNC utilization, with an upsurge from 20.6 to 50.5% from 2006 to 2013, nonetheless a decrease of 30.7% in 2018. Furthermore, the results highlighted that the likelihood of maternal and newborn PNC utilization was higher amongst older age women, who completed some years of schooling, were employed, had decision-making and emotional autonomy, had caesarean sections, and delivered at health facilities by skilled birth attendants. Multivariate analysis also revealed higher odds for women of older age, who had decision-making and emotional autonomy, and had caesarean section deliveries over the period of 2006–2018 for both maternal and newborn PNC utilization. Further, higher odds for maternal PNC utilization were found with parity and size of newborn, while less for ANC attendance and available means of transportation. Furthermore, increased odds were recorded for newborn PNC utilization with the number of children, ANC attendance, gender of child and mass media exposure from 2006 to 18.

   https://link.springer.com/article/10.1186/s12889-023-15286-7

3. **Saleem, S. and Raza, A. (2023). The Discourse on Actor Network Theory.** *Journal of Policy Research. 9*(2), 29–35. DOI: https://doi.org/10.5281/zenodo.8000715. Shezza Saleem, Ahmad Raza (Sociology/SSS&H) Date of Publication: April 2023 HJRS: Y (Null)

   This study sheds light on the evolution of actor network theory and its influence on our society. ANT is evolving rapidly in our lives. At the beginning of its development actor network theory was limited in its range but with time it application are growing. Researchers are rapidly adopting actor network theory and linking

relationships between actor such as agency to network such as technologies (which is now available in numberless quantity) and see or experienced how actor network theory practicing between these two agents. In other words, actor network theory is a practicing relationship between anthropoid and non-human. The study explores viewpoints as various authors through literature reviews of an articles that ANT act as a methodology and theory both. They consider theory as a mediator and ecosystem of a social reality. There also misunderstandings about it because of the word network.

https://jprpk.com/index.php/jpr/article/view/255

4. **Rubab, I., Malik, B., & Aziz, Z. B. (2023). Do Legal and Institutional Reforms in Punjab, Pakistan Protect Women's Inherited Land Rights? Journal of International Women's Studies, 25(4). Beenish Malik (Sociology/SSS&H) Date of Publication: June 2023 HJRS: X (Clay)**

Economic marginalization is a key feature of gender inequality globally. In Pakistan, which ranks 153 out of 156 countries on the Global Gender Gap Index Report 2020, economic marginalization has significantly hampered efforts towards inclusivity. In comparison to dismal levels of female literacy and formal occupation (traditional measures of development), inheritance is an interesting category—a right enshrined both in Islam (the official state religion) and the country's constitution. Given Pakistan's agrarian and otherwise rent-seeking economic orientation, land inheritance plays a pivotal role in financial wellbeing regardless of gender. However, a pervasive denial of women's inheritance rights has been the norm. Considering the data and impelled by its international obligations, the Government criminalized denial of inheritance in 2011, followed by a series of legal and institutional reforms in the province of Punjab. These reforms include provisions for help desks dedicated to women at key offices, digitization of land records, and clamping down on anti-women practices that aid denial of inheritance. It is alarming to note that not much has changed in terms of women's land inheritance since 2011. To understand what is impeding the amendment's efficacy, the study frames these developments from a socialist feminist perspective and captures the opinions of experts engaged with the cause in various capacities. We selected Punjab as a case study and recruited twelve legal, revenue, Islamic, and women's right experts through purposive sampling. In-depth interviews were conducted, and the findings were thematically organized. Experts largely agreed that cultural change is a long-term process and that there has been a patriarchal monopoly of Islamic interpretation. On a more practical end, issues plaguing developing economies were highlighted in addition to institutionalized patriarchy, female mobility, patriarchal control of citizenship and land documents, and bureaucratic hurdles. We recommend the recruitment of more female staff in all relevant offices, adoption of better data management practices catering to institutional harmony, and that district inheritance committees be operationalized, among other measures.

https://vc.bridgew.edu/jiws/vol25/iss4/5/

5. **Munawar, R. & Raza, A. 2023. Discourse on the Durkheimian Tradition in Political Sociology. *Journal of Policy Research.* 9 (4) 39–46. DOI:https://doi.org/10.61506/02.00124.** Hassan Shakeel Shah **Rabia Munawar, Ahmad Raza (Sociology/SSS&H) Date of Publication: December 2023 HJRS: Y (Null)**

This paper examines the understanding of Durkheimian tradition in political sociology. It explores different elements of Durkheimian analysis ranging from social solidarity, anomie, religious experience, and structure functionalism. Durkheim's theories have a significant influence on social scientific research, particularly in sociology, anthropology, and cultural studies. He has emphasized structural functionalism, morality, social cohesion, and religious influence on social institutions. He has given scholars a useful foundation for comprehending today's social problems and cultural practices. In this paper, we also explore criticism faced by Durkheim's concepts by other researchers.

https://jprpk.com/index.php/jpr/article/view/442

Department of Political Science and International Relations

1. **Abou Houran, M., & Mehmood, U. (2023). Defining the roles of socio-economic factors and bureaucratic quality to minimize the impacts of fossil fuels consumption on CO2 emissions in G-20 countries. *Environmental Science and Pollution Research,* 30(18), 51440-51449. doi: 10.1007/s11356-023-25964-z. Usman Mehmood (DPSIR/SSSH) Date of Publication: April 2023 HJRS: W (Silver)**

G-20 nations are committed to reducing CO_2 emissions considering their commitments to the United Nations. Therefore, this work investigates the associations between bureaucratic quality, socio-economic factors, fossil fuel consumption, and CO_2 emissions from 1990 to 2020. To counter the problem of cross-sectional dependence, this work applies to cross-sectional autoregressive distributed lag (CS-ARDL). The valid second-generation methodologies are applied, and the results cannot be found in the environmental Kuznets curve (EKC). Fossil fuels (coal, gas, oil) exert a negative impact on environmental quality. The direct impact of bureaucratic quality and socio-economic factors are suitable to lower CO_2 emissions. A 1% increase in bureaucratic quality and socio-economic factors will lower CO_2 emissions by 0.174% and 0.078% respectively in the long run. The indirect effect of bureaucratic quality and socio-economic factors is significant in reducing

the CO2 emissions created by fossil fuels. The wavelet plots also validate these findings that bureaucratic quality is important to lower environmental pollution in 18 G-20 member countries. Considering the findings, this research presents important policy instruments that there is a need to bring clean energy sources into the total energy mix. For this purpose, it is important to improve bureaucratic quality to speed up the decision-making process for clean energy infrastructural development.

https://link.springer.com/article/10.1007/s11356-023-25964-z

2. **Mehmood, U. (2023). Environmental sustainability through renewable energy and banking sector development: policy implications for N-11 countries.** *Environmental Science and Pollution Research, 30*(9), **22296-22304. doi: 10.1007/s11356-022-23738-7.** Usman Mehmood (DPSIR/SSSH) Date of Publication: February 2023 HJRS: W (Silver)

Climate change has become an alarming condition for developed and developing countries. The main reason for this is the use of non-renewable energy (RE) in economic sectors. Therefore, the world economies are now replacing non-renewable with RE. The role of BANKs is fundamental for this transition because they can fund clean energy projects. Several studies probed the economic growth andCO2e association and ignored the role of BANK development. Therefore, this work investigates the influences of banking sector development on CO2 emissions (CO2e) in the next eleven countries. This work included other factors of GDP, clean energy, and non-RE in the model by taking annual data from 1990 to 2020. Robust econometric techniques are used to highlight the empirical outcomes. The cross-sectional autoregressive distributed lag approach shows that BANK development is a coproduction factor toward CO2 production in the presence of economic development and renewable and nonrenewable energy. More credits from banks to the private sector are enhancing economic activity and increasing energy consumption. This means that a 1% increase in BANK development will increase CO2e by 0.01%. A 1% increase in RE is lowering CO2e by 0.31%. Therefore, this work highlights the importance of BANK development in creating sustainable development. The BANK can fund clean energy projects. Policymakers can utilize the BANK to encourage green investments in household and corporate sectors. The use of green technologies will ultimately bring a cleaner environment and sustainable development to N-11 countries. This work is helpful for policymakers in that they can utilize the banking sector to launch greener projects to attain sustainable development goals.

https://link.springer.com/article/10.1007/s11356-022-23738-7

3. **Mehmood, U.** Tariq, S., Haq, Z., Nawaz, H., Ali, S., Murshed, M., & Iqbal, M. (2023). **Evaluating the role of renewable energy and technology innovations in lowering CO2 emission: a wavelet coherence approach.** *Environmental Science and Pollution Research, 30*(15), 44914-44927. doi: 10.1007/s11356-023-25379-w. Usman Mehmood (DPSIR/SSSH) Date of Publication: March 2023 HJRS: W (Silver)

Environmental sustainability is one of the most critical issues that require efficient environmental and economic policies in modern times. Advancements in renewables and green technologies contribute significantly to sustained long-term development without affecting environmental quality. Several studies focus on the association of carbon dioxide emissions (CO_2e) with economic variables. However, they ignored the impact of technological innovations and renewable energy consumption on CO_2e in developed countries. Therefore, this study examines the relationship between CO_2e, energy consumption, gross domestic product (GDP), renewable energy consumption, and technology innovations in G-7 countries by employing cross-sectionally augmented autoregressive distributed (CS-ARDL) lag and wavelet coherence techniques during 1990–2020. The results depict that GDP and renewable energy consumption are inversely related to CO_2e. A 1% increase in CO_2e will decrease GDP and renewable energy consumption by 0.459 and 0.172% in the long run and by 0.471 and 0.183% in the short run in G7 countries. Technology innovations negatively impact CO_2e in the short run while positively influencing it in the long run. Considering the advancements in green technologies in different energy-dependent and manufacturing sectors is crucial for a sustainable environment in the long run. Such initiatives ensure the effective use of energy sources by limiting CO_2e in the atmosphere. Moreover, the dynamic common correlated effects mean group model confirms the reliability and effectiveness of the CS-ARDL. The wavelet coherence approach revealed a causality relation between CO_2e and technology innovation in Italy, Japan, the UK, and the USA during the study period.

https://link.springer.com/article/10.1007/s11356-023-25379-w

4. **Shi, M., Jia, Z., &** **Mehmood, U.** (2023). **Exploring the roles of green finance and environmental regulations on CO2es: defining the roles of social and economic globalization in the next eleven nations.** *Environmental Science and Pollution Research, 30*(22), 62967-62980. doi: 10.1007/s11356-023-26327-4. Usman Mehmood (DPSIR/SSSH) Date of Publication: May 2023 HJRS: W (Silver)

Achieving sustainable environmental growth and preventing further environmental degradation are challenging goals for policymakers. This study looks at environmental laws and green finance's role in fostering a more sustainable environment. The literature still needs to empirically or theoretically investigate how environmental laws and green financing affect carbon dioxide (CO2) emissions, particularly when combined with moderating factors such as social and economic globalization. As a result, this study investigates how environmental laws

and green funding can help the N-11 nations cut their CO2 emissions. Our research uses empirical data from a group of the N-11 nations that span the years 2000 to 2019. To handle issues with panel data analysis, such as cross-sectional dependence and slope heterogeneity, we use advanced panel approaches (CIPS and CADF unit root and cointegration test and cross-sectional augmented ARDL). This research demonstrates that green financing (GFI) and environmental laws (ENV) have a negative but significant effect on CO2 emissions. While social globalization moderates the causal relationship between energy consumption and GDP while negatively and significantly causing GFI and ENV with CO2 emissions among the N-11 countries, economic growth has had a positive and significant effect on CO2 emissions in the N-11 countries. According to our research, nations could achieve the SDG-7 and SDG-13 goals if they adopted green financial and environmental policies.
https://link.springer.com/article/10.1007/s11356-023-26327-4

5. **Tariq, S., Mariam, A., Mehmood, U., & ul-Haq, Z. (2023). Long term spatiotemporal trends and health risk assessment of remotely sensed PM2.5 concentrations in Nigeria. *Environmental Pollution, 324*. doi: 10.1016/j.envpol.2023.121382. Usman Mehmood (DPSIR/SSSH) Date of Publication: May 2023 HJRS: W (Platinum)**

$PM_{2.5}$ is an important indicator reflecting air quality variations. Currently, environmental pollution related issues have become more severe that significantly threaten human health. The current study is an attempt to analyze the spatio-dynamic characteristics of $PM_{2.5}$ in Nigeria based on the directional distribution and trend clustering analysis from 2001 to 2019. The results indicated that $PM_{2.5}$ concentration increased in most of the Nigerian states, particularly in mid-northern and southern states. The lowest $PM_{2.5}$ concentration in Nigeria is even beyond the interim target-1 (35 µg/m^3) of the WHO. During the study period, the average $PM_{2.5}$ concentration increased at a growth rate of 0.2 µg/m^3/yr from 69 µg/m^3 to 81 µg/m^3. The growth rate varied from region to region. Kano, Jigawa, Katsina, Bauchi, Yobe, and Zamfara experienced the fastest growth rate of 0.9 µg/m^3/yr with 77.9 µg/m^3 mean concentration. The median center of the national average $PM_{2.5}$ moved toward the north indicating the highest $PM_{2.5}$ concentration in northern states. The Saharan desert dust is the dominant source of $PM_{2.5}$ in northern areas. Moreover, agricultural practices and deforestation activities along with low rainfall increase desertification and air pollution in these regions. Health risks increased in most of the mid-northern and southern states. The extent of ultra-high health risk (UHR) areas corresponding to the 8×104−7.3×106 µg·person/m^3 increased from 1.5% to 2.8%. Mainly Kano, Lagos, Oyo, Edo, Osun, Ekiti, southeastern Kwara, Kogi, Enugu, Anambra, Northeastern Imo, Abia, River, Delta, northeastern Bayelsa, Akwa Ibom, Ebonyi, Abuja, Northern Kaduna, Katsina, Jigawa, central Sokoto, northeastern Zamfara, central Borno, central Adamawa, and northwestern Plateau are under UHR areas.
https://www.sciencedirect.com/science/article/pii/S0269749123003846

6. **Tariq, S., Nawaz, H., Mehmood, U., ul Haq, Z., Pata, U. K., & Murshed, M. (2023). Remote sensing of air pollution due to forest fires and dust storm over Balochistan (Pakistan). *Atmospheric Pollution Research,* 14(2). doi: 10.1016/j.apr.2023.101674. Usman Mehmood (DPSIR/SSSH) Date of Publication: February 2023 HJRS: W (Bronze)**

Forest fires and dust storms, inevitable and unprecedented in their intensity and extent, are a major source of atmospheric pollutants. The implementation of both systematic surveillance and lowering air pollution options from forest fires and dust storms remain largely unrecognized in many parts of the world. Therefore, this study examines the air pollution due to forest fires and dust storms over Pakistan using remote sensing techniques. High aerosol optical depth (AOD) (~1.5) and ultraviolet aerosol index (UVAI) (~4.50) values were observed in central, eastern, and southeastern Pakistan during May 18–25 indicating the dominance of absorbing aerosols (i.e., dust, smoke, and mixed-type aerosols). Mixed, dust, smoke, and non-smoke fine-dominated aerosols were observed on May 16 while dust, smoke, and mixed-type aerosols were found on May 23. Contrary to this, dust aerosols were found in abundance over southwestern Pakistan on May 16 and 22, and central and Southern Pakistan on May 23. Moreover, high concentrations of NO_2, CO, and HCHO were found in central, eastern, and northeastern Pakistan during forest fire breakouts. The Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model forward trajectories and concentration weighted trajectory (CWT) analysis also showed that the air masses from northwestern Pakistan carried away atmospheric pollutants from the forest fire region to eastern, northeastern, and southern Pakistan. These findings can be useful for both air quality and forest management in Pakistan.
https://www.sciencedirect.com/science/article/pii/S1309104223000284

7. **Tariq, S., Shahzad, H., Mehmood, U., & ul-Haq, Z. (2023). Summertime variability of aerosols and covariates over Saudi Arabia using remote sensing. *Air Quality, Atmosphere and Health, 16*(2), 327-340. doi: 10.1007/s11869-022-01276-y. Usman Mehmood (DPSIR/SSSH) Date of Publication: February 2023 HJRS: W (Bronze)**

The summer season is the longest in Saudi Arabia and thus significantly modifies the aerosol concentration in the country. Hydrometeorological parameters when exposed to and interacting with multiple source aerosols produce a radiative climatic response. This study was made to analyze the space-time dynamics of aerosol

optical depth (AOD) with prevailing meteorological and surface parameters from the summer of 2003 to 2016. Level 3 daily products from Moderate Resolution Imaging Spectroradiometer (MODIS) and Multiangle Imaging Spectroradiometer (MISR) were used. Covariates such as surface temperature, ozone, and relative humidity (RH) from AIRS, and SO_2, dust column mass density (CMD), and dust surface mass concentration (SMC) were also used on a daily time scale. The spatial distribution of AOD showed high concentration (0.5–0.9) over southern and southeastern regions, whereas relatively low concentrations were present in the northern and northwestern regions. For trend observation of AOD, the Mann-Kendall trend test was used, which manifested an increasing trend in the southern and southwestern regions, whereas a decreasing trend in the northern and central regions of Saudi Arabia was observed. Correlation analysis was performed between AOD and meteorological parameters, in which slightly similar patterns were observed for the same variables. Wavelet analysis displays significant periodicity in the 16–64 band. The wavelet coherency analysis provides the abundance of in-phase, anti-phase, leading, and lagging situations in the 16–64 periodic band, along with a few interjections of the 64–128 periodic band. Through this, an obvious difference was concluded in space-time patterns between MODIS and MISR datasets. These findings may prove useful for short-term and long-term studies including oscillating features of AOD and covariates.
https://link.springer.com/article/10.1007/s11869-022-01276-y

8. **Tariq, S., ul-Haq, Z., Mariam, A., Mehmood, U., & Ahmed, W. (2023). Assessment of air quality during worst wildfires in Mugla and Antalya regions of Turkey.** *Natural Hazards, 115*(2), 1235-1254. doi: 10.1007/s11069-022-05592-5. **Usman Mehmood (DPSIR/SSSH) Date of Publication: January 2023 HJRS: W (Bronze)**
Recently, a worse and large-scale forest fire broke out across Turkey, which adversely affected the country's air quality level and caused a tremendous loss. Mugla and Antalya cities were the hot spot areas of this fire that experienced adverse effects. In this paper, we examined and compared the air pollution before and during the forest fire episode i.e., from 27 July to 10 August 2021 in Antalya and Mugla. The results show that before the fire accusation, i.e., on 27 July, the daily mean aerosol optical depth (AOD) was 0.1 indicating a clear sky. However, after the fire breakout on 28 July, this daily mean AOD value rapidly increased to 0.52 on 6 August, indicating intense air pollution. The highest AOD was 2.2 over northern Marmaris, Ula, southeastern Milas, and Mugla Merkezon on 5 August 2021. The results show that peak fire activity occurred during 4–8 August. Meanwhile, the highest NO_2 concentration was 167 µmol/m^2 over mid-east Merkez and Köycegiz. The peak HCHO load was 750 µmol/m^2 over southern Mugla city. Moreover, Mugla and central Antalya cities experienced the highest O_3 concentration of 0.14 mol/m^2. Similarly, at the junction of Dalaman, Köycegiz, and Ortaca, a peak in CO (0.08 mol/m^2) and aerosol index (AI) (3.5) had been observed. The high-altitude smoke was observed over Mugla city. Whereas, over Antalya, mixed aerosols were dominant, followed by smoke, dust, non-smoke fine mode, and fine dominating aerosols.
https://link.springer.com/article/10.1007/s11069-022-05592-5

9. **Tariq, S., ul-Haq, Z., Nawaz, H., Mehmood, U., & Babar, Z. B. (2023). Remote sensing of aerosols due to biomass burning over Kanpur, Sao-Paulo, Ilorin and Canberra.** *Journal of Atmospheric Chemistry, 80*(1), 1-52. doi: 10.1007/s10874-022-09444-1. **Usman Mehmood (DPSIR/SSSH) Date of Publication: March 2023 HJRS: X (Clay)**
Aerosol affect the climate in number of ways. In order to investigate these effects, we need a deep insight into aerosols optical, physical and radiative properties. So, to understand aerosols climatology, we investigate the properties of aerosols such as aerosol optical depth (AOD) (500 nm), Angstrom exponent (AE) (440–870 nm), single scattering albedo (SSA), refractive index (RI) and aerosols radiative forcing (ARF). For this purpose, we select four different AErosol RObotic NETwork (AERONET) sites located in four different continents; Kanpur, (India) Asia, Sao-Paulo, (Brazil) Southern America, IIorin, (Nigeria) Africa and Canberra, Australia. High AOD and AE is found (AOD = 0.90, AE = 1.31) in November at Kanpur and in September (AOD = 0.39, AE = 1.48) at Sao-Paulo. High AOD (1.06 and 1.12) over IIorin in January and February is found because of fog and haze. SSA shows decreasing trend with increasing wavelengths having minimum value (0.88 and 0.78 at 1020 nm) during the months of DJF and SON over Sao-Paulo and Canberra respectively. The highest value of SSA (~ 0.96) is found during the months of MAM over IIorin because of presence of coarse aerosols. The low value of SSA over Kanpur during DJF months shows dominance of fine urban/ biomass burning aerosols. Based on the values of AOD, AE and SSA, Canberra is the most pristine site. The estimated ARF values indicate that Kanpur and Ilorin sites exhibit higher TOA and BOA values as compared to Sao-Paulo. ARF at ATM is observed to be 7.4 Wm^{-2} higher during JJA months and 10.1 Wm^{-2} during SON months than MAM months over Kanpur. We have also observed lowest ARF efficiency (F^{eff}_{BOA}) of − 181 Wm^{-2} AOD$^{-1}_{550\,nm}$ during MAM months for Sao-Paulo while the highest value of − 297 Wm^{-2} AOD$^{-1}_{550\,nm}$ is observed during DJF months for Kanpur.
https://link.springer.com/article/10.1007/s10874-022-09444-1

10. **ul-Haq, Z., Mehmood, U., Tariq, S., & Mariam, A. (2023). Defining the role of renewable energy, economic growth, globalization, energy consumption, and population growth on PM2.5 concentration: evidence from South Asian countries.** *Environmental Science and Pollution Research, 30*(14), 40008-40017. **doi:**

10.1007/s11356-022-25046-6. Usman Mehmood (DPSIR/SSSH) Date of Publication: March 2023 HJRS: W (Silver)

Rapid industrialization and economic development in South Asia (SA) caused serious air pollution–related issues. Air pollutants, particularly fine particulate matter ($PM_{2.5}$), have negative effects on health, instigating widespread concern. The current study is an attempt to analyze the impact of non-renewable energy (NRE), globalization (GLO), GDP, renewable energy (RE), and population (POP) on $PM_{2.5}$ concentration in SA from 1998 to 2020. In doing so, this study incorporated advanced and robust econometric techniques, i.e., Pesaran (Economet Rev 34(6–10), 1089–1117, 2015), to check the cross-sectional dependency, and the unit root presence checked through Cross-sectional Im, Pesaran, and Shin (CIPS) and Cross-sectionally Augmented Dickey-Fuller (CADF) unit root tests. Moreover, the long and short-run association among the selected variables was analyzed through Westerlund and Edgerton (Econ Lett 97(3), 185–190, 2007), cointegration test, and cross-sectional augmented ARDL (CS-ARDL). The empirical results indicate that the panel was cross-sectionally correlated, stationary at the first difference, and co-integrated in the long run. Moreover, the CS-ARDL model indicates a positive association between GDP and $PM_{2.5}$ concentration. Similarly, NRE and POP contribute significantly to increasing the $PM_{2.5}$ concentration in SA. However, RE and GLO play an important role to decrease the $PM_{2.5}$ concentration in SA.

https://link.springer.com/article/10.1007/s11356-022-25046-6

11. **Sajjad, F. W. (2023). A subaltern gaze on White ignorance, (in) security and the possibility of educating the White rescue plans. *Security Dialogue.* https://doi.org/10.1177/09670106231165660. Fatima Waqi Sajjad (DPSIR\ SSS&H) Date of Publication: June 2023 HJRS: W (Platinum)**

In this article, I, as a subaltern, offer a reverse gaze on White security plans to rescue the world from the tide of violent extremism. Violent extremism has been identified as a global security threat by the United Nations, which announced a Plan of Action to combat the threat in 2016. Education has been considered a valuable *tool* for preventing violent extremism. In 2017, UNESCO published a policy guide explaining how education can be used to prevent violent extremism. This article offers a critique of the UNESCO policy guide, using the construct of *White ignorance* as explained by Charles Mills and Jennifer Mueller's Theory of Racial Ignorance. This critique, coming from a location (Pakistan) where education has been under intense White scrutiny since 9/11, owing to its alleged link with violent ideologies, provides an inverse perspective on the problem of violent extremism. Using Mills's concept of the *epistemology of ignorance*, I argue that international security policies view *security* as maintenance of White hegemony and refuse to listen to the people labelled as a *security* problem by White epistemic authorities. I contend that it is the *White security policy* that needs to be educated to prevent violence and maintain durable security.

https://journals.sagepub.com/doi/10.1177/09670106231165660

12. **Sajjad, F. W. (2023). On the delusion of disobedience amid coloniality: location Pakistan. *Third World Quarterly*, 1-16. https://doi.org/10.1080/01436597.2023.2176841. Fatima Waqi Sajjad (DPSIR\SSS&H) Date of Publication: February 2023 HJRS: W (Gold)**

In this paper, I explore how the pervasive coloniality of mind in the Global South deludes popular aspirations to disobey Western systems and hegemony. Coloniality of mind includes binary thinking, instrumental thinking and seduction of the West that trap development and educational visions of Southern countries. Focusing on the case of contemporary Pakistan, I examine two education initiatives of the former Pakistan Tehreek i Insaf (PTI) government that aimed to challenge and change the prevailing education structures in the country: Al Qadir University, which promises to integrate religious and secular instruction in the realm of higher education; and the Single National Curriculum that was intended to eliminate education apartheid in the country. Drawing on the speeches of former Prime Minister Imran Khan and his team members, and key policy documents, I try to make sense of the educational vision of the PTI government. I discuss how these apparently disobedient discourses are rooted in the very colonial knowledge and system that they aim to defy. I term this specific dilemma of the Southern countries *the coloniality of disobedience*. I emphasise that the struggles of epistemic disobedience in formerly colonised spaces must avoid the trap of coloniality to be able to enact independent decolonial futures.

https://www.tandfonline.com/doi/full/10.1080/01436597.2023.2176841

13. **Abou Houran, M., & Mehmood, U. (2023). How institutional quality and renewable energy interact with ecological footprints: do the human capital and economic complexity matter in the Next Eleven nations? *Environmental Science and Pollution Research.* doi: 10.1007/s11356-023-26744-5. Usman Mehmood (DPSIR/SSSH) Date of Publication: May 2023 HJRS: W (Silver)**

Changes in the economy and human conduct have contributed to one of today's most urgent challenges: environmental pollution. This study's overarching objective is to evaluate the following Next Eleven nations (N-11) ecological footprints (EF) with their natural resources (NR), economic complexity (EC), renewable energy (RE), and foreign direct investment (FDI). The data from 1995 to 2018 are used with the panel data estimations. The complexity of an economy is found to influence the EF. For this purpose, the cross-sectional autoregressive

distributed lag method is appropriate. The analysis shows that a higher degree of economic complexity was associated with a larger ecological impact. Moreover, this correlation was the highest among all the variables considered. However, the consumption of natural resources and the economies' complexity enhance environmental conditions. The key recommendation from the study's conclusions is to improve R&D activities to build environmentally friendly technology and clean energy infrastructures and to change to a clean industry pattern. Meanwhile, strategic initiatives are offered to legislators depending on the stability of institutional quality.
https://link.springer.com/article/10.1007/s11356-023-26744-5

14. Caglar, A. E., Daştan, M., Mehmood, U., & Avci, S. B. (2023). Assessing the connection between competitive industrial performance on load capacity factor within the LCC framework: Implications for sustainable policy in BRICS economies. Environmental Science and Pollution Research. doi: 10.1007/s11356-023-29178-1. Usman Mehmood (DPSIR/SSSH) Date of Publication: August 2023 HJRS: W (Silver)

Industrialization plays a crucial role in socio-economic development as it holds significant potential for creating new jobs, tightening the income gap, and promoting the use of advanced technology. As global competition intensifies, emerging economies emulate industrialized economies in accelerating manufacturing activity to improve national welfare and join the new global order. However, policymakers' understanding of how competitiveness in the industrial sector helps developing countries accomplish their sustainable development goals must be deepened. This paper aims to analyze the connections among competitive industrial performance, renewable energy consumption, urbanization, and load capacity factor (LCF) in the BRICS economies for the period between 1990 and 2018. Robust evidence from the continuously updated fully modified (CUP-FM) and continuously updated bias-corrected (CUP-BC) models shows that greater industrial competitiveness enhances environmental quality. The findings also reveal that income growth ultimately evolves as an ecologically friendly factor, confirming the validity of the load capacity curve (LCC) hypothesis. Another outcome of the econometric analysis indicates that renewable energy consumption contributes to the LCF, whereas urbanization damages the environment. Therefore, BRICS policymakers should concentrate on maintaining their competitiveness, implementing resilient urban planning, and promoting the usage of renewable energy to safeguard the environment while simultaneously achieving rapid economic growth.
https://link.springer.com/article/10.1007/s11356-023-29178-1#Abs1

15. Jaffery, T., & Shoaib Pervez, M. (2023). China's Response Towards QUAD in the Indo-Pacific: A Paradoxical Strategy? Strategic Analysis. doi: 10.1080/09700161.2023.2263702. Tayyaba Jaffery, Muhammad Shoaib Pervez (DPSIR/SSSH) Date of Publication: Dec 2023 HJRS: X (Honorable Mention)

In response to China's phenomenal rise in the Indo-Pacific, the United States and its allies have institutionalized the QUAD. This article seeks to critique the novel construct of 'Harmonious Realism' and argues that the Chinese strategy for an Indo-Pacific regional order is paradoxical in nature. This paradox entails dichotomy between China's rhetoric and practices in its institutional, strategic and economic aspects which can be empirically corroborated by the way China relates to ASEAN, its effort to seek an alternate model of security, and ensure economic interconnectivity through the BRI—all of which is counter-intuitive to China's rhetoric of peaceful co-existence.
https://www.tandfonline.com/doi/full/10.1080/09700161.2023.2263702

16. Ahmad, M., Dai, J., Mehmood, U., & Abou Houran, M. (2023). Renewable energy transition, resource richness, economic growth, and environmental quality: Assessing the role of financial globalization. Renewable Energy, 216. doi: 10.1016/j.renene.2023.119000. Usman Mehmood (DPSIR/SSSH) Date of Publication: November 2023 HJRS: W (Platinum)

This study investigates the impact of renewable energy transition, abundance of natural resources, financial globalization, and economic growth on the ecological footprint (EF) in G-11 countries under the Environmental Kuznets Curve (EKC) framework. In addition, this study further analyzes the moderating role of financial globalization in the nexus between renewable energy transition and EF. To do this, the study used the cross-sectional autoregressive distributed lags (CS-ARDL) for the short-run and long-run estimations, which allow heterogeneity in the slope parameters and dependency across countries. The results indicate that renewable transition and financial globalization are significantly and negatively related to ecological footprint, while natural resource rent positively impacts EF. Moreover, the findings further reveal that financial globalization impedes EF through the channel of renewable energy transition, and the robustness test also validates these findings. Our results confirm the presence of the EKC hypothesis for G-11 countries. In light of these findings, the study suggests that G-11 countries should adopt policies that enhance financial globalization along with renewable energy transition and redesign policies for sustainable utilization of natural resources in order to attain sustainable development goals.
https://www.sciencedirect.com/science/article/abs/pii/S0960148123009060

17. **Li, L., Chen, Q., & Mehmood, U. (2023). Analyzing the validity of load capability curve: how economic complexity, renewable energy, R&D, and communication technologies take their part in G-20 countries.** *Environmental Science and Pollution Research,* **30(40), 92068-92083. doi: 10.1007/s11356-023-28436-6. Usman Mehmood (DPSIR/SSSH) Date of Publication: August 2023 HJRS: W (Silver)**
Intense anthropogenic contamination of the air, water, and soil inspires scholars to examine the causes of pollution and provide remedies to assure environmental sustainability. Therefore, researchers in this study are driven to investigate the causes of the severe air, water, and soil contamination that has resulted from human activity and to offer recommendations for achieving environmental sustainability. This research contributes to the ecological works by suggesting the load capability curve (LCH) hypothesis and using the load capacity factor (LC) to investigate components influencing climatic quality. The LC enables thorough climatic value examination when comparing ecological footprint and biocapacity. Information and communication technologies (INF), development and research (R&D), renewable energy (RE) usage, and disposable income are all examined, considering their effects on the load capacity factor. This analysis utilizes the cross-sectionally augmented autoregressive distributed lag estimator and the Westerlund cointegration on data for the G-20 countries from 1995 to 2018. Empirical evidence suggests that renewables, R&D spending, economic complexity, and INF all benefit environmental quality. This study cannot support the LCH hypothesis, which states that increasing income worsens ecological conditions up to a certain point but then aids in improving environmental quality afterward. Based on the findings, G-20 governments should prioritize environmental policies that boost economic growth, spread renewable energy, prioritize research and development spending, and assist the implementation of green INF infrastructure.
https://link.springer.com/article/10.1007/s11356-023-28436-6

18. **Li, X., Sun, Y., Dai, J., & Mehmood, U. (2023). How do natural resources and economic growth impact load capacity factor in selected Next-11 countries? Assessing the role of digitalization and government stability.** *Environmental Science and Pollution Research,* **30(36), 85670-85684. doi: 10.1007/s11356-023-28414-y. Usman Mehmood (DPSIR/SSSH) Date of Publication: August 2023 HJRS: W (Silver)**
With growing environmentalconcerns, everyone's attention has shifted to how we use our limited materials supplies. Rapid economic expansion is dependent on heavy resource use, decreasing biodiversity and raising the ecological footprints (EF), resulting in a reduction in the load capacity factor (LCF). Because of this, scholars and policymakers are actively looking for approaches to improve the LCF without hindering economic growth (GDP). For similar reasons, this research aims at how the selected next eleven economies improved their LCF from 1990 to 2018 by analyzing the effect of digitalization (DIG), natural resources (NAT), GDP, globalization, and governance. To account for dependence across sections and slope variation, the cross-sectional augmented ARDL model is used in this research. The long-term findings indicate that LCF was diminished by dependence on NAT, globalization, and economic growth and was bolstered by DIG and sound governance. The work recommends that financial and policy support is needed for initiatives such as zero-emission vehicle production and energy-efficient building construction. By offering a line of credit at low interest rates, renewable energy projects can attract domestic and private investors.
https://link.springer.com/article/10.1007/s11356-023-28414-y

19. **Mehmood, U. (2023). Analyzing the Role of Political Risk, GDP, and Eco-Innovations Towards CO2 Emissions in South Asian Countries.** *Journal of the Knowledge Economy.* **doi: 10.1007/s13132-023-01292-y. Usman Mehmood (DPSIR/SSSH) Date of Publication: March 2023 HJRS: X (Honorable Mention)**
This research work estimates the impacts of political risk towards carbon emissions while incorporating the role of technological innovations, financial development, economic growth, and trade, in panel data of Pakistan, India, Bangladesh, and Sri Lanka. In doing so, the yearly data of 1984–2017 is analyzed by adopting an advanced econometric method of the cross-sectional autoregressive distributed lag (CS-ARDL) approach. The Westerlund co-integration test confirms the strong association among the variables, and the results of CS-ARDL show that innovations, economic growth, and trade are not environmentally friendly in South Asian countries. Furthermore, financial development and a stable political environment are important to achieve carbon neutrality in developing South Asian countries. This work diverts the attention of policymakers in making a stable political environment. This will improve the environmental quality and save these countries from future drastic climatic variability.
https://link.springer.com/article/10.1007/s13132-023-01292-y#Abs1

20. **Mehmood, U., Tariq, S., Aslam, M. U., Agyekum, E. B., Uhunamure, S. E., Shale, K., . . . Khan, M. F. (2023). Evaluating the impact of digitalization, renewable energy use, and technological innovation on load capacity factor in G8 nations.** *Scientific Reports,* **13(1). doi: 10.1038/s41598-023-36373-0. Usman Mehmood (DPSIR/SSSH) Date of Publication: June 2023 HJRS: W (Platinum)**
Ecosystems are in danger due to human-caused air, water, and soil pollution, so it is important to find the underlying causes of this issue and develop practical solutions. This study adds to environmental research gap by suggesting the load capability factor (LCF) and using it to look at the factors affectting environmental health.

The load capacity factor simplifies monitoring environmental health by illustrating the distinction between ecological footprint and biocapacity. We examine the interplay between mobile phone users (Digitalization DIG), technological advancements (TEC), renewable energy use, economic growth, and financial development. This study assesses G8 economies' data from 1990 to 2018, using a Cross-Section Improved Autoregressive Distributed Lag CS-ARDL estimator and a cointegration test. The data shows that green energy, TEC innovation, and DIG are all beneficial for natural health. Based on the results of this study, the G8 governments should focus on environmental policies that promote economic growth, increase the use of renewable energy sources, guide technological progress in key areas, and encourage the development of digital information and communications technologies that are better for the environment.
https://www.nature.com/articles/s41598-023-36373-0#Abs1

21. **Sabir, S. A., Rehman, M. A., Javed, M. Z., Mehmood, U., & Ishaq, R. (2023). A causal link between financialization and ecological status: a novel framework for Asian countries?** *Environmental Science and Pollution Research,* 30(36), 85685-85700. doi: 10.1007/s11356-023-28352-9. Usman Mehmood (DPSIR/SSSH) Date of Publication: July 2023 HJRS: W (Silver)

Sustainable finance and green trade are essential to accomplish the green growth agenda. Though the literature prevails, little is known about the inclusive influence of financialization and trade openness on ecological status rather than just focusing on air pollution or inconclusive element. This study aims to analyze the role of financial dimensions and trade openness with environmental performance in the context of three panels of Asian countries consisting of low, middle, and high-income over the period 1990–2020. The estimated outcomes from the novel panel, the Granger non-causality technique, demonstrate that financialization further contributes to environmental deterioration instead of preserving the environmental quality. Regarding the low and middle-income economies, the authorities should enhance gains from trade openness to develop energy efficiency and ecological status policies. In the case of high-income Asian countries, they are even more desperate to consume energy and ignore the ecological challenges. The findings of this research offer various policy suggestions to accomplish sustainable development objectives.
https://link.springer.com/article/10.1007/s11356-023-28352-9#Abs1

22. **Samour, A., Mehmood, U., Radulescu, M., Budu, R. A., & Nitu, R. M. (2023). Examining the Role of Renewable Energy, Technological Innovation, and the Insurance Market in Environmental Sustainability in the United States: A Step toward COP26 Targets.** *Energies,* 16(17). doi: 10.3390/en16176138. Usman Mehmood (DPSIR/SSSH) Date of Publication: August 2023 HJRS: W (Bronze)

Investigating the determinants of environmental sustainability has become a very attractive and popular area of research in response to the United Nations' sustainable development goals (SDGs) and COP26 targets. Against this backdrop, this paper aims to explore the effects of renewable energy, technological innovation, and the insurance market on environmental sustainability in the United States (US). This work contributes to the extant body of knowledge by exploring the effect of the insurance market on the load capacity factor (LC), specifically regarding the US. The LC tracks a certain ecological threshold by simultaneously comparing biocapacity and ecological footprint (EF), thereby providing a comprehensive empirical analysis of ecological sustainability determinants. However, this proxy includes the combined attributes of the demand and supply sides of ecological sustainability. Using the recently developed autoregressive distributed lag method, this research reveals that the insurance market adversely affects the LC in the US. The overall outcomes highlight the positive role of renewable energy, technological innovation, and the insurance market in achieving the SDGs and COP26 targets. Policy recommendations for policymakers concerning promoting renewable energy, green innovation activities, the green insurance market, and ecological regulations are also discussed.
https://www.mdpi.com/1996-1073/16/17/6138

23. **Sharif, A., Mehmood, U., Tariq, S., & Haq, Z. U. (2023). The role of financial inclusion and globalization toward a sustainable economy in ASEAN countries: evidence from advance panel estimations.** *Environment, Development and Sustainability.* doi: 10.1007/s10668-023-03145-9. Usman Mehmood (DPSIR/SSSH) Date of Publication: March 2023 HJRS: W (Bronze)

This study probes the sustainable development path for ASEAN countries throughout 1990–2019. In doing so, we estimated two equations with the dependent variable of Gross domestic product (GDP) and CO2 emissions, respectively. We took independent variables of capital formation CAP, labor productivity LAB, financial inclusion FIN, globalization GLO, per capita income PI, private–public partnership, and population growth POP. The findings reveal that there exists a strong association between the estimated equations. The coefficient values obtained from cross-sectional ARDL show that CAP, LAB, FIN, GLO, and PI are increasing GDP in ASEAN countries. At the same time, POP, PI, and GLO are contributing toward more CO2 emissions in ASEAN countries. It was observed that FIN is reducing CO2 emissions significantly. To attain a sustainable expansion economy, these developing countries need to revise their economic and environmental policies. PI and POP are positively correlated with CO2 emissions, which means that these countries are even consuming non-renewable energy in the economic sector. Moreover, POP is also contributing factor to environmental pollution. There is a need

to increase public awareness about climatic problems.
https://link.springer.com/article/10.1007/s10668-023-03145-95

24. **Sharif, A., Mehmood, U., & Tiwari, S. (2023). A step towards sustainable development: role of green energy and environmental innovation.** *Environment, Development and Sustainability.* **doi: 10.1007/s10668-023-03111-5.** Usman Mehmood (DPSIR/SSSH) Date of Publication: August 2023 HJRS: W (Bronze)

The world has acknowledged the importance of natural resources to compensate for energy requirements for sustainable development. Green Energy (GE) and Eco-innovations have the potential to improve air quality by reducing CO_2 emissions and ensuring sustainable development, which the available literature has neglected. Therefore, we investigate the dynamic impact of green energy and environmental innovations on the USA's economic growth and CO_2 emissions. We applied the quantile-on-quantile (QARDL) approach from 1990 to 2019. Our findings indicate that GE consumption mitigates CO_2 emissions by increasing economic growth in different quantiles in the USA. Furthermore, Eco-innovations also contribute to economic growth by reducing CO_2 emissions in different quantiles. Additionally, Bi-directional quantile causality was found between green energy consumption, economic growth, and CO_2 emissions. Thus, the empirical results of the current study provide acumens for policymakers of the USA to consume green energy and use green technology and environmental innovations to counterbalance the environmental issues induced by CO_2 emissions without halting economic growth and sustainable development.
https://link.springer.com/article/10.1007/s10668-023-03111-5

25. **Sun, Y., Gao, P., Tariq, S., Azhar, A., Haq, Z. U., &** Mehmood, U. **(2023). Assessment of long-term trends in chlorophyll-a and sea surface temperature in the Arabian Sea and their association with aerosols using remote sensing.** *Ocean and Coastal Management,* **242. doi: 10.1016/j.ocecoaman.2023.106716.** Usman Mehmood (DPSIR/SSSH) Date of Publication: August 2023 HJRS: W (Gold)

Aerosols over the oceanic region significantly influence Earth's energy budget and climate change. Therefore, this study examines the spatiotemporal patterns of MODIS retrieved aerosol optical depth, sea surface temperature, Chlorophyll-a, Sea-WiFS retrieved aerosol optical depth, and MERRA-2 model dust mass concentrations over the Arabian Sea (4o N–26o N to 50o E–78o E) during the period 2002–2020. The effects of dust aerosols on phytoplankton blooms using the Mann-Kendall and Theil Sen-slope are also analyzed in this study. An increase in aerosol optical depth (AOD) was observed within the latitudes of (4o N–26o N). The AOD shows an increasing trend at 13.4% per year over the Arabian Sea (AS). The highest value of Chl-a ($\sim$7 mgm−3) was observed along the coast of Pakistan, Iran, and Oman. Moreover, a negative correlation is found between AOD and sea surface temperature (SST) along the coast of Oman and Somalia, while a strong positive correlation ($\sim$0.99) is observed between AOD and Chlorophyll-a (Chl-a) along the coasts of Oman and Somalia.
https://www.sciencedirect.com/science/article/abs/pii/S0964569123002417

26. **Sun, Y., Gao, P., Tariq, S., Shahzad, H.,** Mehmood, U., **& ul Haq, Z. (2023). Analysis of aerosol optical depth and relation to covariates during pre-monsoon season (2002–2019) over Pakistan using ARIMAX model and cross-wavelet analysis.** *Environmental Research,* **233. doi: 10.1016/j.envres.2023.116436.** Usman Mehmood (DPSIR/SSSH) Date of Publication: September 2023 HJRS: W (Platinum)

The pre-monsoon season heavily influences the precipitation amount in Pakistan. When hydrometeorological parameters interact with aerosols from multiple sources, a radiative climatic response is observed. In this study, aerosol optical depth (AOD) space-time dynamics were analyzed in relation to meteorological factors and surface parameters during the pre-monsoon season in the years 2002–2019 over Pakistan. Level-3 (L3) monthly datasets from Moderate Resolution Imaging Spectroradiometer (MODIS) and Multi-Angle Imaging Spectroradiometer (MISR) were used. Tropical Rainfall Measuring Mission (TRMM) derived monthly precipitation, Atmospheric Infrared Sounder (AIRS) derived air temperature, after moist relative humidity (RH) from Modern-Era Retrospective analysis for Research and Applications, Version-2 (MERRA-2), near-surface wind speed, and soil moisture data derived from Global Land Data Assimilation System (GLDAS) were also used on a monthly time scale. For AOD trend analysis, Mann-Kendall (MK) trend test was applied. Moreover, Autoregressive Integrated Moving Average with Explanatory variable (ARIMAX) technique was applied to observe the actual and predicted AOD trend, as well as test the multicollinearity of AOD with covariates. The periodicities of AOD were analyzed using continuous wavelet transformation (CWT) and the cross relationships of AOD with prevailing covariates on a time-frequency scale were analyzed by wavelet coherence analysis. A high variation of aerosols was observed in the spatiotemporal domain. The MK test showed a decreasing trend in AOD which was most significant in Baluchistan and Punjab, and the overall trend differs between MODIS and MISR datasets. ARIMAX model shows the correlation of AOD with varying meteorological and soil parameters. Wavelet analysis provides the abundance of periodicities in the 2–8 months periodic cycles. The coherency nature of the AOD time series along with other covariates manifests leading and lagging effects in the periodicities. Through this, a notable difference was concluded in space-time patterns between MODIS and MISR datasets. These findings may prove useful for short-term and long-term studies including oscillating features of AOD and covariates.

https://www.sciencedirect.com/science/article/abs/pii/S0013935123012409

27. Sun, Y., Tian, W., **Mehmood, U.,** Zhang, X., & Tariq, S. (2023). **How do natural resources, urbanization, and institutional quality meet with ecological footprints in the presence of income inequality and human capital in the next eleven countries?** *Resources Policy,* **85. doi: 10.1016/j.resourpol.2023.104007. Usman Mehmood (DPSIR/SSSH) Date of Publication: August 2023 HJRS: W (Platinum)**

The rapid pace of financial and societal progress has generated a multitude of environmental challenges. In light of this perspective, this work endeavours to analyze the effect of income inequality (GINI), natural resources (NAT), human development (HC), and quality of institutions (IQ) on EF in N-11 countries from 1990 to 2018. The cross-sectionally augmented autoregressive distributed lags (CS-ARDL) method is employed to explore the long-term and short-term relationships, which effectively address panel data problems such as slope homogeneity and cross-sectional dependence. The empirical findings indicate that improvements in NAT, HC, URB, and IQ have a positive effect on the environment. Income inequality exacerbates social disparities, thereby exerting a detrimental impact on the ecosystem. Based on these results, the study recommends allocating more financial resources to human development and promoting institutional quality to mitigate the ecological footprint. Additionally, it emphasizes the importance of sustainable utilization of natural resources to ensure their long-term availability and minimize ecological impact. Simultaneously, addressing income inequality is crucial in effectively managing environmental challenges and fostering long-term ecological sustainability.

https://www.sciencedirect.com/science/article/abs/pii/S0301420723007183

28. Tariq, S., Mariam, A., ul-Haq, Z., & **Mehmood, U.** (2023). **Assessment of variability in PM2.5 and its impact on human health in a West African country.** *Chemosphere,* **344. doi: 10.1016/j.chemosphere.2023.140357. Usman Mehmood (DPSIR/SSSH) Date of Publication: December 2023 HJRS: W (Platinum)**

PM2.5 has become a global challenge threatening human health, climate, and the environment. PM2.5 is ranked as the most common cause of premature mortality and morbidity. Therefore, the current study endeavors to probe the spatiodynamic characteristics of PM2.5 in the Republic of Niger and its impacts on human health from 1998 to 2019. Based on remotely sensed satellite datasets, the study found that the concentration of PM2.5 continued to rise in Niger from 68.85 μg/m3 in 1998 to 70.47 μg/m3 in 2019. During the study period, the annual average PM2.5 concentration is far above the WHO guidelines and the interim target-1 (35 μg/m3). The overall annual growth rate of PM2.5 concentration in Niger is 0.02 μg/m3/year. The health risk (HR) due to PM2.5 exposure is also escalated in Niger, particularly, in Southern Niger. The extent of the extremely high-risk areas corresponding to 1×104–9.4×105 μg.persons/m3 is increased from 0.9% (2000) to 2.8% (2019). Niamey, southern Dakoro, Mayahi, Tessaoua, Mirriah, Magaria, Matameye, Aguié, Madarounfa, Groumdji, Madaoua, Bouza, Keita, eastern Tahoua, eastern Illéla, Bkomnni, southern Dogon-Doutchi, Gaya, eastern Boboye, central Kollo, and western Tillabéry are experienced high HR due to long-term exposure to PM2.5. These findings indicate that PM2.5 causes a serious health risk across Niger. There is an immediate need to carry out its regional control. Therefore, policymakers and the Nigerien government should make conscious efforts to identify the priority target areas with radically innovative appropriate mitigation interventions.

https://www.sciencedirect.com/science/article/abs/pii/S0045653523026279

29. Tariq, S., Shahzad, H., **Mehmood, U.,** & Haq, Z. (2023). **Linear and wavelet analysis of aerosol optical depth (AOD) and prevailing meteorological factors during summer (2003–2016) over Turkey using Remote Sensing.** *Air Quality, Atmosphere and Health,* **16(12), 2509-2528. doi: 10.1007/s11869-023-01422-0. Usman Mehmood (DPSIR/SSSH) Date of Publication: September 2023 HJRS: W (Bronze)**

The summer season has a high influence on the aerosol load of Turkey. Atmospheric parameters produce a radiative climatic response when exposed to aerosols from multiple sources. The main aim of this research is to observe the spatio-temporal characteristics of aerosol optical depth (AOD) with atmospheric and surface covariates during the summer of 2003–2016 in Turkey. The AOD products for this study were retrieved at level 3 from Moderate Resolution Imaging Spectroradiometer (MODIS) and Multiangle Imaging Spectroradiometer (MISR) on a daily timescale. Prevailing meteorological parameters such as precipitation, air temperature, relative humidity, surface soil moisture, and enhanced vegetation index (EVI) were used on a daily and monthly timescale. The spatio-temporal distribution of aerosols and meteorological parameters were plotted and analyzed from which each variable exhibited a unique spatial distribution. The Mann–Kendall (MK) trend test was used to analyze the increasing and decreasing trends of AOD throughout the years. MODIS AOD had an increasing trend in the eastern, northeastern, southeastern, southwestern, and northern regions of Turkey whereas a significant decreasing trend was observed in the northwestern regions. MISR AOD had a strong significantly increasing trend in the eastern, northeastern, southern, and central regions whereas the western, northern, and central regions of Turkey expanded under a decreasing trend. Furthermore, correlation analysis was performed to analyze the relationship between AOD and the prevailing covariates from which the correlation between EVI and AOD was extremely variable in both datasets. Wavelet analysis (both continuous

and coherence) was performed to analyze the periodic nature of AOD and meteorological parameters. Both MODIS and MISR exhibited significant coherencies in the 16–256 periodic for all covariates except for EVI which was plotted on a monthly time scale. In this study, a notable variation was observed in the space–time dynamics between MODIS and MISR datasets which can be used for future studies that attempt to analyze the relationship between AOD and covariates during the summer season.
https://link.springer.com/article/10.1007/s11869-023-01422-0

30. **Tariq, S., Zeydan, Ö., Nawaz, H., Mehmood, U., & ul-Haq, Z. (2023). Impact of land use/land cover (LULC) changes on latent/sensible heat flux and precipitation over Türkiye.** *Theoretical and Applied Climatology,* **153(3-4), 1237-1256. doi: 10.1007/s00704-023-04535-9. Usman Mehmood (DPSIR/SSSH) Date of Publication: June 2023 HJRS: W (Bronze)**

Land use and land cover (LULC) changes have some implications on land–atmosphere interactions, surface energy budget, and hydrological cycle. The understanding of LULC changes and their interactions with the environment provide better management of agriculture, forests, and water resources. LULC changes are frequently observed in developing countries such as Türkiye and much research has been conducted in this field. However, few studies investigated the countrywide LULC changes and their interactions with energy fluxes and precipitation. In this paper, LULC changes in Türkiye over the last two decades have been evaluated by utilizing an Enhanced Vegetation Index (EVI) derived from the Terra satellite. The latent and sensible heat fluxes were obtained from the Modern-Era Retrospective analysis for Research and Applications (MERRA-2) reanalysis datasets. Precipitation data were acquired from the Tropical Rainfall Measuring Mission (TRMM) satellite. The results showed that EVI has an increasing trend over Türkiye between 2000 and 2021, while climate change–induced desertification, droughts, and forest fires have threatened the vegetative cover in some portions of the country. The latent heat flux has a rising trend due to increasing vegetative cover and irrigated areas. A slight reduction was observed in sensible heat flux, while a sharp increase was witnessed in specific humidity. EVI represented a high positive correlation (R = 0.84) with sensible heat flux and a moderate positive correlation (R = 0.69) with latent heat flux. No significant relation was determined between EVI and precipitation on a monthly basis.
https://link.springer.com/article/10.1007/s00704-023-04535-9

31. **ul Haq, Z., Mehmood, U., Tariq, S., Hanif, A., & Nawaz, H. (2023). Role of meteorological parameters with the spread of Covid-19 in Pakistan: application of autoregressive distributed lag approach.** *International Journal of Environmental Science and Technology.* **doi: 10.1007/s13762-023-04997-4. Usman Mehmood (DPSIR/SSSH) Date of Publication: June 2023 HJRS: W (Bronze)**

This research focuses on the impacts of different meteorological parameters (temperature, humidity, rainfall, and evapotranspiration) on the transmission of Covid-19 in the administrative regions and provinces of Pakistan, i.e., Azad Jammu and Kashmir, Gilgit Baltistan, Khyber Pakhtunkhwa, Islamabad, Punjab, Sindh, and Balochistan from June 10, 2020, to August 31, 2021. This study analyzes the relation between Covid-19-confirmed cases and the meteorological parameters with the help of the autoregressive distributed lag model. In this research, additional tools (t-statistics, f-statistics, and time series analysis) are used for the motive of examining the linear relationship, the productivity of the model, and for the significant association between dependent and independent variables, lnccc and lnevp, lnhum, lnrain, lntemp, respectively. Values of t-statistics and f-statistics reveal that variables have a connection and individual significance for the model exist. Time series display that the Covid-19 spread increased from June 10, 2020, to August 31, 2021, in Pakistan. Temperature positively influenced the Covid-19-confirmed cases in all provinces of Pakistan in the long run. Evapotranspiration and rainfall influenced positively, while specific humidity influenced negatively on the confirmed Covid-19 cases in Azad Jammu Kashmir, Khyber Pakhtunkhwa, and Punjab. Specific humidity had a positive impact, while evapotranspiration and rainfall had the negative impact on the Covid-19-confirmed cases in Sindh and Balochistan. Evapotranspiration and specific humidity influenced positively, while rainfall influenced the Covid-19-confirmed cases negatively in Gilgit Baltistan. Evapotranspiration influenced positively, while specific humidity and rainfall influenced negatively on the Covid-19-confirmed cases in Islamabad.
https://link.springer.com/article/10.1007/s13762-023-04997-4

32. **Ullah, A., Raza, K., & Mehmood, U. (2023). The impact of economic growth, tourism, natural resources, technological innovation on carbon dioxide emission: evidence from BRICS countries.** *Environmental Science and Pollution Research,* **30(32), 78825-78838. doi: 10.1007/s11356-023-27903-4. Usman Mehmood (DPSIR/SSSH) Date of Publication: June 2023 HJRS: W (Silver)**

The main objective of this manuscript was to investigate the relationships among economic development, tourism, the use of natural resources, technical advancement, and carbon dioxide emissions in the BRICS group of nations. Data from the panel was gathered from 1995 to 2018. Modern methodology tools including the CS-ARDL tests, Westerlund cointegration tests, and panel data unit root tests have been used in this study. Results of the models show that all the variables were transformed to the first difference to make it stationary. The

Westerlund model test results suggest that dependent and independent variables have robust cointegration. Results of the CS-ARDL models reveal that all the variables signed, and significance are aligned with the economic theory. It indicates that except for tourism, the rest of the variables like technical innovation, natural resources, and economic growth have positive and significant effects on carbon dioxide emissions both in the short and long runs. Additionally, a 1% rise in economic growth, technical innovation, and natural resources over the long term would raise carbon dioxide emissions in the BRICS economies by 1.79%, 0.15%, and 0.10%, respectively. However, a 1% increase in tourism would result in a 0.39% decrease in carbon dioxide emissions among the nations in the panel data set. Therefore, the promotion of sustainable tourism and advancement in technological innovation is highly important in these countries, so the high impact of environmental degradation pressure may reduce to some extent. An in-addition comprehensive set of policies should be made on encouraging low-carbon transportation, promoting sustainable tourism certification, boosting local produce, reducing waste management, and provide education and awareness campaigns to tourists. https://link.springer.com/article/10.1007/s11356-023-27903-4

33. **Xu, P., Zhang, J., & Mehmood, U. (2023). How Do Green Investments, Foreign Direct Investment, and Renewable Energy Impact CO2 Emissions? Measuring the Role of Education in E-7 Nations.** *Sustainability (Switzerland),* **15(19). doi: 10.3390/su151914052. Usman Mehmood (DPSIR/SSSH) Date of Publication: September 2023 HJRS: W (Silver)**

The COP27 conference establishes fresh objectives for global economies to achieve the goals outlined in the Paris Agreement, which are centered on reducing carbon (CO2) emissions and constraining the rise in global temperatures to 1.5 °C. In this background, this study looks at how education has affected CO2 emissions, the economy, the use of renewable energy, green investments, and foreign direct investment in the E-7 countries from 2000 to 2021. Two unit root tests, CADF and CIPS, were used to gauge the data's stationarity. The long-run coefficients were identified using the momentum quantile regression approach. The empirical results show a cointegration of the variables. Long-term CO2 emissions are influenced by a variety of factors, including foreign direct investment, economic growth, green investments, and education. The outcomes of reliable statistics provide support for the overall empirical study of groups and the economy. The results also suggest that there is a significant increase in education, leading to a reduction in CO2 emissions across long time periods. Additionally, the E-7 countries should place a high priority on boosting the use of renewable energy and investing in the expansion of higher education for sustainable development. To mitigate the rise in carbon dioxide emissions (CO2em), it is recommended that the governments of the E-7 nations take measures to promote the adoption of green investments. Governments must prioritize their efforts to ensure that green financing policies are able to complement environmental welfare policies and green growth policies. https://www.mdpi.com/2071-1050/15/19/14052

34. **Zhao, H., Li, Y., & Mehmood, U. (2023). How human capital and energy prices play their role to enhance renewable energy: defining the role of innovations and trade openness in G-11 countries.** *Environmental Science and Pollution Research,* **30(27), 71284-71295. doi: 10.1007/s11356-023-27451-x. Usman Mehmood (DPSIR/SSSH) Date of Publication: May 2023 HJRS: W (Silver)**

It is crucial to switch from nonrenewable energy to renewable energy sources to improve environmental quality. For this reason, innovations play a crucial part, yet the use of renewable energy is insufficient. This work contributes to the literature by Using both aggregate and disaggregated data, this study investigates the relationship between energy consumption, trade openness, human capital (HCA), and innovations in G11 nations. This study analyzed yearly data from 1990 to 2020 using empirical methods of augmented mean group (AMG) and cross-sectional autoregressive distributed lag (CS-ARDL) techniques. The findings highlight the significance of human capital, energy pricing, and innovations in fostering the growth of renewable energy in G-11 nations. A 1% increase in GDP and trade openness will enhance total energy consumption by 0.47% and 0.07%. GDP and trade are also increasing non and renewable energy consumption. A 1% increase in human capital and eco-innovations are increasing renewable energy by reducing non-renewable energy consumption. In addition, the G-11's rising commerce and GDP have increased their reliance on energy sources that rely on fossil fuels. The authors of this study suggest raising HCA as a means of encouraging the G-11 to use cleaner forms of energy. The need to bolster renewable energy to achieve a cleaner environment in the G-11 countries. https://link.springer.com/article/10.1007/s11356-023-27451-x

35. **Zhu, W., Mehmood, U., Alnafrah, I., Abou Houran, M., & Dagestani, A. A. (2023). How military spending, economic growth, and renewable energy impacts ecological footprints in Next Eleven nations.** *Environmental Science and Pollution Research,* **30(47), 103947-103957. doi: 10.1007/s11356-023-29633-z. Usman Mehmood (DPSIR/SSSH) Date of Publication: September 2023 HJRS: W (Silver)**

The objective of this study is to investigate the association between military spending and environmental sustainability within the N-11 countries. There exists a strong correlation between sustainable economic expansion and energy consumption, which in turn results in the generation of elevated levels of carbon emissions. Moreover, it is plausible that a correlation exists between military spending and the degradation of

the environment. The primary objective of this study is to examine the emissions of carbon and emissions of greenhouse gases in the N-11 countries, as these nations exhibit comparatively elevated levels of such emissions. Therefore, this study examines the correlation among economic growth, militarization, renewable energy, and environment in the Next Eleven nations from 1990 to 2022. The cross-section autoregressive distributed lag (CS-ARDL) model is employed to analyze the enduring and immediate connections between variables. Empirical evidence indicates that a country's environment is positively influenced by GDP and militarization. The escalation of military capital intensity has exacerbated the environmental damage. Increasing the adoption of renewable energy sources can mitigate negative environmental impacts over time. This study proposes policy recommendations for sustainable development, including reducing militarization and improving the use of clean energy.

https://link.springer.com/article/10.1007/s11356-023-29633-z

Book Chapter

1. **Pervez, M. S.** (2023). *Indian Strategic Culture: A Review Essay in Handbook of Strategic Culture Edited By Kerry M. Kartchner, Briana D. Bowen, Jeannie L. Johnson*. London: Routledge. **Muhammad Shoaib Pervez (DPSIR/SSSH) Date of Publication: September 29, 2023.**

   His chapter synthesizes perspectives on Indian strategic culture through summaries of three bodies of literature: (1) themes on Indian strategic culture as explained by think tank experts and tailor-made for policy formulation; (2) India's strategic culture as described in academic experts' works; and (3) a summary of key works on the impact of strategic culture on India's nuclear strategy. Pervez asserts that future studies on Indian strategic culture would benefit from more in-depth historical analyses of Indian strategic thinking by linking the practices of its elites with that of the sociocultural norms of broader Indian society. The chapter concludes by declaring that Indian strategic culture is at a crossroads that could constitute a clear break from its past – from a strategic culture constructed on the foundation of Ahimsa norms (nonviolence toward other states) to a strategic culture based on assertive security practices and overt nuclear posturing.

   https://www.routledge.com/Routledge-Handbook-of-Strategic-Culture/Kartchner-Bowen-Johnson/p/book/9780367445485

2. **Tariq, S., Nawaz, H., Ul-Haq, Z., & Mehmood, U.** (2023). *Remote Sensing of Greenhouse Gases and Aerosols from Agricultural Residue Burning Over Pakistan Vegetation Fires and Pollution in Asia* (pp. 299-315). **Usman Mehmood (DPSIR/SSSH) Date of Publication: May 2023**

   Biomass burning is a significant source of particulate matter and greenhouse gas emissions. It has harmful effects on human health and degrades air quality worldwide. The drivers of biomass burning vary, such as clearing the natural forest for agriculture through slash and burn, to remove shrubs, bushes, and weeds, including stubble burning to prepare the land for the next crop and other reasons. Approximately 8700 Tg of dry matter is charred annually. Several studies analyzed the physical aspects of biomass burning. However, quantifying interannual and seasonal variations in aerosols and greenhouse gas emissions is still challenging. Estimates show that ~ 66% of basmati rice, 61% of non-basmati rice, 61% of the wheat crop, 32% of maize, and 78% of the crop area of sugarcane is burnt annually in Pakistan. These numbers are increasing every year because of the need for more government policies. Thus, adding a large amount of reactive gases and particulate matter into the atmosphere substantially disturbs tropospheric oxidation capacity and energy budget.

   https://link.springer.com/chapter/10.1007/978-3-031-29916-2_18#Abs1

School of Governance and Society (SGS)

1. **Mumtaz, B., Azhar, A., Abdullah, M. I., & Khan, A. A. (2023). Examining the relationship of paternalistic leadership, extent of centralisation and employee's voice behaviour.** *International Journal of Work Organisation and Emotion,* **14(1), 101-118. https://doi.org/10.1504/IJWOE.2023.130243. Aisha Azhar (SGS) Date of Publication: March 2023 HJRS: Y (Null)**

   Among many leadership approaches in Asia, literatures failed to gauge applicability of paternalistic leadership in Pakistani organisations. This research stresses on discussing how voice varies across the triad model of paternalistic leadership styles, power distance orientation, their interactions, and extent of centralisation. Data was collected from a sample of 324 employees, which includes 146 employees from public and 178 employees from private universities and banks. The proposed hypotheses were tested by using confirmatory factor analysis followed by multiple regression analysis. The findings showed that employees' voice behaviour was negatively associated with authoritarian paternalism; positively associated with benevolent and moral paternalism; and negatively associated with extent of centralisation. Also, the positive relationship of benevolent paternalism and employees' voice behaviour was stronger when employees experience high levels of power distance, thereby accepting the proposed hypotheses. However, contrary to the propositions, no

significant results were obtained regarding power distance moderating negative authoritarian and positive moral paternalist link with voice behaviour. Implications of findings and future research prospects are discussed.
https://www.inderscienceonline.com/doi/abs/10.1504/IJWOE.2023.130243

2. **Azhar, A.,** & Steen, T. (2023) **Underlying assumptions of public service motivation: a view from the developing world,** *Asia Pacific Journal of Public Administration, 45*(3), 274-294, DOI: 10.1080/23276665.2022.2121294. **Aisha Azhar (SGS) Date of Publication: 2023 HJRS: X (Clay)**
Based on a qualitative study of public service motivation (PSM)among public employees in Pakistan, the authors formulate a model of contextual factors influencing public-service-motivated behaviours. Through an analysis of 36 interviews, the research finds that because of their different cultural background Pakistan public employees did not identify with the principal motivational structure generally associated with PSM. While Pakistan public employees exhibited empathy and compassion, they did not relate them to public service. The antecedents for these motives were primarily their Islam religion. Employees showed inclinations for the pursuit of power, job security, and implicit opportunities for corruption as motives for seeking public employment. The contextual factors not only directly influenced employees' behaviours more strongly than PSM, but they also tended to undermine the effect of PSM as a strong influencer for employees to think of serving society at large. The authors conclude that assumptions about PSM in a developing country such as Pakistan are not irrational but are embedded in local rationalities that admittedly countervail the ethical foundations of public service. These local rationalities seem widely accepted among public employees in Pakistan. The findings of the study can be related to other developing countries, particularly South Asian countries.
https://www.tandfonline.com/doi/pdf/10.1080/23276665.2022.2121294

3. **Waheed, S., Sial, M., & Azhar, A.** (2023). **The bureaucratic disconnect in collaborative institutions: A case of rural water supply in Punjab, Pakistan.** *International Journal of Water Governance, 10*(1). DOI: https://doi.org/10.25609/ijwg.9.2023.6236. **Seemi Waheed, Aisha Azhar (SGS) Maqbool Hussain Sial (Economics & Statistics/HSM) Date of Publication: June 2023 HJRS: Y (Null)**
The collaborative model for rural water supply (RWS), introduced at the behest of international funders in the 1990s, experienced only partial success owing to the low accept-ability of public managers and the slow process of community development (CD). This article goes into the empirical findings of a study that is based on in-depth interviews with 20 staff and line public managers of the four RWS in different regions as well as on content analysis of policy documents and funding organizations' reports. The results indicate that appropriate CD, reforms in internal organization arrangements, and understanding of context-specific social, economic, and political diversity remain necessary in collaborative compliance with institutions for RWS sustainability. The study aims at making a contribution to the theory of collaborative governance and the practice of collaborative implementation in developing countries.
https://journals.open.tudelft.nl/ijwg/article/view/6236

4. **Aslam, Z., Azhar, A.,** Ali, A., & Manzoor, A. (2023). **Does politicizing affect the public sector organizations: a qualitative study?** *Journal of ISOSS,* 9(1), 183-198. **Zeeshan Aslam, Aisha Azhar (SGS) Date of Publication: June 2023 HJRS: Y (Null)**
Unable to expel its dark side, deeply rooted among the public, the Police in Punjab seem a threat instead of a public-friendly organization, which depicts a negative relationship between the Police and the general masses. The attempts have been unsuccessful to refashion the negative image of the Police through introducing reforms in the past. The reforms were either not implemented or could not achieve the desired results. Therefore, this study highlights the experiences of different societal stakeholders and the various reasons behind the weak implementation process of reforms. The study also highlights the lack of political administration dichotomy and the role politics and bureaucracy play in resisting any progressive change in the system. This study follows the qualitative approach, and interviews were conducted with various police officers, legal advisors, and media personnel, supported by content analysis of the newspaper. The findings indicate that the political power and decentralized decision-making highly constrain the department of Punjab police. Furthermore, the causal factors are categorized into themes, ie, the economy explains the low budgetary allocations, weak governance structure highlights the lack of implementation and accountability, and politicized policing explains the deep-rooted involvement of politicians and bureaucrats in administrative functions of Punjab police.
http://www.joi.isoss.net/wp-content/uploads/2023/04/12-J-ISOSS-9-1-Galley-Proof.pdf

5. **Waheed, S., Azhar, A., Sial, M. H., & Faran, M.** (2023). **The relational factors in managing rural water supply in Punjab, Pakistan.** *Water Policy*, 25(6),545-563. https://doi.org/10.2166/wp.2023.116. **Seemi Waheed, Aisha Azhar (SGS) Maqbool H. Sial, Muhammad Faran (Economics and Statistics/HSM) Date of Publication: May 2023 HJRS: W (Bronze)**

The Punjab Public Health Engineering Department (PHED) and community-based organizations (CBOs) collaboratively manage the rural water supply (RWS) system in Punjab, Pakistan since the mid-nineties. In a command-and-control administration, a collaborative approach to managing RWS is atypical. The study addresses this gap by analyzing the relational behavior as a monitoring and enforcement mechanism to ensure community compliance with government-produced institutions for managing RWS. Four focus group interviews were conducted with the CBO members and the survey of households from the same villages. Using the partial-least square structural equation model (PLS-SEM), the mediating influence of frequent communication, commitment of users, and shared meaning on community compliance with institutions was analyzed. The integrated results from the two methods imply that trained CBOs better self-organize, as they communicate frequently with the community members. It is recommended that for the sustainability of the RWS system, regular government support for CBOs underscores the success of collaborative collective action, though trained CBOs better manage RWS in weak monitoring by the government.
https://iwaponline.com/wp/article/25/6/545/95134/The-relational-factors-in-managing-rural-water

6. **Usman, M., Gul, A. A., Abbas, S., Rabbani, U., & Irteza, S. M. (2023). Identifying morphological hotspots in large rivers by optimizing image enhancement.** *Remote Sensing Letters,* **14(11), 1173-1185. doi: 10.1080/2150704X.2023.2275550. Ahmad Ali Gul (SGS) Date of Publication: November2023 HJRS: W (Honorable Mention)**
Limited access to observe in-situ sediment changes requires viable means for quantifying sediment transport in large rivers for effective management of changes in river channels. This study developed a remote sensing-based framework to identify erosion hotspots by magnifying sediment concentration from Sentinel-2 and Landsat-8/9 multispectral images of the Brahmaputra River and the Indus River. First, uncorrelated independent bands were produced to boost the spectral information using the Principal Component Analysis (PCA). The optimal band composite was then identified by applying the Optimum Index Factor (OIF) on the Principal Components (PCs). This approach determined a 3-PCs composite having the highest variance with the least correlation to highlight active morphological changes during flood times. The results of the study reaffirm the significance of the minor PCs (PC4, PC5 and PC6) to characterize the small variation in the data, whereas the main PCs depict the majority of the brightness values around means. The approach was applied to Sentinel-2 imagery acquired on September 2018 in the Brahmaputra River, and Landsat-8/9 images of 2015 and 2022 in the Indus River during flood time to enhance and identify active riverbank erosion hotspots. Precise and timely monitoring of erosion-prone areas can support the control of riverbank erosion and improve soil conservation practices.
https://www.tandfonline.com/doi/full/10.1080/2150704X.2023.2275550

School of Law and Policy (SLP)

1. **Qaiser. K., Jabeen, A., & Sheikh, M. F. Framework against Inequality and Gender Hierarchy as a Tool for Organizational Change in Different Societies.** *International Review of Basic and Applied Sciences,* **11(1), 18-26. Khushbakht Qaiser (SLP) Date of Publication: January 2023 HJRS: Y (Null)**
This article pursues to investigate the enduring discourse of gender equality and patriarchal order as an arduous task to achieve in the humanitarian sector. It seeks to find out the aspects of inequality and sexual hierarchy and their role in the patriarchy along with focusing on the socio-political and cultural attributes of gender specific role which contributes to the ongoing incidents of torture, rape and murder of less dominating gender which is unharmonious with the humanitarian set of principles. Several interpretations and terminologies can be seen, discussing the equality between women and men, but here when it comes to inequality, there must not be any disparity. For instance, equality between all men and women/all people, irrespective of gender and sexuality must be highlighted.
https://irbas.academyirmbr.com/paper_details.php?id=1146

2. **Hameed, U., Qaiser, K., & Qaiser, Z. (2023). A Comparative Study of National Laws Dealing with Terrorism in Broad and Narrow Senses, and their Implications for Civil Liberties, Especially in the US, UK and Pakistan.** *Journal of Peace, Development and Communication***, 07(02), 172–190. doi.org/10.36968/JPDC-V07-I02-14. Khushbakht Qaiser (SLP) Date of Publication: January 2023 HJRS: Y (Null)**
National strategies to combat terrorism differ from state to state relative to their capacity and general principles of the national justice system. For this reason, some states implement broad definitions of terrorism authorizing preventive action, even so no crime is committed. In contrast, there are states which adopt narrow definitions of terrorism to safeguard due process rights of the suspects. While this approach may be more humane, it undermines the ability of states to act in anticipation of a terrorist attack. Clearly, the emphasis of the former strategy is to preserve national security even at the cost of civil liberties. In reverse, the latter approach aims at preserving civil liberties despite the threat of terrorism. Recently, the Supreme Court of Pakistan has re-defined terrorism to narrow down its scope, making it applicable to those acts only which are

motivated to coerce a government or intimidate a civilian population to advance a religious, sectarian and ethnic objective. In furtherance of the new interpretation, these courts will be trying only most serious cases, such as those involving attacks on state infrastructure or state personnel. Apart from these, all other acts will be deemed regular crimes for want of motive to commit terrorism. This article will elucidate whether states driven by national security concerns define the word terrorism broadly criminalizing even the preparatory acts, such as, making donation to the charitable arm of a designated entity. And which aspects regarding the above provides a narrow approach.

https://pdfpk.net/pdf/wp-content/uploads/2023/07/520-14.pdf

School of Design and Textile (SDT)

1. **Islam, S. R., Patoary, M. K., Yousif, A. H., Chaudary, A., Estifanos, H. D., Naveed, T., & Shao, H. (2023). SiO2 aerogels (SAs) coating on the surface of 3D weft-knitted spacer fabrics (WKSFs) used as sorbent in oil spill cleanup.** *Journal of Water Process Engineering,* **51, 103451. doi: 10.1016/j.jwpe.2022.103451. Tayyab Naveed (SDT) Date of Publication: February 2023 HJRS: W (Bronze)**
Oily wastewater and advanced manufacturing organic pollutants are posing a serious global threat to the environment. Herein, SiO2 aerogels prepared from tetraethylorthosilicate (C8H20O4Si) by sol-gel method were coated 5 various 3D weft-knitted spacer fabrics (WKSFs) to study and compare the oil spill cleanup behavior in different temperatures (20 °C, 30 °C, 40 °C, 50 °C, and 60 °C), oil, and water medium. SEM and BET were used to observe the surface morphology and specific surface area of WKSFs. FTIR-ATR and XRD for the microstructure of fabrics were used to characterize the surface changes induced by the silica aerogel coating. TGA was performed to clarify the thermal degradation of WKSFs. The findings demonstrated that entirely the sorbents, particularly sorbent 2, ensured significant oil weight gain (%) and retention rate (%) in all cases. Sorbent 2 (with a weight of 350 g/m2, a thickness of 3 mm, a stitch density of 1.58/inch, a fabric density of 117 kg/m3, and a spacer yarn arrangement angle of 79.96°) showed a higher oil weight gain (%) and retention rate (%) of ((763 ± 2.31 %, 758 ± 2.08 %, and 740 ± 2.52 %) and (88.92 ± 0.87 %, 88.74 ± 0.68 %, and 85.88 ± 1.02 %)) for vegetable oil and ((698 ± 2.65 %, 693 ± 2.52 %, and 673 ± 2.65 %) and (91.18 ± 0.83 %, 90.82 ± 0.75 %, and 88.16 ± 0.90 %)) for engine oil in temperature, oil, and water medium, respectively. The statistical study revealed that coated WKSFs performed significantly at the 0.05 level (P = 0.000). The outcomes also revealed that the varieties of 3D fabric physical structures, specific surface areas, pore sizes, pore volumes, porosity ratios, water contact angles, silica aerogel add-on %, surface roughness, thermal behaviors, temperatures, and oil characteristics all played a significant effect on oil weight gain and retention capacity, especially in the oil spill cleanup performance.
https://www.sciencedirect.com/science/article/pii/S2214714422008959

2. **Mohsin, M., Sardar, S., Akhtar, K. S., Anam, W., Ijaz, S., Afraz, N., & Jamil, A. (2023). Performance enhancement of water and energy efficient foam dyeing and finishing through different foaming agents.** *Journal of Natural Fibers*, **20**(1), 2164102. doi: 10.1080/15440478.2022.2164102. **Nadeem Afraz (SDT) Date of Publication: January 2023 HJRS: X (Clay)**
Foam dyeing and finishing is an ecofriendly alternative to conventional padding in textile processing. However, the generation and application of foam is a challenging task especially for wide range of dyes and chemicals due to technical and compatibility issues. In the foam dyeing and finishing process, foaming agent plays a central role. However, there is a lack of research on the compatibility of range of foaming agents with the range of different dyes and finishes. Therefore, in this research, foam was generated and optimized for seven different colorants including three reactive dyes, two direct dyes, and two pigments, and three different finishes including softener, oil and water repellent, and fire retardant using three different foaming agents separately. These foaming agents are alkyl dimethyl amine oxide, alkane sulfonate sodium salt, and ethoxylated decanol. Foam was successfully generated, optimized, and applied on the cotton fabric. Performance of the fabric samples treated with padding and three foaming agents for each dye and finish was evaluated. In most of the foam dyeing and foam finishing recipes, alkane sulfonate sodium salt-based foaming agent indicated the best dyeing and finishing properties and its performance was comparable with conventional padding in addition to significant savings of water, chemicals, and energy.
https://www.tandfonline.com/doi/full/10.1080/15440478.2022.2164102

3. **Jiang, L., Zulifqar, A., Hai, A. M., Anwar, F., Hu, H., Liu, F., & Chen, H. (2023). Effect of using alternate elastic and non-elastic yarns in warp on shrinkage and stretch behavior of bi-stretch woven fabrics.** *Journal of Engineered Fibers and Fabrics*, **18**, 15589250221137897.doi: 10.1177/15589250221137897. **Faiza Anwar (SDT) Date of Publication: 12 January 2023 HJRS: X (Clay)**
Stretch woven fabrics are known for their elastic and recovery properties. To date, they found many interesting applications from simple jeans to complex fabric structures with functional properties for example bi-stretch auxetic woven fabrics, compressions garments and stretchable textile carriers for healthcare applications. Many studies have been carried out on the physical, mechanical and comfort properties of stretchable knitted and

woven fabrics. However, to identify combination of yarns with different stretch properties and other design parameters required to meet multiple objectives in the production and usage of bi-stretch woven fabrics is an area that has been taken up by fabric scientists recently. This study compared the effect of using elastic yarns and alternate elastic and non-elastic yarns in warp on the properties of bi-stretch woven fabrics while using elastic yarns in weft direction. It was found that shrinkage of the fabrics made of elastic yarns was higher along the warp direction as compared to that in weft direction due to shrinkage balancing effect; however, in case of fabrics made of alternate elastic and non-elastic yarns in warp the shrinkage behavior was exact opposite. The comparison of shrinkage for different weave patterns revealed that satin had the highest shrinkage followed by twill and plain, due to least number of interlacements in satin among these three patterns.
https://journals.sagepub.com/doi/full/10.1177/15589250221137897

4. **Islam, S. R., Hasan, M. M., Shen, X., Naveed, T., Patoary, M. K., Jiang, J., & Zareen, A. (2023). Sustainable decoloration of polluted water through cellulosic TiO2 nano-crystalline material composite using sono synthesis. *The Journal of the Textile Institute*, *114*(1), 75-87.doi; 10.1080/00405000.2021.2022827. Tayyab Naveed (SDT) Date of Publication: January 2023 HJRS: X (Honorable Mention)**
Titanium dioxide (TiO2) nanomaterials are noteworthy for their valuable photoactive properties and applications. Their cellulosic nano-particles could be used for the decoloration of polluted water since they are eco-friendly. Therefore, this study investigated the cellulose powder coated with a layer of nano-crystalline-titanium dioxide (TiO2) through the sonosynthesis process to minimize the hazardous of contaminated water containing reactive dyes. Powder X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), and Zeta Potential Spectroscopy were utilized to examine the subsequent composition. Decoloration of the compositions was perceived through Ultra Violet (UV) light at 30 min. It was observed that the composition simultaneously improved the quality (cleaning) of polluted water. It absorbed the reactive dye hastily in 2 min which is the fastest time reported up to now and transformed the polluted water quality into hygienic condition. Additionally, the cleaning efficiency of the polluted water was increased with the number of functional repeats. Thus, assisted in an eco-friendly remedy of wastewater and minimizing the pollution.
https://www.tandfonline.com/doi/full/10.1080/00405000.2021.2022827

5. **Ullah, A., Sun, L., Wang, F. F., Nawaz, H., Yamashita, K., Anwar, F., . . . Kim, I. S. (2023). Eco-friendly bioactive β-caryophyllene/halloysite nanotubes loaded nanofibrous sheets for active food packaging. *Food Packaging and Shelf Life, 35*. doi: 10.1016/j.fpsl.2023.101028. Faiza Anwar (SDT) Date of Publication: March 2023 HJRS: W (Silver)**
We fabricated Zein/polycaprolactone (PCL) electrospun nanofiber sheets incorporated with different concentrations of β-caryophyllene loaded into halloysite (HNT) nanotubes as an eco-friendly, bioactive food packaging material. We obtained heterogeneous fibers with flat ribbon-like morphology. The loading of β-caryophyllene/HNT increased the fiber diameters from ~900 nm to ~1100 nm. The nanofiber showed improved thermal and mechanical performance upon incorporating β-caryophyllene/HNT. The water vapor permeability decreased due to a decrease in the porosity of the nanofiber sheets. The β-caryophyllene/HNT loaded nanofiber showed good DPPH free radical scavenging and was effective against both gram-positive *B.subtilis* and gram-negative *E.coli* bacteria subjected to agar disc diffusion test and time-kill study. The initial release of β-caryophyllene from the 5%, 10%, and 20% loaded nanofiber sheets was ~22%, ~25%, and ~31% within 12 h, and ~63%, ~69%, and ~77% after 120 h indicating a sustained slow release for long term bioactivity. The WST-1, LDH, and cell adhesion properties of β-caryophyllene/HNT-loaded nanofiber render them biocompatible and nontoxic. Composting experiment reveals the eco-friendly nature of the fabricated nanofiber sheets as they all lose their fibrous morphology after 21 days of composting and a mass loss of ~65% for Zein/PCL nanofibers and ~63%, ~55%, and ~48% for 5%, 10%, and 20% β-caryophyllene/HNT loaded Zein/PCL nanofiber sheets. During the application test for postharvest quality preservation of strawberries, the strawberries covered in Zein/PCL-20 showed the best-preserved quality after 4 days of storage at 25 °C in 40% humidity. The physicochemical, biological, and application tests demonstrated the potential of the prepared nanofiber sheets as a potential bioactive food packaging material.
https://www.sciencedirect.com/science/article/pii/S2214289423000054

6. **Khan, M. R., Liao, S., Farooq, A., Naeem, M. A., Wasim, M., & Wei, Q. (2023). Regeneration and modification of cellulose acetate from cigarette waste: Biomedical potential by encapsulation of tetracycline hydrochloride. *International Journal of Biological Macromolecules,* 250. doi: 10.1016/j.ijbiomac.2023.126266. Muhammad Awais Naeem (SDT) Date of Publication: October 2023 HJRS: W (Gold)**
Cigarette waste are pervasive litter on Earth, posing a major threat to organisms and ecosystems. However, these waste contain cellulose acetate (CA) and can be recycled, transforming into raw materials for new products. Polymers like CA can be used in biomedical applications as drug carriers and scaffolds for drug release. In this study, cigarette filters waste was collected, recycled and used for fabricating the nanofibrous membrane

of cellulose acetate nanofibers (CFCA) through electrospinning technique. Tetracycline hydrochloride (TC) was encapsulated in the nanofibers to prevent bacterial infections. Various analyses were conducted: Scanning Electron Microscope (SEM), Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction Analysis (XRD) and Thermogravimetric analysis (TGA). CA and CFCA exhibited high water uptake properties and exhibited similar breaking stress and strain values. Both CA and CFCA effectively acted as stable drug carriers, with sustained in vitro drug release. Antibacterial activity was demonstrated by the drug-loaded CA and CFCA nanofibers against, Gram-positive bacteria Staphylococcus aureus and Gram-negative bacteria Escherichia coli. Based on their cytotoxicity evaluations on mouse fibroblast cells (L929), CA and CFCA fibrous mats demonstrated no cytotoxicity and similar cell viability results. Consequently, the TC-loaded nanofibers made from CA and CFCA exhibited suitable properties for wound healing applications.
https://www.sciencedirect.com/science/article/abs/pii/S0141813023031628

7. **Anwar, F., Abbas, M., Malik, M. H., Cheema, A. A., Tariq, S., Afzal, W., & Khan, A.** (2023). **Development of Mosquito-Repellent Camouflage Fabric Using Eucalyptus Oil with Moringa oleifera Gum.** *ChemEngineering,* **7(4). doi: 10.3390/chemengineering7040064.** Faiza Anwar, Mudassar Abbas, Mumtaz Hasan Malik, Amna Aziz Cheema, Suniya Tariq , Warda Afzal, Asfandyar Khan (SDT) Date of Publication: August 2023 HJRS: X (Clay)

Military personnel are exposed to several harsh conditions and mosquitos in mountains and wild forests. Mosquito-repellent textiles can help them to cope with such conditions. The present research work established a sustainable approach for fabricating microcapsules from Eucalyptus oil, Moringa oleifera, and Arabic gum via a complex coacervation method. Moringa oleifera and Arabic gums were utilized as the outer shell of the microcapsules, whereas the core part was made of Eucalyptus oil in different concentrations. The military camouflage-printed polyester/cotton (PC) blended fabric was coated with the as-prepared microcapsules using the pad–dry–cure technique. The surface morphology of the microcapsules was examined using an optical microscope and scanning electron microscope (SEM), and the coated fabric's mosquito-repellent property was investigated using a specified cage test according to a standard testing protocol. The water absorbency and air permeability of the treated samples were also evaluated in order to learn about the comfort properties. The cage test results revealed that the coated fabric had a good tendency to repel the mosquitoes used in the cage test. In addition, the coated fabric showed significant durability even after several rigorous washing cycles. However, the application of microcapsules to the fabric slightly affected the water absorbency and air permeability of the fabric. This study presents a novel sustainable approach for fabricating microcapsules from the mentioned precursors and their application in the field of textiles, particularly for military purposes.
https://www.mdpi.com/2305-7084/7/4/64

School of Food and Agricultural Sciences (SFAS)

1. **Fu, X., Li, X., Ali, M., Zhao, X., Min, D., Liu, J., ... & Zhang, X. (2023). Methionine sulfoxide reductase B5 plays vital roles in tomato fruit defense response against Botrytis cinerea induced by methyl jasmona.** *Postharvest Biology and Technology.* **196,112165 doi: 10.1016/j.postharvbio.2022.112165.** Maratab Ali (SFAS) Date of Publication: February 2023 HJRS: W (Platinum)

A methionine sulfoxide reductase (Msr) gene is identified in tomato fruit, and its protein's identity as MsrB5 was determined by phylogenetic analysis and multiple sequence alignment. Correspondingly, the role of SlMsrB5 in methyl jasmonate (MeJA)-mediated defense to B. cinerea in tomato fruit was investigated by using 0.05 mM MeJA treatment on SlMsrB5-silenced fruit during storage. The results showed that MeJA treatment upregulated total phenols and flavonoids, disease resistance enzymes activities, and expression of pathogenesis-related (PR) genes, including SlPR1/2a/2b/3a/3b/STH2 in tomato fruit. Additionally, MeJA inhibited the increase of hydrogen peroxide and superoxide anions by improving antioxidant enzyme activities and the ascorbic acid-glutathione (ASA-GSH) cycle. Similarly, MeJA induced the accumulation of jasmonic acid and the transcriptions of its signal transduction-related genes (SlCOI1 and SlMYC2), which could lead to the transcription of disease response-related marker genes such as SlPI I and SlPI II. These MeJA-regulated changes may contribute to improved disease resistance in tomato fruit. However, SlMsrB5 silence reduced the effect of MeJA on the above parameters and caused severer disease occurrence in the SlMsrB5-silenced + MeJA treated group than in MeJA treated group, probably because the low levels of SlMsrB5 transcription could not restore the activity of defense and antioxidant-related enzymes. Furthermore, correlation analysis revealed that the above effects regulated by MeJA were highly correlated with SlMsrB5 transcript levels. Therefore, these findings provide insight on SlMsrB5's role in MeJA-mediated tomato immune responses to B. cinerea by regulating defensive enzymes and genes, antioxidant capacity, and the JA signaling pathway.
https://www.sciencedirect.com/science/article/pii/S0925521422003337

2. **Aslam, M. Q., Hussain, A., Akram, A., Hussain, S., Naqvi, R. Z., Amin, I., ... & Mansoor, S. (2023). Cotton Mi-1.2-like Gene: A potential source of whitefly resistance.** *Gene,* **851,** 146983. **doi:**

10.1016/j.gene.2022.146983. Athar Hussain (SFAS) Date of Publication: January 2023 HJRS: W (Honorable Mention)

Whitefly (Bemisia tabaci) inflicts tremendous yield losses to cotton crops in many parts of the world by sap-sucking and transmitting viral diseases. The tomato-associated Mi-1.2 gene has been successfully deployed in tomato cultivars to attain whitefly resistance. In the current study, putative Mi-1.2-like orthologs were identified in five whitefly hosts and functionally validated through virus-inducing gene silencing (VIGS) in cotton plants. The expression profiling and qPCR results depicted differential regulation of the Mi-1.2-like gene in various tissue types and under different biotic and abiotic stresses, especially in whitefly susceptible and resistant cotton plants. The upregulation of the Mi-1.2-like gene (Gadrp RPP-13 Like gene) was observed at 24 h and 48 h post-whitefly exposure (PWFE) in whitefly resistant (FDH-228) and tolerant (Mac7) cotton plants as compared to susceptible plants of Coker-312. However, delayed expression was recorded at 72 h of PWFE in Coker-312 plants. In TRV based gene silencing experiment, silencing of the Mi-1.2-like gene, significantly enhanced the whitefly infestation on both whitefly-resistant and susceptible cotton genotypes. Based on these results, we conducted the evolutionary analysis of Mi-1.2-like orthologs among cotton, cassava, tomato, papaya, and cucumber hosts. This indicated that cotton associated Mi-1.2 like gene has a close relation with cassava and tomato. These results suggested that Mi-1.2-like R genes could be the potential candidate for deriving whitefly resistance response in cotton plants.

https://www.sciencedirect.com/science/article/pii/S0378111922008034

3. **Akram, U., Sahar, A., Sameen, A., Muhammad, N., Ahmad, M. H., Khan, M. I., ... & Rahman, H. U. U. (2023). Use of Fourier transform infrared spectroscopy and multi-variant analysis for detection of butter adulteration with vegetable oil.** *International Journal of Food Properties*, *26*(1), 167-178.doi: 10.1080/10942912.2022.2158860. Hafiz Ubaid-ur-Rehman (SFAS) Date of Publication: Jan-Dec 2023 HJRS: W (Bronze)

During butter manufacturing, adulteration of animal and plant fats is one of the major issues in dairy industries. In dairy products, there is a huge potential in spectroscopic techniques such as Fourier transform infrared spectroscopy (FTIR) for the rapid determination of various adulterants. These spectroscopic techniques are reliable, rapid, and accurate as compared to traditional methods. Therefore, the aim of this study was to measure the potential of FTIR spectroscopy along with mathematical modeling for the detection of vegetable oil in butter samples. In this study, different levels of vegetable oil were added to the butter. FTIR spectra of different samples were collected and processed using principal component analysis (PCA) as well as partial least square (PLS) regression. PCA results postulated that 98% of the total variance was accounted by the first two principal components (PC) with a predominance of PC 1 (85%). PLS regression analysis showed values of R^2 for calibration as 0.95 and R^2 for validation as 0.90 which described good prediction efficiency of vegetable oil adulteration through FTIR data. The present work summarized that Fourier transform infrared spectroscopy along with multivariate analysis can be used to measure the adulteration in butter.

https://www.tandfonline.com/doi/full/10.1080/10942912.2022.2158860

4. **Akhlaq, M., Farooq, M. U., Ali, S. W., Amir, M., Siddique, F., Javed, M. A., ... & Munir, M. M. (2023). Characterization of quinoa-wheat flour blend for the preparation of dry cake.** *Food Science and Technology*, *43*.doi: 10.1590/fst.14722. Muhammad Mubashir Munir (SFAS) Date of Publication: January 2023 HJRS: W (Honorable Mention)

The current study aimed at the quinoa-wheat composite flour's characterization (including total phenolics, total flavonoids, and antioxidant activity) as well as its effect on dry cake sensory quality. Findings revealed a rise in ash content, fat, protein, and crude fiber of composite-flour (0.56-1.23%, 1.13-1.76%, 10.14-11.02%, and 0.23-1.04%, respectively) with an increase of quinoa flour (5-20%). The addition of quinoa flour to the composite flour enhanced cake texture (0.26-.70 kg), but it also decreased L-value of cake crumb (55.29-50.73). Total flavonoids (56.44-59.48 mg QE/100 g) and antioxidant activity (4.66-9.76%) increased as quinoa flour was increased, whereas total phenolics (8.68-5.46 mgGAE/g) decreased. By mixing wheat flour with quinoa flour, the nutritional value of wheat flour was increased. During sensory evaluation, the cake made from composite-flour containing 10% quinoa-flour scored the highest overall acceptability. Sensory quality of last two treatments, which included 15% and 20% quinoa flour, was lower. Quinoa seeds had a better nutritional profile than wheat, with higher levels of amino acids, minerals, dietary fibers, and oil. Since wheat is a staple food in Pakistan, adding quinoa-flour would help to reduce malnutrition in Pakistan. Furthermore, no previous research on the suitability of quinoa-wheat flour for dry cake has been conducted on Pakistani wheat flour.

https://www.scielo.br/j/cta/a/K5spW9T9zrFtwpbsdRLgfhw/

5. **Ramadhan, M. G., Khalid, N., Uemura, K., Neves, M. A., Ichikawa, S., & Nakajima, M. (2023). Efficient water removal from water-in-oil emulsions by high electric field demulsification.** *Separation Science and Technology*, *58*(1), 164-174.doi: 10.1080/01496395.2022.2086882. Nauman Khalid (SFAS) Date of Publication: January 2023 HJRS: X (Clay)

Following hydrothermal liquefaction (HTL), microalgae bio-crude products contain approximately 5–20% water. High electric field (HEF) demulsification can separate water from settled oil based on electrostatic charge. In this study, we investigated the effect of HEF demulsification on water-in-oil (W/O) emulsions as a model bio-crude emulsion using a batch-type coalescer. Three W/O emulsions of soybean oil, medium-chain triglyceride (MCT) oil, and castor oil (10 wt% water content) were prepared and exposed to an alternating current electric field at different voltages (1000–4000 V) and frequencies (50–2000 Hz) for 1 h. Water content in castor oil samples declined to 9.6–8.6 wt% from the initial 10 wt% as the applied voltage increased at 50 Hz after 1 day storage. A noticeable difference in the remaining water in the oil occurred between samples exposed to 50 Hz and 500 Hz at 4000 V. The water content declined to 1.8 and 1.4 wt% (MCT oil); 4.3 and 1.8 wt% (soybean oil); and 8.4 and 8.1 wt% (castor oil) at 50 Hz and 500 Hz, respectively, at 4000 V. Moreover, HEF demulsification consumed negligible energy compared to centrifugation (1.37×10^3 J/kg versus 2.71×10^{10} J/kg).
https://www.tandfonline.com/doi/full/10.1080/01496395.2022.2086882

6. **Afreen, A., Ahmed, Z., Khalid, N., Ferheen, I., & Ahmed, I. (2023). Optimization and cholesterol-lowering activity of exopolysaccharide from Lactiplantibacillus paraplantarum NCCP 962.** *Applied Microbiology and Biotechnology,* **107**(4), 1189-1204. doi: 10.1007/s00253-023-12372-z. **Nauman Khalid (SFAS) Date of Publication: February 2023 HJRS: W (Silver)**

Exopolysaccharides (EPSs) are biological polymers with unique structural features have gained particular interest in the fields of food, chemistry and medicine, and food industry. EPS from the food-grade lactic acid bacteria (LAB) can be used as a natural food additives to commercial ones in the processing and development of functional foods and nutraceuticals. The current study was aimed to explore the EPS-producing LAB from the dahi; to optimize the fermentation conditions through Plackett–Burman (PB) and response surface methodology (RSM); and to study its physicochemical, rheological, functional attributes, and cholesterol-lowering activity. Lactiplantibacillus paraplantarum NCCP 962 was isolated among the 08 strains screened at the initial stage. The PB design screened out four independent factors that had a significant positive effect, i.e., lactose, yeast extract, CaCl2, and tryptone, while the remaining seven had a non-significant effect. The RSM exhibited lactose, yeast extract, and CaCl2, significantly contributing to EPS yield. The maximum EPS yield (0.910 g/L) was obtained at 6.57% lactose, 0.047% yeast extract, 0.59% CaCl2, and 1.37% tryptone. The R2 value above 97% explains the higher variability and depicts the model's validity. The resulted EPS was a heteropolysaccharide in nature with mannose, glucose, and galactose monosaccharides. FTIR spectrum reflected the presence of functional groups, i.e., O–H, C–H, C = O, C–O–H, and CH2. SEM revealed a porous and rough morphology of EPS, also found to be thermally stable and negligible weight loss, i.e., 14.0% at 257 °C and 35.4% at 292.9 °C was observed in the 1st and 2nd phases, respectively. Rheological attributes revealed that strain NCCP 962 had high viscosity by increasing the EPS concentration, low pH, and temperature with respectable water holding, oil capacities, foaming abilities, and stability. NCCP 962 EPS possessed up to 46.4% reduction in cholesterol concentration in the supernatant. Conclusively, these results suggested that strain NCCP 962 can be used in food processing applications and other medical fields.
https://link.springer.com/article/10.1007/s00253-023-12372-z

7. **Anis, Z. B., Iqbal, R., Nazir, W., & Khalid, N. (2023). Technological advances in supply chain of processed foods during COVID-19: a review.** *Arab Gulf Journal of Scientific Research, 41*(2), 158-174. doi: 10.1108/AGJSR-09-2022-0164. **Zainab Bintay Anis, Rashid Iqbal, Wahab Nazir and Nauman Khalid (SFAS) Date of Publication: March 2023 HJRS: Y (Null)**

Purpose – The novel coronavirus (SARS-CoV-2) variant of 2019 has taken more than 3.8 million lives according to the World Health Organization. To stop the spread of such a deadly and contagious disease, lockdown of varying nature was imposed worldwide. Lockdown, preventive techniques and observation of standard operating procedures (SOPs) have effectively decreased the spread of contagious diseases but have affected various businesses and industries economically. The food industry has been hit hard by different restriction parameters, due to which a disruption in food supply and demand was observed. Therefore, this study aims to study this disruption in the supply chain of processed food. Design/methodology/approach – A comprehensive review was conducted on PubMed, Google Scholar, and Scopus to locate articles on processed foods, food delivery and supply chain. The selected articles were evaluated using the context analysis method. Findings – The pandemic situation has increased the consumption and demand for processed food products from retail stores, and decreased the demand for food service products. These circumstances called for technological advancement in the field of food supply from farm to fork. This study reviews research articles, policies and secondary literature. Several advances have been made to deliver safe, nutritious and wholesome food to consumers. Block chain-based food supply chains, value stream mapping, sustainable supply chain domain and online ordering systems via mobile apps have been discussed in correspondence with information and communication technology (ICT) during COVID-19. Research limitations/implications – This study concludes that the use of advanced software and its adequate knowledge by suppliers, logistics companies and consumers have assisted in handling shocks to the global food system and provided in-time food delivery, traceability, database information and securely processed food to consumers. Originality/value – This study shows the

effects of COVID-19 pandemic on global food systems; disruption in food demand and supply chain is overlooked and changed; use of technological advances in food supply chain to tackle pandemic; online food ordering system gained popularity and improved technically.
https://www.emerald.com/insight/content/doi/10.1108/AGJSR-09-2022-0164/full/html

8. **Asghar, W., & Khalid, N.** (2023). Nutrigenetics and nutrigenomics, and precision nutrition. *Nutrition and Health, 29*(2), 169-170. doi: 10.1177/02601060231167228. **Waqas Asghar, Nauman Khalid (SFAS) Date of Publication: June 2023** HJRS: Y (Null) **(Editorial)**
https://journals.sagepub.com/doi/full/10.1177/02601060231167228

9. **Asghar, W., & Khalid, N.** (2023). Sustainable nutrition – healthy populations. *Nutrition and Health, 29*(1), 3-4. doi: 10.1177/02601060231159915. **Waqas Asghar, Nauman Khalid (SFAS) Date of Publication: March 2023** HJRS: Y (Null) **(Editorial)**
https://pubmed.ncbi.nlm.nih.gov/36814415/

10. **Haider, S., Akhtar, A., & Khalid, N.** (2023). Quality Assessment of Fried Oils from Different Street Food Vendors and Restaurants in Different Areas of Gilgit, Pakistan: Cooking Oil Quality in Northern Areas of Pakistan. *Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences*, *60*(1), 71–82. https://doi.org/10.53560/PPASB(60-1)748. **Sara Haider, Aqsa Akhtar, Nauman Khalid (SFAS) Date of Publication: March 2023** HJRS: X (Null)
The study was designed to estimate the quality of the frying oils used in northern areas of Pakistan. A cross-sectional analysis was performed to investigate the behavior and common practices of street food vendors (SFVs) regarding oil selection, food preparation, and awareness of rancid oil on human health. Seventy-Eight (78) commercial fried oil samples were evaluated based on the free fatty acid (FFAs), peroxide value (PV), moisture contents (MC), total polar matter (TPM), color, and iodine value (IV). The analysis showed that FFAs, PV, TPM, color, and IV significantly deviated from standard values provided by Pakistan Standard Quality Control Authority, (PSQCA) Pakistan. The SFVs used low-quality oil because of low price and ease of availability over quality, frying oil was changed infrequently and blended with new oil. Furthermore, the majority of SFVs were unaware of the hazards of rancid oil to human health, food handling practices were unsanitary, and cleaning methods were ineffective. Quality control, legislation, and SFVs safety and hygiene training are the most critical requirements to improve the overall quality of fried street foods in Gilgit, Pakistan.
http://www.ppaspk.org/index.php/PPAS-B/article/view/781/545

11. **Irfan, S.,** Murtaza, M. A., Mueen ud Din, G., Hafiz, I., Murtaza, M. S., Rafique, S., . . . Mohamed Ahmed, I. A. (2023). Physicochemical, microbial, and functional attributes of processed Cheddar cheese fortified with olive oil–whey protein isolate emulsion. *Food Science and Nutrition, 11*(3), 1247-1256. doi: 10.1002/fsn3.3159. **Shafeeqa Irfan (SFAS) Date of Publication: March 2023** HJRS: W (Bronze)
Olive (*Olea europaea* L.) has triacylglycerols, phenolics, and other antioxidants in its composition playing significant roles in maintaining health and reducing the onset of diseases. This study aimed to analyze the quality, antioxidant, textural profile, and sensory properties of processed Cheddar cheese fortified with 0%, 5%, 10%, 15%, and 20% (v/w) olive oil–whey protein isolate emulsion during 60 days of storage period. The results showed that processed cheese had significantly higher ($p < .05$) antioxidant activity, and total phenolic and flavonoids contents, whereas nonsignificant increase ($p > .05$) in moisture and acidity while decreasing tendencies in pH, fat, protein, and ash contents. Sensory analysis showed that processed Cheddar cheese with 5% emulsion had higher taste, aroma, texture/appearance, overall acceptability scores, and hardness. Conclusively, results indicated that olive oil–whey protein isolate emulsion could be beneficial for manufacturing and commercializing processed cheeses, analogs, or spreads with improved nutritional value and sensory characteristics.
https://onlinelibrary.wiley.com/doi/epdf/10.1002/fsn3.3159

12. **Manzoor, S., Asghar, W., Khan, R. S., & Khalid, N.** (2023). Assessing the Effectiveness of Saponins from Alfalfa (Medicago sativa L.) to Mitigate Cypermethrin Residues in Apples. *Journal of the Chemical Society of Pakistan, 45*(1), 64-71. doi: 10.52568/001197/JCSP/45.01.2023. **Soban Manzoor, Waqas Asghar, Rao Sanaullah Khan, Nauman Khalid (SFAS) Date of Publication: February 2023** HJRS: Y (Null)
Pesticide residues on fruits and vegetables are of major health concern around the world. Some of these pesticide residues are extremely toxic and can become a major causative factor for various diseases such as cardiovascular disorders (CVDs), lung, endocrine, and nervous system damage, as well as the circulatory system, and reproductive system problems. This study was aimed at investigating the effectiveness of saponins isolated from alfalfa (Medicago sativa L.) seeds for mitigating cypermethrin residues on apples (Malus domestica Borkh.) in comparison to tap water, citric acid, and baking soda. Cypermethrin concentration applied to apples was 1 ml/L. After washing the apples with varying concentrations of different washing solutions, analysis for cypermethrin residues was performed using a UV/VIS spectrophotometer at a wavelength of 535 nm. The

maximal removal of residues recorded for baking soda, tap water, and citric acid was 92.98, 72.50, and 74.59 % respectively. Saponins exhibited a maximum of 13.90 % of residual removal which was not as effective as other washing agents.
https://jcsp.org.pk/issueDetail.aspx?aid=9466f28b-2749-440d-ba85-bd7778fa6619

13. **Min, D., Zhao, J., Bodner, G., Ali, M., Li, F., Zhang, X., & Rewald, B. (2023). Early decay detection in fruit by hyperspectral imaging–Principles and application potential.** *Food Control, 152.* **doi: 10.1016/j.foodcont.2023.109830.** Maratab Ali (SFAS) Date of Publication: October 2023 HJRS: W (Gold)
Although fruits are rich in health-promoting properties and associated with several health benefits to humans, they are highly susceptible to pathogen infection which results in the deterioration of fruit quality and food waste and subsequent increased economic losses. Consequently, the development of techniques to detect decaying fruits at an early stage of infection during the postharvest period is an ecological and economic necessity. The use of hyperspectral imaging has recently been recognized as an effective and non-destructive approach for assessing fruit quality. In this article, fundamental knowledge of hyperspectral image acquisition, image sensing modes and hardware, and basic imaging processing techniques are summarized. Given the importance, the review focuses on recent advances in hyperspectral imaging techniques in detecting the decay of fruits such as citrus, apple, peach, and different berries at the early stages of fungal infection. Challenges and future research needed to allow for the implementation of hyperspectral imaging for fruit decay detection in industrial sorting processes have been addressed. To summarize, hyperspectral imaging is already today capable to detect early decay in fruit. However, detection times in-line, adjustment of models by specialists and costs of hardware are still hampering its broad implementation.
https://www.sciencedirect.com/science/article/pii/S095671352300230X

14. **Abbas, G., Hussain, A., Hussain, A., Ahmed, Z., Abbas, Y., & Nemat, A. (2023). Geostatistical analysis for spatial distribution of anemia (Hb level) among women of reproductive age and determinant factors.** *Food Science and Nutrition,* **11(7), 4183-4190. doi: 10.1002/fsn3.3408.** Zahoor Ahmed (SFAS) Date of Publication: July 2023 HJRS: W (Bronze)
The study was designed to assess the geostatistical spatial distribution of anemia and determinant factors among the women of reproductive age group (RAG) in Gilgit district, Pakistan. The Hb levels for 15–25 RAG, 26–35 RAG, and 36–45 group showed 10.22 g/dL, 10.41 g/dL, and 9.90 g/dL levels, respectively, while the Hb level showed a nugget/sill ratio of 0.21 inferring strong for the 15–25 group, weak for the 26–36, and moderate for 36–45 spatial dependence. Furthermore, 15–25 RAG showed 8% severe and 33.34% sufficient cases and 26–35 showed 12% severe and 29.33% sufficient results in their Hb level, whereas 36–45 had 9.34% severe and 29.33% sufficient.
https://onlinelibrary.wiley.com/doi/full/10.1002/fsn3.3408

15. **Afreen, A., Ahmed, Z., & Khalid, N. (2023). Optimization, fractional characterization, and antioxidant potential of exopolysaccharides from Levilactobacillus brevis NCCP 963 isolated from "kanji".** *RSC Advances,* **13(29), 19725-19737. doi: 10.1039/d2ra07338b.** Nauman Khalid (SFAS) Date of Publication: June 2023 HJRS: W (Bronze)
A novel exopolysaccharide (EPS) was obtained from Levilactobacillus brevis NCCP 963 isolated from a black carrot drink named "kanji". The culture conditions for maximum EPS yield were explored by the Plackett–Burman (PB) design and response surface methodology (RSM) along with the fractional characterization and antioxidant potential of EPSs. The PB design screened out five significant factors, namely, glucose, sucrose, tryptone, $CaCl_2$, and di-potassium phosphate out of eleven independent factors. The RSM indicated glucose and $CaCl_2$ as significant factors in EPS production and a maximum EPS production of 968.89 mg L-1 was obtained at optimized levels of 10.56% glucose, 9.23% sucrose, 0.75% tryptone, 0.446% $CaCl_2$, and 0.385% K_2HPO_4. A R2 value above 93% indicates higher variability, depicting the validity of the model. The obtained EPS has a molecular weight of 5.48×10^4 Da and is a homopolysaccharide in nature with glucose monosaccharides. FT-IR analysis showed significant band stretching of C–H, O–H, C–O and C–C and indicated the β-glucan nature of EPSs. The comprehensive antioxidant investigation showed significant in vitro DPPH, ABTS, hydroxyl, and superoxide scavenging capacity with EC50 values of 1.56, 0.31, 2.1, and 6.7 mg mL-1 respectively. Curd formation from the resulting strain prevented synergis.
https://pubs.rsc.org/en/content/articlehtml/2023/ra/d2ra07338b

16. **Khalid, N. (2023). Impact of carbonated beverages on early onset of osteoporosis: A narrative review.** *Nutrition and Health.* **doi: 10.1177/02601060231201890.** Nauman Khalid (SFAS) Date of Publication: September 2023 HJRS: Y (Null)
Background: Processed and semi-processed foods are getting popular in the diets of the Western population. The Western diet is almost coupled with consuming carbonated beverages, either alcoholic or nonalcoholic. The presence of sugar, caffeine, and alcohol in different carbonated beverages and detrimental dietary patterns are leading causes of obesity, diabetes, and periodontal diseases in the young population. Aims: This article aims to

review the impact of carbonated beverages on early onset of osteoporosis. Methods: A nonsystematic literature review searches in PubMed and Google Scholar electronic databases with predefined terms relating to carbonated beverages, caffeine intake, childhood obesity, osteoporosis, and bone softness. Results: Bone diseases significantly increase due to early exposure to caffeine and phosphoric acid in the pubertal period. Musculoskeletal growth is a dynamic and complex process, and bone mass achievement is of great importance in this process. According to the global burden of diseases, bone disorders consist of "6.8% of total disability-adjusted life-years." The consumption of soft drinks and their impact on bone accretion and bone mineral density in the young population is under research in the current literature on osteoporotic disorders. Since bone is a metabolically active tissue, it's in constant reconstruction mode. This process is regulated by genetic, hormonal, nutritional, and physical factors. Any imbalance in one of these processes might lead to mineral deposition and osteoporosis. Conclusion: Habitual intake of carbonated drinks with added sugars and caffeine is associated with increased body weight and bone fragility; stringent regulations are needed for proper education.

https://journals.sagepub.com/doi/abs/10.1177/02601060231201890

17. **Ahmad, I., Xiong, Z., Hanguo, X., Lyu, F., Khalid, N., Aadil, R. M., . . . Li, Y. (2023). Combination of enzymatically hydrolyzed potato powder with skimmed milk powder on the quality improvements of yogurt during refrigeration storage. *Journal of Food Science and Technology,* 60(7), 2031-2041. doi: 10.1007/s13197-023-05737-9. Nauman Khalid (SFAS) Date of Publication: May 2023 HJRS: W (Silver)**

This study aimed to prepare a stirred type of fat-free yogurt from enzymatically hydrolyzed potato powder (EHPP) and skimmed milk powder (SMP) without changing its quality and consumer acceptance. The yogurt formulations prepared contained different amount of EHPP 0, 10, 25 and 50% and were stored for 28 days at 4 °C and observed that with increasing substitution ratio, acid production was increased while the viability of lactic acid bacteria was decreased after 28 days of storage at 4 °C. The antioxidant activities (2-Diphenyl-1-picryl-hydrazyl (DPPH) free radical scavenging activity and ferric reducing antioxidant power (FRAP) of the yogurt were increased with increasing EHPP over the storage period. The yogurt formulations having 25 to 50% EHPP has the highest DPPH free radical scavenging activity and FRAP values. Water holding capacity (WHC) was decreased over the storage period with 25% EHPP. The hardness, adhesiveness and gumminess were decreased while no significant change was found in springiness with EHPP addition over the storage period. The rheological analysis showed an elastic behavior of yogurt gels with EHPP supplementation. The sensory results of yogurt containing 25% EHPP have the highest values of taste and acceptance. Yogurt in combination with EHPP and SMP has the higher levels of WHC than non-supplemented yogurt and better stability was recorded during storage.

https://link.springer.com/article/10.1007/s13197-023-05737-9

18. **Akhtar, A., Aslam, S., Khan, S., McClements, D. J., Khalid, N., & Maqsood, S. (2023). Utilization of diverse protein sources for the development of protein-based nanostructures as bioactive carrier systems: A review of recent research findings (2010–2021). *Critical Reviews in Food Science and Nutrition*, 63(16), 2719-2737. doi: 10.1080/10408398.2021.1980370. Aqsa Akhtar, Sadia Aslam, Sipper Khan, Nauman Khalid (SFAS) Date of Publication: June 2023 HJRS: W (Platinum)**

Consumer awareness of the relationship between health and nutrition has caused a substantial increase in the demand for nutraceuticals and functional foods containing bioactive compounds (BACs) with potential health benefits. However, the direct incorporation of many BACs into commercial food and beverage products is challenging because of their poor matrix compatibility, chemical instability, low bioavailability, or adverse impact on food quality. Advanced encapsulation technologies are therefore being employed to overcome these problems. In this article, we focus on the utilization of plant and animal derived proteins to fabricate micro and nano-particles that can be used for the oral delivery of BACs such as omega-3 oils, vitamins and nutraceuticals. This review comprehensively discusses different methods being implemented for fabrications of protein-based delivery vehicles, types of proteins used, and their compatibility for the purpose. Finally, some of the challenges and limitations of different protein matrices for encapsulation of BACs are deliberated upon. Various approaches have been developed for the fabrication of protein-based microparticles and nanoparticles, including injection-gelation, controlled denaturation, and antisolvent precipitation methods. These methods can be used to construct particle-based delivery systems with different compositions, sizes, surface hydrophobicity, and electrical characteristics, thereby enabling them to be used in a wide range of applications.

https://www.tandfonline.com/doi/full/10.1080/10408398.2021.1980370

19. **Akhtar, A., Khan, S., Zoq Ul Arfreen, R., & Khalid, N. (2023). Potential challenges and threats associated with pine nut cultivation and marketing in Pakistan. *Journal of Animal and Plant Sciences, 33*(3). doi: 10.36899/JAPS.2023.3.0642. Aqsa Akhtar, Sipper Khan, R. Zoq ul Arfreen, Nauman Khalid (SFAS) Date of Publication: June 2023 HJRS: Y (Null)**

Pine nut or chilgoza pine (Pinus gerardiana) is considered one of the most valuable non-timber forest species (NTFP) of Pakistan Pine nut is a rich source of many valuable food constituents including unsaturated fatty acids, sugar, vitamins and minerals. Due to the poor management policies and heavy exploitation, it has been listed

as threatened species by the IUCN. Pine nuts lose their quality and nutritional value due to poor processing technologies that tend to lower their acceptability in big markets. In order to increase the market value of pine nuts, research institutes should work in collaboration to conserve this endangered valuable species by developing good quality pest-resistant seeds. Moreover, they should propose such treatments which help to extend the shelf life of pine nut seeds during processing and storage on a commercial level. Meanwhile, the government should launch new projects to understand the dynamics of the pine nuts life cycle together with sustainable conservation.

https://www.thejaps.org.pk/docs/2023/03/01.pdf

20. **Akhtar, A., Nasim, I., Din, M. S. U.**, Araki, T., & Khalid, N. **(2023). Effects of different fat replacers on functional and rheological properties of low-fat mozzarella cheeses: A review.** *Trends in Food Science and Technology*, **139. doi: 10.1016/j.tifs.2023.104136**. Aqsa Akhtar, Iqra Nasim, Muhammad Saeed ud Din, Nauman Khalid **(SFAS) Date of Publication: September 2023** HJRS: W (Platinum)

Background: Mozzarella, a stretched curd cheese obtained from buffalo or bovine milk, densely packed with saturated dairy fats, is extensively used in pizza toppings due to the desirable stretch, a vital functional attribute induced by fat-casein matrix. Besides its appreciation in foods by consumers, chronic ailments like obesity, cardiovascular diseases (CVDs), and high body cholesterol remain major health concerns associated with the regular consumption of mozzarella cheese globally. The production of mozzarella cheese with low dairy fats is the most demanded trend driven by the pizza consumer worldwide. Researchers devised many ways to produce mozzarella cheese with skimmed or low-fat milk. Still, the end product appeared with compromised textural and rheological attributes, which can significantly impair consumer acceptability. After a critical investigation, substituting dairy fats with plant or animal-based fat replacers in mozzarella cheese is considered an emerging and effective technique to obtain optimum quality end product. https://www.sciencedirect.com/science/article/abs/pii/S0924224423002510#preview-section-abstract

21. **Akhtar, M., Akhtar, A., Nazir, W., & Khalid, N. (2023).** **Formulation of Edible Coatings from Alfalfa Saponins to Enhance the Postharvest Quality of Tomatoes.** *Preventive Nutrition and Food Science,* **28(2), 178-188. doi: 10.3746/pnf.2023.28.2.178**. Mahnoor Akhtar, Aqsa Akhtar, Wahab Nazir, Nauman Khalid **(SFAS) Date of Publication: June 2023** HJRS: X (Null)

Tomatoes are a major crop for global exports and have significant nutritional benefits. However, their lifespan is limited due to various biotic and abiotic factors. This study aimed to formulate an edible coating using crude alfalfa saponins coupled with decaglycerol monolaurate (ML-750) and polyoxyethylene (20) sorbitan monolaurate (Tween 20), to enhance the postharvest quality and shelf life of tomatoes by preventing spoilage. The effectiveness of alfalfa saponins coatings, both alone, and with ML-750 and Tween 20, was evaluated by comparing their impact on color, texture, overall acceptability, and % weight loss at 4°C and 25°C for 7 days. Significant improvements were observed in the quality attributes of tomatoes, including firmness, aroma, color, texture, and overall acceptability. Crude alfalfa saponins in emulsified form with Tween 20 increased the shelf stability of tomatoes more effectively than uncoated and ML-750 combined coatings. The total soluble solids (TSS) and pH also play a crucial role in determining the quality of the fruits. The results indicated no significant changes in the TSS of tomatoes coated with encapsulated saponins. Subsequently, a gradual increase in the pH of the coated tomatoes was observed on days 5 and 7, respectively. The findings of this study revealed that alfalfa saponins coupled with synthetic emulsifiers may be a beneficial strategy for prolonging the shelf life and improving the postharvest quality of tomatoes.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10321443/

22. **Ali, M., Batool, S., Khalid, N., Manzoor, M. F., Zhao, X., Li, X., . . . Aadil, R. M. (2023). Alcoholic Off-Flavor Disorders in Fresh Fruits.** *Journal of Food Biochemistry,* **2023. doi: 10.1155/2023/3959653**. Nauman Khalid **(SFAS) Date of Publication: 2023** HJRS: W (Bronze)

The off-flavor disorder is one of the most quality deteriorating and undesirable postharvest physiological disorders in fresh fruits. Over-biosynthesis and accumulation of ethanol metabolism-related metabolites such as acetaldehyde and ethanol have been associated with an alcoholic off-flavor disorder in various fresh fruits at both pre- and postharvest stages. Correspondingly, many studies have reported the association of such off-flavor disorders with several inducing factors, including anaerobic respiration, low O2 stress, high CO2 stress, and storage temperature stress, that upregulate ethanol metabolism in fruits. Furthermore, numerous metabolic and physiological mechanisms that govern ethanol metabolism under such factors are subsequently addressed. These mechanisms include the γ-aminobutyric acid (GABA) shunt pathway, mitochondrial energy metabolism, glycolysis, Krebs or TCA cycle, cytosolic malate metabolism, and starch and sugar metabolism. To summarize the relevant findings, the current paper reviews the literature on alcoholic off-flavor disorder, focusing on the role of significant underlying causes and key metabolic and physiological mechanisms in boosting ethanol metabolism in fresh fruits. In addition, recent measures that have been already taken or are in progress to control the higher activity of ethanol metabolism that may eventually result in limiting the alcoholic off-flavor disorder in harvested fresh fruits have also been discussed. Moreover, functions of metabolic

mechanisms, including respiratory mechanisms, and other factors such as fruit genetic makeup, degree of maturity, and postharvest handling and storage conditions, are needed to be investigated in future work at both physiological and transcriptomics levels to reveal the additional relation to alcoholic off-flavor disorders in fresh fruits during ripening and storage.

https://www.hindawi.com/journals/jfbc/2023/3959653/

23. **Ali, S., Nawaz, A., Naz, S., Ali, M., Ejaz, S., Azam, M., & Razzaq, K. (2023). Exogenous melatonin mitigates chilling injury in zucchini fruit by enhancing antioxidant system activity, promoting endogenous proline and GABA accumulation, and preserving cell wall stability.** *Postharvest Biology and Technology,* **204. doi: 10.1016/j.postharvbio.2023.112445. Maratab Ali (SFAS) Date of Publication: October 2023 HJRS: W (Platinum)**

Zucchini fruit are sensitive to chilling injury (CI) during postharvest low temperature storage which makes their cold stored life short. In this work, zucchini fruit were treated with melatonin (200 µmol L−1) and stored at 5 ºC for 15 d. The pre-storage melatonin treatment reduced weight loss (6.51%) and suppressed symptoms of CI (1.5 Score) along with lower malondialdehyde (MDA), relative ion leakage (RIL), superoxide anion and hydrogen peroxide (H_2O_2) in contrast with control. The treated zucchini exhibited higher L* (51.89) and lower a* (−10.17) and b* (29.15) values of exocarp in comparison with control. Melatonin treated zucchini showed enhanced γ-aminobutyric acid (GABA) concentration due to higher glutamate content and stimulated glutamate decarboxylase (GAD) and suppressed γ-aminobutyric acid transaminase (GABA-T) activities. In addition, melatonin application increased proline accumulation owing to stimulation of Δ-1-pyrroline-5-carboxylate synthetase (P5CS) and ornithine δ-aminotransferase (OAT) enzymes and reduced proline dehydrogenase (ProDH) activity as compared with control. The activity of antioxidative such as ascorbate peroxidase (APX), peroxidase (POD), catalase (CAT) and superoxide dismutase (SOD) enzymes remained higher in melatonin treated zucchini. The fruit treated with melatonin exhibited reduced water soluble pectin (WSPN) along with higher sodium carbonate soluble pectin (SCSP), protopectin (PRPN), chelate soluble pectin (CSPN), cellulose (CLS) and hemicellulose (HLS) in comparison with control. The exogenous melatonin suppressed the activities of polygalacturonase (PG), β-galactosidase (β-Gal), cellulase (CX), and pectin methylesterase (PME) along with higher firmness. In conclusion, exogenous melatonin at 200 µmol L−1 concentration could be used for zucchini fruit CI mitigation under cold storage.

https://www.sciencedirect.com/science/article/abs/pii/S0925521423002065

24. **Anwar, A., Aslam, S., & Khalid, N. (2023). Effect of Beef Fat Replacement with Linseed Oil Emulsions on Physicochemical and Sensory Properties of Beef Patties.** *Pakistan Journal of Zoology,* **55(4), 1715-1724. doi: 10.17582/journal.pjz/20220215060250. Ayesha Anwar, Sadia Aslam, Nauman Khalid (SFAS) Date of Publication: August 2023 HJRS: X (Null)**

The aim of this study was to replace beef fat with linseed oil emulsions in beef patties to measure its impact on physicochemical and sensory properties. The varying concentrations of beef fat was replaced with 5 to 15% linseed oil-based emulsions. The chemical composition of the patties was affected by the inclusion of the linseed oil emulsion in patties. The cooked and uncooked patties prepared with the 10% and 15% linseed emulsion showed highest moisture and ash content while patties with 20% beef showed highest fat and protein content. There was a significant difference between the pH values of cooked and uncooked patties from different treatments. Increased lipid oxidation content was observed in cooked and uncooked patties containing different concentrations of emulsions, together with non-significant difference in values of water holding capacity and cooking yield among different treatments. A slightly higher scores were obtained for sensory parameters of patties containing linseed oil emulsions.

https://researcherslinks.com/current-issues/Effect-Beef-Fat-Replacement-Linseed-Oil-Emulsions-on-Physicochemical/20/1/6339

25. **Li, J., Abbas, M., Desoky, E. S. M., Zafar, S., Soaud, S. A., Hussain, S. S. Hussain. A, . . . El-Sappah, A. H. (2023). Analysis of metal tolerance protein (MTP) family in sunflower (Helianthus annus L.) and role of HaMTP10 as Cadmium antiporter under moringa seed extract.** *Industrial Crops and Products,* **202. doi: 10.1016/j.indcrop.2023.117023. Athar Hussain (SFAS)Date of Publication: October 2023 HJRS: W (Platinum)**

Sunflower (*Helianthus annuus* L.) is rich source of essential amino acids, omega-6, and linoleic acid, but cadmium (Cd^{2+}) accumulation is hazardous. The higher accumulation of Cd^{2+} is facilitated by metal tolerance proteins (*HaMTPs*) in cell membrane of root hairs, and it was hypothyzed that higher expression of a specific antiporter will resist Cd^{2+} accumulation. We reterived 16 *HaMTPs* from sunflower genome under Cd^{2+} stress, and 5% moringa seed extract (MSE). Phylogenetic analysis revealed that HaMTPs were clustered into 7 groups, classified into 5 sub-families, and are true members of cation diffusion facilitators (CDFs) proteins. *HaMTP12* have highest 12 introns, *HaMTP1* have 11, *HaMTP2* have 9, *HaMTP9, -10,* and *-13* have 6, *HaMTP11, -12, -14* and *-16* have 5, while all 5 members of "E" subfamily have no any intron. RNA-seq and heatmap analysis revealed differential expression of all *HaMTPs* in selected tissues. Integrative application of 5% MSE increased rate of photosynthesis and ~25% yield by upregulating expression of *HaMTP10* under

Cd^{2+} stress, confirmed by qRT-PCR. Expression pattern and presence of stress responsive TC-rich, abscisic acid responsive elements (ABRE), and P-box *cis*-elements indicated stimulation of *HaMTPs* under MSE and Cd^{2+} responsiveness. HaMTP10 protein is a member of Mn-CDF subfamily and an antiporter of Cd^{2+} revealed by gene ontology and transmembrane topology analysis. In conclusion, integrative application of MSE and/or stable overexpression of *HaMTP10* provide precise tools to mitigate Cd^{2+} accumulation in sunflower. https://www.sciencedirect.com/science/article/abs/pii/S0926669023007884

26. **Liaqat, S.,** Ahmed, Z., Iqbal, F., & Umer, M. U. (2023). **Hydroxyapatite fortified mango mousse: Formulation, characterization, and sensory data evaluation using fuzzy logic.** *Journal of Food Science,* **88(11), 4509-4528. doi: 10.1111/1750-3841.16783**. **Saba Liaqat (SFAS) Date of Publication: November 2023** **HJRS: W (Silver)**
Abstract: In this experimental study, hydroxyapatite (HAp), as a valuable calcium source, was extracted from discarded goat bone; raw and nano-biogenic powders were prepared through calcination and ultra-sonication. Resultant powders were characterized by using various spectroscopy techniques. As per the findings of atomic absorption spectroscopy, raw and nano-biogenic powders depicted 1439.7 ± 0.12 and 3194.8 ± 0.07 ppm calcium content, respectively. The range of particle size of nano-biogenic and raw powders was 47–139 and 183 nm, respectively. X-ray diffraction (XRD) confirmed crystalline behavior whereas laser-induced breakdown spectroscopy (LIBS)-derived Ca/P-ratio endorsed excellence in nano-biogenic 1.76 against 1.63 in raw powder. In vitro bioavailability of calcium in raw and nano-biogenic powder was ∼36% and ∼39%, respectively. Next, the powders were further used to develop calcium-fortified mango mousse with varied formulations. A maximum overrun of 23.31% was found in the case of "Raw-A," whereas a maximum viscosity of 8489.98 mPa s was found in the case of "Nano-A." Sensory data of mango mousse were obtained by fuzzy logic method, and PCA ranked the Nano-B and Nano-A samples the best in terms of overall acceptability. Meanwhile, the consumer responses toward product likeness and/or dislikeness were recorded by the hedonic scale that endorsed Nano-A and Nano-B formulations as the most preferred samples. Practical Application: The revolution in the eating habits of consumers from traditional foods to fast food imposes the development of new products having good nutritional values. Different waste biogenic food sources can provide an acceptable powdered form of ingredients for the development of novel food products. In this regard, the development of novel food products using calcium supplements has gained space in the food industry.
https://ift.onlinelibrary.wiley.com/doi/full/10.1111/1750-3841.16783

27. **Liu, J., Li, F., Fu, X., Min, D., Ali, M., Zhao, X., . . . Ali, M.,** Zhang, X. (2023). **SlMsrB5 contributes to the chilling tolerance induced by methyl jasmonate in postharvest tomato fruit.** *Scientia Horticulturae,* **322. doi: 10.1016/j.scienta.2023.112386**. **Maratab Ali (SFAS) Date of Publication: December 2023** **HJRS: W (Gold)**
Chilling injury (CI) is a common phenomenon during low temperature storage for most fruits, reducing the effectiveness of refrigeration methods. Methyl jasmonate (MeJA) has been extensively employed to extend the shelf life of fruits during cold storage. However, the mechanism of MeJA inducing fruit resistance to CI requires further investigation. The study found that treating tomatoes with 0.05 mM MeJA inhibited CI by regulating the reactive oxygen species (ROS) metabolism, polyamines, and jasmonic acid (JA) signaling pathway, as well as cold response pathway. Interestingly, the expression of SlMsrB5 in tomato was up-regulated under MeJA treatment, showing an increase of 36.44% to 161.75% compared to the control fruit. Notably, silencing the expression of SlMsrB5 led to a continuously increased in CI incidence by 52.17% and CI index by 36.58% compared to the control fruit at the end of storage. Additionally, the silencing of SlMsrB5 weakened the inhibitory impact of MeJA on CI and reduced its induction effects on the aforementioned indicators. In addition, correlation analysis showed that the transcription of SlMsrB5 has a negative correlation with ROS related indicators under MeJA treatment, while was highly correlated with the aforementioned induction effects controlled by MeJA. Therefore, this study demonstrates a new basis for revealing the underlying mechanisms in the MeJA-regulated chilling resistance in postharvest fruits.
https://www.sciencedirect.com/science/article/abs/pii/S0304423823005551

28. **Min, D., Fu, X., Ali, M., Liu, J., Sun, W., Li, M., . . . Zhang, X. (2023). Involvement and Possible Mechanism of Autophagy in Postharvest Tomato Fruit Resistance Against Botrytis cinerea.** *Journal of Plant Growth Regulation.* **doi: 10.1007/s00344-023-11064-2**. **Maratab Ali (SFAS) Date of Publication: June 2023** **HJRS: W (Silver)**
Gray mold caused by *Botrytis cinerea* is one of the most prevailing deteriorative postharvest diseases in fruit and vegetables. Autophagy, a highly conserved mechanism in eukaryotes, is involved in defense responses against stresses, especially for pathogens infection in plants. However, limited studies have been conducted to elucidate the roles and regulatory mechanisms of autophagy in postharvest fruit disease resistance. In this regard, our earlier experimentation indicated that 50 mmol L^{-1} lithium chloride (LiCl) and 5 mmol L^{-1} hydroxychloroquine (HCQ) could be an autophagy activator and an autophagy inhibitor, respectively, that can reveal the role of autophagy in postharvest fruit defense against *B. cinerea*. Present findings further elaborated that the LiCl-mediated increase in autophagy activity showed concomitant higher expression levels of autophagy-related genes and the number of autophagosomes, whereas HCQ treatment reversed the

phenomenon. LiCl-activated autophagy inhibited the disease as evidenced by lower disease incidence and lesion diameter, whereas HCQ application largely reversed this phenomenon. Transcriptome analysis revealed that the differentially expressed genes between LiCl-treated and control fruit were involved in the secondary metabolic pathway, represented by phenylpropanoid biosynthesis and reactive oxygen species (ROS) metabolism. LiCl treatment promoted the accumulation of total phenolics by activating phenylpropanoid biosynthesis. LiCl treatment also balanced ROS homeostasis by increasing antioxidant enzyme activities and regulating the ascorbate–glutathione cycle. Moreover, differentially expressed transcription factors between LiCl-treated and control fruit, such as WRKYs, MYBs, AP2, bHLH, HB-other, and MYB-related families might specifically affect the transcription of genes involved in ROS metabolism and phenylpropanoid biosynthesis. Meanwhile, MYBs (Solyc05g009230.1), bHLH (Solyc01g090790.2), and MYB-related (Solyc11g010710.1) transcription factors also participated in autophagy by directly binding to *SlATGs* (Solyc08g078820.3 and Solyc01g068060.3). These findings suggest that LiCl-induced autophagy results in increased activities of defense enzymes, activation of phenylpropanoid biosynthesis, and balance of ROS homeostasis, which contributes to disease resistance in postharvest fruit.

https://link.springer.com/article/10.1007/s00344-023-11064-2#Abs1

29. **Min, D., Li, F., Ali, M., Liu, J., Fu, X., Song, Y., . . . Zhang, X. (2023). Interaction of methionine sulfoxide reductase B5 with SlMYC2 stimulates the transcription of MeJA-mediated autophagy-related genes in tomato fruit.** *Horticulture Research,* **10(3). doi: 10.1093/hr/uhad012**. **Maratab Ali (SFAS) Date of Publication: March 2023** **HJRS: W (Platinum)**

Methyl jasmonate (MeJA) has been shown to induce autophagy in various plant stress responses and metabolic pathways. MYC2 is involved in MeJA-mediated postharvest fruit biological metabolism, but it is unclear how it affects MeJA-induced fruit autophagy. In this study, we noticed that silencing *SlMYC2* significantly reduced the increase in *autophagy-related genes* (*SlATGs*) expression induced by MeJA. SlMYC2 could also bind to the promoters of several *SlATGs*, including *SlATG13a*, *SlATG13b*, *SlATG18a*, and *SlATG18h*, and activate their transcript levels. Moreover, SlMsrB5, a methionine sulfoxide reductase, could interact with SlMYC2. Methionine oxidation in SlMYC2 and mimicking sulfoxidation in SlMYC2 by mutation of methionine-542 to glutamine reduced the DNA-binding ability and transcriptional activity of SlMYC2, respectively. SlMsrB5 partially repaired oxidized SlMYC2 and restored its DNA-binding ability. On the other hand, silencing *SlMsrB5* inhibited the transcript levels of *SlMYC2*-targeted genes (*SlATG13a*, *SlATG13b*, *SlATG18a,* and *SlATG18h*). Similarly, dual-luciferase reporter (DLR) analysis revealed that SlMsrB5–SlMYC2 interaction significantly increased the ability of SlMYC2-mediated transcriptional activation of *SlATG13a*, *SlATG13b*, *SlATG18a,* and *SlATG18h*. These findings demonstrate that SlMsrB5-mediated cyclic oxidation/reduction of methionine in SlMYC2 influences *SlATGs* expression. Collectively, these findings reveal the mechanism of SlMYC2 in *SlATGs* transcriptional regulation, providing insight into the mechanism of MeJA-mediated postharvest fruit quality regulation.

https://academic.oup.com/hr/article/10/3/uhad012/7022302

30. **Min, D., Li, F., Ali, M., Zhang, X., & Liu, Y. (2023). Application of methyl jasmonate to control chilling tolerance of postharvest fruit and vegetables: a meta-analysis and eliciting metabolism review.** *Critical Reviews in Food Science and Nutrition.* **doi: 10.1080/10408398.2023.2258201**. **Maratab Ali (SFAS) Date of Publication: Sep 2023** **HJRS: W (Platinum)**

Chilling injury is one of the most significant limitations for low temperature storage of postharvest fruits and vegetables, causing quality deterioration and economic loss. Increasing studies indicated that methyl jasmonate (MeJA) is critical in regulating the postharvest fruit and vegetables chilling tolerance. Based on a meta-analysis, the review analyzed the action of exogenous MeJA application on the chilling index in postharvest fruit and vegetables and summarized MeJA's mechanisms for controlling postharvest chilling injury. The meta-analysis found that MeJA treatment remarkably inhibited postharvest fruit and vegetable chilling injury. Moreover, we concluded the following function mechanism of MeJA on postharvest fruit and vegetable chilling tolerance: (1) Enhancing membrane integrity and energy supply, (2) Increasing antioxidant activity, (3) Enhancing arginine pathway, (4) Enhancing sugar metabolism, (5) Regulating phenolic metabolism, (6) Activating CBF pathway, (7) Regulating HSP accumulation and expression, and (8) Crosstalk with phytohormone. Finally, we summarized the regulatory mechanisms of MeJA on postharvest fruit and vegetable biological processes at the transcriptional and post-translational levels.

https://www.tandfonline.com/doi/full/10.1080/10408398.2023.2258201

31. **Sattar, S., & Khalid, N. (2023). Selection of processed and packaged potato-based snacks among university students: a cross-sectional study regarding food environment and dietary behavior.** *Arab Gulf Journal of Scientific Research.* **doi: 10.1108/AGJSR-11-2022-0258**. **Saima Sattar, Nauman Khalid (SFAS) Date of Publication: March 2023** **HJRS: Y (Null)**

Purpose – Potato-based snacks (PBS) are widely popular among people of all age groups despite known negative health aspects. University students, due to their busy routines and less familiarity with diets are more prone to

selecting unhealthy meals and snacks. The study aims to explore the outlook of university students regarding their consumption of processed and packaged PBS in their daily lives and compares gender's PBS choices with dietary habits and food environment. Design/methodology/approach – A total of 122 students from various universities across Pakistan were included in this study. The data were collected using a structured questionnaire and distributed using the snowball method. Findings – The university students showed a significant difference in their living habits (p 5 0.016), where 25.4% of enrolled male students were hostellers as compared to females (14.8%). Significant differences were noticed in choosing PBS that further depends on the familiarity of the product, (p 5 0.030), where 9.0% of female students rated familiarity with the product as being important while 20.5% of males responded familiarity as a critical factor. Studying the usual location/point of purchase for a PBS, a significant difference was observed (p 5 0.008%) where more male students (27.9%) choose to buy their PBS from a local convenience store as compared to female students (18.9%). Female students (13.1%) would rather choose to buy their PBS on their weekly grocery runs. Originality/value – This study concluded that female and male students' attitudes regarding the consumption of PBS were almost the same regardless of environment and brand repute.
https://www.emerald.com/insight/content/doi/10.1108/AGJSR-11-2022-0258/full/html

32. **Sibt-E-Abbas, M., Sadiq Butt, M., Saeeduddin, M., Taferra, T. F., & Ahmad, S. (2023). Bioefficacy and Safety Assessment of Protein Isolates Obtained from Nonconventional Sources.** *Journal of Food Biochemistry,* **2023. doi: 10.1155/2023/8577423. Muhammad Saeeduddin (SFAS) Date of Publication: Apr 2023 HJRS: W (Honorable Mention)**

Nonconventional protein isolates were prepared from defatted oilseeds (sesame, flaxseed, and canola). Bioevaluation was performed via growth study parameters i.e., protein efficiency ratio (PER), net protein ratio (NPR), and relative net protein ratio (RNPR). The highest values for these parameters were recorded in sesame protein isolates (SPIs) followed by canola protein isolates (CPIs) and flaxseed protein isolates (FPIs). Nitrogen balance study parameters represented maximum true digestibility (TD) in SPI trailed by FPI and CPI. However, biological value (BV) was found higher in FPI. Similarly, the highest value for net protein utilization (NPU) was noticed in FPI tracked by SPI and CPI. Moreover, safety assessment of protein isolates was also performed including serum protein and kidney and liver function tests. All these parameters showed nonsignificant variations among the tested protein isolates. The outcomes of research explicated that these protein isolates can play a pivotal role to increase the protein level of individual.
https://www.hindawi.com/journals/jfbc/2023/8577423/

33. **Usman, M., Ishaq, A., Regenstein, J. M., Sahar, A., Aadil, R. M., Sameen, A., . . . Alam, A. (2023). Valorization of animal by-products for gelatin extraction using conventional and green technologies: a comprehensive review.** *Biomass Conversion and Biorefinery.* **doi: 10.1007/s13399-023-04547-5. Anum Ishaq (SFAS) Date of Publication: July 2023 HJRS: X (Honorable Mention)**

A large number of animal by-products including the bones, skins, tendons, scales, and feet are being generated around the world. These by-products are produced by meat processing facilities, slaughterhouses, and fish processing units. These are often put into landfills without any treatment, thus causing environmental pollution. However, these by-products can be used for the production of valuable compounds such as collagen and gelatin that can be used in different food products. Gelatin is the most widely used hydrocolloid in the world. By the year 2025, the market size of gelatin will exceed ~$5 billion and is predicted to reach $6.7 billion in 2027. Therefore, gelatin recovery is beneficial both economically and environmentally. Commercially available gelatin is derived from porcine and bovine bones and skins. There are several other by-products from which gelatin can be extracted including by-products from chickens, ducks, fish, and camels. The increase in sustainable and green technologies that eliminate the usage of toxic solvents and less time for extraction has increased the demand for novel extraction processes in the food industries. The application of more recently developed techniques can be used for the extraction of gelatin to overcome several limitations of the traditional process. The present review discusses the application of conventional (hot water bath) and advanced technologies (ultrasound, microwave, or enzyme-assisted extraction) to extract the gelatin from different animal by-products. The physicochemical properties of gelatin depend on the source, extraction conditions, and pretreatment methods. These advanced techniques improve the functional properties, quality, and process efficiency of gelatin.
https://link.springer.com/article/10.1007/s13399-023-04547-5#Abs1

34. **Wang, J., Li, F., Zhang, X., Sun, W., Ali, M., Li, X., & Zhang, X. (2023). Combined transcriptomic and targeted metabolomic analysis reveals the mechanism of flesh browning in cold stored 'Fuji' apple fruit.** *Scientia Horticulturae,* **320. doi: 10.1016/j.scienta.2023.112195. Maratab Ali (SFAS) Date of Publication: October 2023 HJRS: W (Gold)**

Flesh browning (FB) is a common physiological disease of apple fruit during cold storage, which physiological mechanism was revealed in the present study through analyzing physical, transcriptomic, and targeted metabolomic parameters. A total of 8559 differentially expressed genes were identified between FB and normal flesh. In FB, the glycolysis/gluconeogenesis pathway was down-regulated; starch and sucrose metabolism,

phenylpropane biosynthesis, plant hormone signal transduction, mitogen-activated protein kinase signaling pathway, and plant-pathogen interaction were all up-regulated. In addition, FB was also associated with the expression level of genes related to defense, cold stress, and reactive oxygen species (ROS) scavenging, and various transcription factor families. Characteristics of FB tissue included lower contents of flavonoids and sugars, higher contents of jasmonic acid and ROS, lower organic acids contents and higher proportion of lactic acid/malic acid level. In conclusion, FB is a complex metabolic process, which involves the changes in the metabolites, genes expression, and transcriptional regulations in the primary metabolism, secondary metabolism, signal transduction and other pathways of apple fruit during cold storage.
https://www.sciencedirect.com/science/article/abs/pii/S0304423823003667

35. **Zahir, I., Asghar, W., & Khalid, N.** (2023). **Recent trends and policy shifts on empowering breastfeeding in developing countries.** *Nutrition and Health,* **29(3), 359-361. doi: 10.1177/02601060231196994**. **Izma Zahir, Waqas Asghar, Nauman Khalid (SFAS)Date of Publication: September 2023** HJRS: Y (Null)
Breastfeeding provides a vital source of nourishment for infants, particularly young infants not on complementary feeding. It provides benefits, both physiological and psychological, to not only infants but also their mothers (Ali Dawed et al., 2023). According to the World Bank and the United Nations (UN), developing countries, also sometimes referred to as low- and middle-income countries (LMICs), are nations that are home to about 50% of the world's population, with much of their population living below the poverty line, and with economies marred by inconsistent growth and stagnancy. For such nations, breastfeeding provides an additional benefit through cost-effective interventions (Ali Dawed et al., 2023).
https://journals.sagepub.com/doi/full/10.1177/02601060231196994

36. **Zahoor, S.,** Abdullah, S., Saifullah, M. A., Zahoor, S., Amer, K., & Ali, S. (2023). **Outcomes of the Use of Direct-Acting Antiviral Therapy in Patients of Chronic Hepatitis-C of Genotype 3a.** *Pakistan Armed Forces Medical Journal,* **73, S69-S72. doi: 10.51253/pafmj.v73iSUPPL-1.5798**. **Saroosh Zahoor (SFAS) Date of Publication: September 2023** HJRS: Y (Null)
Objective:To measure the outcomes of direct actingAntiviral therapy in terms of frequency of Hepatocellular carcinoma after its use of in HCV patients infected with 3a genotype and to analyze the efficacy of double and triple regimen in HCV patients of Child Pugh's class A and B respectively.Study Design:Quasi-experimental study.Place and Duration of Study:Mayo Hospital, LahorePakistan,from May to Dec 2019.Methodology: After applying inclusion and exclusion criteria262 patients of 3a genotype were awarded as Child Pugh's Class A and B and were treated with double and triple regimen for 12 and 24 weeks respectively.They were followed up with Ultrasound Abdomenevery month and PCR Quantitative was done for evaluating Sustained Virological Responseafter 3 months of completing treatment.Results:Out of 262 patients, 141(53.8%) were male and 121(46.2%)were female.243(92.7%)patients achieved Sustained Virological Response. 9(3.4%) developed Hepatocellular carcinomaof which 8 were on triple regimen and 1 on double regimen.
https://pafmj.org/clone/index.php/PAFMJ/article/view/5798

School of Health Sciences (SHS)

Department of Nutrition and Dietetics

1. **Azhar, S., Sabahat, R., Sajjad, R., Nadeem, F., Amjad, A., Hafeez, N., . . . Tanweer, A.** (2023). **Effect of Citrus Flavanones on Diabetes: A Systematic Review.** *Current Diabetes Reviews, 19*(5), 94-102. doi: 10.2174/1573399819666220707102237. **Afifa Tanweer (DNS/SHS) Date of Publication: June-July 2023** HJRS: Y (Null)
Background: Fruits and vegetables play a significant role in the health and nutrition of human beings. Flavanones being the major class of flavonoids are the main phytochemicals in citrus fruits having several favorable effects, particularly in preventing diabetes.Objective: The purpose of this systematic review was to discuss the anti-diabetic potential of citrus flavanones based on in vivo studies.Methods: A search of Google Scholar, PubMed, NCBI, Research Gate, Science Direct, HEC Digital Library databases for articles that have been published since 2010 was conducted using the keywords citrus, flavanones, and diabetes.Results: A total of 10 articles were identified, in which it was reported that 5 flavanones have antidiabetic effects. These flavanones have many benefits, such as they help in glycemic control, regulate the biomarkers of lipid profile, renal function, and modulate the signaling pathways that increase insulin sensitivity and uptake of glucose, thus are responsible for preventing diabetes and complications related to it. Conclusion: Therefore, citrus flavanones are the candidates having promising anti-diabetic potential but their effect needs to be verified through human studies.
https://www.eurekaselect.com/article/125029

2. **Iqra, Sughra, K., Ali, A., Afzal, F., Yousaf, M. J., Khalid, W., . . . Arshad, A.** (2023). **Wheat-based gluten and its association with pathogenesis of celiac disease: a review.** *International Journal of Food Properties, 26*(1),

511-525. doi: 10.1080/10942912.2023.2169709. **Ammara Arshad (DNS/SHS) Date of Publication: June-July 2023 HJRS: W (Bronze)**

In this review, different extraction techniques of bioactive protein gluten from wheat and their association in the pathogenesis of celiac disease have been updated. Wheat gluten is an important constituent of whole-grain wheat. It comprises two subunits named as alpha-subunit and beta-subunit. Due to its importance in nutritional and pharmaceutical biochemistry, it gains much attention in molecular biology. This study compares different techniques used for isolation, purification, and identification of gluten protein from wheat. Different conventional approaches had been used to characterize gluten, but due to certain limitations and risk assessment, recent and advanced techniques have taken their place. Moreover, gluten seeks its intention as it may cause different allergic responses e.g., gluten intolerance and celiac disease in humans due to absence or low level of enzymes required for is proper digestion. Certain treatments based on different modification techniques cure these allergic reactions. These modifications include genetic modifications and generation of different immune responses in body to combat these diseases. Intestinal permeability and cytokine-based modifications in T-cells are essential to become resistant against gluten intolerance and celiac disease. However, vaccine development is on the way to treat patients suffering from these diseases. In conclusion, being a vital part of an important staple food, gluten characterization and disease treatment is a significant step. It will help in improving quality of wheat gluten and patients to fight against certain health disorders.

https://www.tandfonline.com/doi/full/10.1080/10942912.2023.2169709

3. **Manzoor, M. S., Pasha, I., Younas, S., Zhu, M., Hussain, R., Younis, N., . . . Chughtai, M. F. J. (2023). Phenolic acid profile of oat cultivars, and their suppressive effect on intracellular reactive oxygen species.** *International Food Research Journal, 30*(1), 87-95. doi: 10.47836/ifrj.30.1.06. **Noor Younis (DNS/SHS) Date of Publication: February 2023 HJRS: X (Clay)**

Oat (Avena sativa L.) has rich phenolic contents with nutritional and therapeutic health benefits. The objective of the present work was to perform a cell cytotoxicity assay of three South Asian oat cultivars to determine their suppressive effect on intracellular reactive oxygen species (ROS). Oat cultivars were firstly examined for total phenolic content, 1,1-diphenyl-2-picrylhydrazyl (DPPH) scavenging activity, and phenolic acid profiling through HPLC. Total phenolic contents of oat cultivars ranged from 167.57 to 198.41 mg GAE/100 g, and DPPH scavenging activity was IC50 = 18.81 to 13.18 mg/mL. Oat cultivars displayed average content of phenolic acids such as vanillic acid (0.33 µg/g), syringic acid (6.70 µg/g), caffeic acid (4.16 µg/g), ferulic acid (2.06 µg/g), p-coumaric acid (20.22 µg/g), with the highest being gallic acid (74.32 µg/g). Cell cytotoxicity assay of oat polyphenolic extracts revealed that 10 and 15 µg/mL concentrations had nonsignificant differences when compared with their respective control treatments. Oat extracts suppressed ROS in Caco-2-cells, with or without hydrogen peroxide stimulation from 65.20 - 86.13%, and 56.36 - 79.56% with 10 and 15 µg/mL concentrations, respectively. In conclusion, oat is a rich source of polyphenols which have strong antioxidant behaviour to suppress the ROS activity.

http://www.ifrj.upm.edu.my/30%20(01)%202023/06%20-%20IFRJ21743.R1.pdf

4. **Tahir, H., Munir, N., Iqbal, S. S., Bacha, U., Amir, S., Umar, H., . . . Akram, M. (2023). Maternal vitamin D status and attention deficit hyperactivity disorder (ADHD), an under diagnosed risk factor; A review.** *European Journal of Inflammation, 21*. doi: 10.1177/1721727X231161013. **Hafsa Tahir, Umar Bacha, Saira Amir (DNS/SHS) Syeda Saira Iqbal (KRSS) Date of Publication: January-December 2023 HJRS: Y (Null)**

Vitamin D is important to mediate several brain processes such as proliferation, apoptosis, and neurotransmission in early stages of life. Vitamin D deficiency during critical periods of development can lead to persistent brain alterations. Vitamin D homeostasis during pregnancy is affected by two factors which includes an increase in mother's calcitriol levels and an increase in mother's Vitamin D Binding protein concentrations. Attention deficient hyperactivity disorder (ADHD) is an outcome of a complicated interaction between genetic, environmental, and developmental traits, and genetic factors cover about 80% of the cases. The efficiency of the immune system can be altered by a deficiency of Vitamin D in maternal body and maternal stress during gestation such as perinatal depression. Studies have proved that during gestation if there is a deficiency of vitamin D in maternal body, it can influence the brain development of the fetus and can also alter the synthesis of the brain-derived neurotropic factor. The current manuscript has been compiled to elaborate different factors which are associated with ADHD particularly focusing on the relationship of vitamin D deficiency in mothers. References material was selected from NCBI (PUBMED), Science direct, Google scholar, Publons etc. Using the terms ADHD, Vitamin D and Maternal nutritional status. Although, controversial relationship was found between the deficiency of Vitamin D level in pregnant women and development of ADHD in children but more controlled trials are required for future direction as well as to rule out other associated causes.

https://journals.sagepub.com/doi/full/10.1177/1721727X231161013

5. **Shahzad, N., Anjum, I., Ahsan, H., Syed, S. K., & Mushtaq, M. N. (2023). Gastroprotective potential and mechanisms of action of Hedera nepalensis. Brazilian** *Journal of Pharmaceutical Sciences, 59*, **DOI:**

https://doi.org/10.1590/s2175-97902023e20493. Shahzad Khurrum Syed (DNS/SHS) Date of Publication: June 2023 HJRS: Y (Null)

Hedera nepalensis (H. nepalensis) , belonging to the family Araliaceae, is a medicinal plant traditionally used to treat stomach problems. The current study investigated the gastroprotective potential and the mechanism of action of *H. nepalensis* in diclofenac-and ethanol-induced ulcer models. Anti-oxidant and lipid peroxidation inhibitory prospects of *H. nepalensis* were checked out by free radical scavenging assay and UV spectrophotometer respectively. Effect of *H. nepalensis* on the pH, gastric total acidity of gastric juice and protective effects of *H. nepalensis* against ulcer models have been examined. Histopathological studies have been carried out. The aqueous methanol extract of *H. nepalensis* (100 μg/mL) showed anti-oxidant (83.55%) and lipid peroxidation inhibitory (70.88%) potential at 1000 μg/mL; the extract had no buffer potential. The extract (400 mg/kg) significantly (81.12% and 63.46%) showed gastroprotective effect in diclofenac and ethanol-induced rat ulcer models respectively. Histopathological studies confirmed the biochemical findings. FTIR analysis showed the presence of carboxylic acid, alkanes, conjugated alkanes, aldehydes and alkyl-aryl ethers. Gallic acid, M-coumaric acid and quercetin were found by HPLC analysis. *H. nepalensis* exhibited significant protection against diclofenac and ethanol induced gastric damage by anti-oxidant and lipid peroxidation suppression effects suggesting potential broad utility in treatment of diseases characterized with gastric damage.

https://www.revistas.usp.br/bjps/article/view/213858

6.   **Ghulam, F., Javeed, A., Ashraf, M., Syed, S. K., & Zahoor, B. (2023). Evaluation of the immunomodulatory activity of meloxicam in vitro and in vivo.** *Tropical Journal of Pharmaceutical Research, 22*(6), 1231-1236. **doi: 10.4314/tjpr.v22i6.12. Shahzad Khurrum Syed (DNS/SHS) Date of Publication: June 2023 HJRS: Y (Null)**

Purpose: To demonstrate the immunomodulatory activity of meloxicam based on cellular and humoral immune responses and in mice.Methods: Cyclophosphamide-induced neutropenia assay and delayed-type hypersensitivity assay (DTH) were carried out to assess cellular immunity. In addition, mouse lethality and haemagglutination assays were carried out to investigate humoral immunity. Meloxicam was administered intraperitoneally in two doses, i.e., 5 mg/kg and 10 mg/kg to mice.Results: Cyclophosphamide-induced neutropenia assay data showed a significant decline in differential leukocyte count (DLC) and total leukocytes count (TLC) in the meloxicam administered groups when compared with control group (p < 0.05). In DTH test, meloxicam showed a significant reduction in skin thickness against dinitrochlorobenzene than the control group, respectively (p < 0.05). A significant dose-dependent decline in antibody titre in the meloxicam-treated groups was observed (p < 0.05), while a gradual decrease in antibody titre occurred with increasing dose. However, there was significant rise in mortality ratio with increasing dose of meloxicam (p < 0.05).Conclusion: The results indicate that meloxicam has immunosuppressive activity in mice, and therefore, can potentially be developed for use in countering organ transplant rejection.

https://www.tjpr.org/home/abstract.php?abstractTitle=Evaluation%20of%20the%20immunomodulatory%20activity%20of%20meloxicam%20in%20vitro%20and%20in%20vivo&id=3977

7.   **Afzal, H., Noor, R., Mumtaz, N., Bashir, M. S., & Saqulain, G. (2023). Effects of Kendall Exercise vs. Gong's Mobilization on Pain, Range of Motion, Function, and Strength in Cases With Text Neck Syndrome.** *Iranian Rehabilitation Journal,* 21(3), 411-420. **doi: 10.32598/irj.21.3.1335.12. Muhammad Salman Bashir (DNS/SHS) Date of Publication: September 2023 HJRS: Y (Null)**

Introduction: The term "text neck" is the brainchild of Dr. Dean and represents an overuse syndrome resulting from a head posture adopted during mobile phone usage with downward and forward flexion [1]. It results in harmful symptoms in areas of the head, neck, shoulder, and upper back. While focusing on the screens of smartphones, as the neck flexion angle increases, the forces on the neck increase proportionately [2]. This postural problem is becoming a major health concern and can affect millions of people worldwide. A study conducted by Kumari et al. reported a high prevalence of text neck syndrome with a mild prevalence of 36%, moderate 23.4%, and severe and complete text neck syndrome of 2.1% [3]. A local study also revealed the alarming nature of the condition with most population suffering neck pain using mobiles for more than 3 hours a day with a neck angle of 30-45 degrees [4]. Clinically text neck can present with neck stiffness, pain that is cutting and radiating, and general features, such as the area being sore, numb, and weak as well as headache [5]. Bad posture related to prolonged musculoskeletal aches includes head bending forwards [6]. Literature reveals that the young adult population lacks awareness as well as knowledge of prevention regarding this condition [7] with treatment strategies being a topic requiring further research [8]. The results of a study conducted by Kong et al. suggest that the Mackenzie and Kendall program is very useful to cater to disabling conditions, neck range of motion (ROM), pain, and improved forward head posture due to mobile usage [9], while Gong et al. reported that Gong mobilization used to increase the ROM is better than glides [10]. Hence, the literature supports the effectiveness of Kendall and Gong's intervention in reducing pain, and disability and improving cervical ROM in separate studies. However, very limited studies have been conducted regarding the use of Gong's intervention in the neck region. Moreover, the combined impact of Kendall versus Gong's

intervention has not been investigated in text neck syndrome. Therefore, the present study undertook to determine the impact of these treatments on pain, movement range, function, strength, and posture in cases suffering from the syndrome of text neck. This area of study is crucial since it involves a huge segment of society and helps clinicians to better decide treatment strategies for cases with text neck syndrome along with future research purposes.

https://irj.uswr.ac.ir/browse.php?a_id=1683&slc_lang=en&sid=1&ftxt=1&html=1

8. **Khan, A., Niazi, M. B. K., Ansar, R., Jahan, Z., Javaid, F., Ahmad, R., . . . Bokhari, A. (2023). Thermochemical conversion of agricultural waste to hydrogen, methane, and biofuels: A review. Fuel, 351. doi: 10.1016/j.fuel.2023.128947. Rafiq Ahmad (DNS/SHS) Date of Publication: November 2023 HJRS: W (Platinum)**

Purpose: To demonstrate the immunomodulatory activity of meloxicam based on cellular and humoral immune responses and in mice. Methods: Cyclophosphamide-induced neutropenia assay and delayed-type hypersensitivity assay (DTH) were carried out to assess cellular immunity. In addition, mouse lethality and haemagglutination assays were carried out to investigate humoral immunity. Meloxicam was administered intraperitoneally in two doses, i.e., 5 mg/kg and 10 mg/kg to mice. Results: Cyclophosphamide-induced neutropenia assay data showed a significant decline in differential leukocyte count (DLC) and total leukocytes count (TLC) in the meloxicam administered groups when compared with control group (p < 0.05). In DTH test, meloxicam showed a significant reduction in skin thickness against dinitrochlorobenzene than the control group, respectively (p < 0.05). A significant dose-dependent decline in antibody titre in the meloxicam-treated groups was observed (p < 0.05), while a gradual decrease in antibody titre occurred with increasing dose. However, there was significant rise in mortality ratio with increasing dose of meloxicam (p < 0.05). Conclusion: The results indicate that meloxicam has immunosuppressive activity in mice, and therefore, can potentially be developed for use in countering organ transplant rejection.

https://www.tjpr.org/home/abstract.php?abstractTitle=Evaluation%20of%20the%20immunomodulatory%20activity%20of%20meloxicam%20in%20vitro%20and%20in%20vivo&id=3977

9. **Akhtar, F., Patel, P. K., Heyat, M. B. B., Yousaf, S., Baig, A. A., Mohona, R. A., . . . Wu, K. (2023). Smartphone Addiction among Students and its Harmful Effects on Mental Health, Oxidative Stress, and Neurodegeneration towards Future Modulation of Anti-Addiction Therapies: A Comprehensive Survey based on SLR, Research Questions, and Network Visualization Techniques. *CNS and Neurological Disorders -Drug Targets,* 22(7), 1070-1089. doi: 10.2174/1871527321666220614121439. Saba Yousaf (DPR\SHS) August 2023 HJRS: W (Bronze)**

Background: Addiction is always harmful to the human body. Smartphone addiction also affects students' mental and physical health. Aim: This study aims to determine the research volume conducted on students who are affected by smartphone addiction and design a database. We intended to highlight critical problems for future research. In addition, this paper enterprises a comprehensive and opinion-based image of smartphone-addicted students. Methodology: We used two types of methods, such as systematic literature review and research questions based on the Scopus database to complete this study. We found 27 research articles and 11885 subjects (mean ±SD: 440.19 ± 513.58) using the PRISMA technique in this study. Additionally, we have deeply investigated evidence to retrieve the current understanding of smartphone addiction from physical changes, mental changes, behavioural changes, impact on performance, and significant concepts. Furthermore, the effect of this addiction has been linked to cancers, oxidative stress, and neurodegenerative disorders. Results: This work has also revealed the future direction and research gap on smartphone addiction among students and has also tried to provide goals for upcoming research to be accomplished more significantly and scientifically. Conclusion: This study suggests future analysis towards identifying novel molecules and pathways for the treatment and decreasing the severity of mobile addiction.

https://www.ingentaconnect.com/content/ben/cnsnddt/2023/00000022/00000007/art00011

10. **Khan, Z. S., Amir, S., Sokač Cvetnić, T., Jurinjak Tušek, A., Benković, M., Jurina, T., . . . Gajdoš Kljusurić, J. (2023). Sustainable Isolation of Bioactive Compounds and Proteins from Plant-Based Food (and Byproducts). *Plants,* 12(16). doi: 10.3390/plants12162904. Saira Amir (DPR\SHS) August 2023 HJRS: W (Silver)**

Plant-based food produces significantly less greenhouse gases, and due to its wealth of bioactive components and/or plant-based protein, it becomes an alternative in a sustainable food system. However, the processing and production of products from plant sources creates byproducts, which can be waste or a source of useful substances that can be reused. The waste produced during the production and processing of food is essentially nutrient- and energy-rich, and it is recognized as an excellent source of secondary raw materials that could be repurposed in the process of manufacturing and preparing food, or as feed for livestock. This review offers an overview of the sources and techniques of the sustainable isolation of bioactive substances and proteins from various sources that might represent waste in the preparation or production of food of plant origin. The aim is to uncover novel approaches to use waste and byproducts from the process of making food to provide this waste food an additional benefit, not forgetting the expectations of the end user, the consumer. For the

successful isolation of bioactive ingredients and proteins from food of plant origin, it is crucial to develop more eco-friendly and efficient extraction techniques with a low CO2 footprint while considering the economic aspects.

https://www.mdpi.com/2223-7747/12/16/2904

11. **Latif, A.,** Shehzad, A., Niazi, S., Zahid, A., Ashraf, W., Iqbal, M. W., . . . Korma, S. A. (2023). Probiotics: mechanism of action, health benefits and their application in food industries. *Frontiers in Microbiology,* 14. doi: 10.3389/fmicb.2023.1216674. Anam Latif (DPR\SHS) August 2023 HJRS: W (Gold)

Probiotics, like lactic acid bacteria, are non-pathogenic microbes that exert health benefits to the host when administered in adequate quantity. Currently, research is being conducted on the molecular events and applications of probiotics. The suggested mechanisms by which probiotics exert their action include; competitive exclusion of pathogens for adhesion sites, improvement of the intestinal mucosal barrier, gut immunomodulation, and neurotransmitter synthesis. This review emphasizes the recent advances in the health benefits of probiotics and the emerging applications of probiotics in the food industry. Due to their capability to modulate gut microbiota and attenuate the immune system, probiotics could be used as an adjuvant in hypertension, hypercholesterolemia, cancer, and gastrointestinal diseases. Considering the functional properties, probiotics are being used in the dairy, beverage, and baking industries. After developing the latest techniques by researchers, probiotics can now survive within harsh processing conditions and withstand GI stresses quite effectively. Thus, the potential of probiotics can efficiently be utilized on a commercial scale in food processing industries.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10470842/

12. **Mohsin, S. N., Saleem, F., Humayun, A., Tanweer, A., & Muddassir, A.** (2023). Prospective Nutraceutical Effects of Cinnamon Derivatives Against Insulin Resistance in Type II Diabetes Mellitus—Evidence From the Literature. Dose-Response, 21(3). doi: 10.1177/15593258231200527. Afifa Tanweer (DNS/SHS) Date of Publication: September 2023 HJRS: X (Honorable Mention)

Apart from advances in pharmaceutical antidiabetic agents, efforts are being made toward hypoglycemic agents derived from natural sources. Cinnamon has been reported to have significant benefits for human health, particularly as an anti-inflammatory, antidiabetic, and anti-hypertriglyceridemic agent. The phytochemicals in cinnamon can be extracted from different parts of plant by distillation and solvent extraction. These chemicals help in decreasing insulin resistance and can act against hyperglycemia and dyslipidemia, inflammation and oxidative stress, obesity, overweight, and abnormal glycation of proteins. Cinnamon has shown to improve all of these conditions in *in vitro*, animal, and/or human studies. However, the mechanism of action of active ingredients found in cinnamon remains unclear. The current review presents the outstanding ability of cinnamon derivatives to control diabetes by various pathways modulating insulin release and insulin receptor signaling. It was also found that the type and dosage of cinnamon as well as subject characteristics including drug interactions are likely to affect the response to cinnamon. Future research directions based on this review include the synergistic usage of various cinnamon derivatives in managing and/or preventing diabetes and possible other relevant chronic diseases.

https://journals.sagepub.com/doi/full/10.1177/15593258231200527

13. **Tanweer, A., Zia, M., Riaz, K., Mushtaq, H., Siddique, M., Imran, S., . . . Hussain, Z. U. U.** (2023). Comparing the web-based and traditional self-reported 24-hour dietary recall data in the PakNutriStudy. *Computer Methods and Programs in Biomedicine*, 240. doi: 10.1016/j.cmpb.2023.107682. Afifa Tanweer (DNS/SHS) Date of Publication: October 2023 HJRS: W (Gold)

Background The flaws in dietary assessment methods can generate misleading information and thus may impact on the interventions planned based on that information. Context specific digitalization of dietary assessment tools is a potential way forward to reduce biases and resources involved in data handling. Methods Two versions of Twenty-Four Hour Recall (24HR) (traditional [24HR Ver-01] and digital [24HR Ver-02]) were tested for data agreement and feasibility by gathering cross sectional paired data on both the versions from 102 participants (18–25 years age). The web based 24HR was setup using the system of Intake24 (New Castle University) with incorporation of South Asian food data base for beverages. Results The data sets obtained from 24HR Ver-01 and 24HR Ver-02 on beverage consumption (food items as well as portion sizes) were compared for agreement. The highest percentage of agreement of food item reporting between 24HR Ver-01 and 24HR Ver-01 was during the lunch time. The average kappa value (κ =0.375833) for all the meals indicated a fair agreement betweenVer-01 and 24HR Ver-02 The correlation of portion sizes reported using 24HR Ver-01 and 24 HR Ver-02 was statistically significant for morning snack, lunch and dinner (r = 0.465; r = 0.324; r = 0.407 respectively). According to Bland Altman plot, least agreement between the two versions was found in the portion sizes reported for morning snacks. Data collectors found 24 HR Ver-02 easier in terms of data processing but it was regarded time taking and less convenient by the participants.

https://www.sciencedirect.com/science/article/abs/pii/S0169260723003474#preview-section-abstract

Book Chapter

1. **Hassan, S. R., Ahmed, N., Saleem, W., Talat, A., Munir, F., Islam, N, Mustafa, F. Yousaf, S, …. Baig, A. A. (2023).** *The detrimental effects of a high-fat diet on the psychological and mental health in normal and obese attributes Everything You Need to Know About High-Fat Diets* **(pp. 303-327). Syeda Rameesha Hassan, Aiza Talat, Nida Islam, Faheem Mustafa, Saba Yousaf (DNS/SHS) Date of Publication: June 2023**
   The ever-increasing consumption of processed and easy-to-go foods contributes to increased saturated and unsaturated fats. Consumption of these high fats, so-called "comfort foods, " has negative repercussions on physical health and devastatingly impacts mental well-being. Such high-fat diets result in direct and indirect alterations in mood, leading to anhedonia. Consumption of a diet high in fat acts as a bridge between two of the most popular co-related ongoing health problems, i.e., obesity and depression. Studies have shown the involvement of HFD in impaired hippocampus neurogenesis, neuronal atrophy, and interference in a cell signaling pathway regulating various psychomotor functions. The dietary fat particles present in the diet can also accumulate in various parts of the brain through bloodstream passage. Long-term consumption of a high-fat diet is directly related to different types of obesity, which augments psychosocial stress. Different dietary fats elicit different effects on the body; it is necessary to know and choose beneficial sources of dietary fats over those having detrimental impacts. This chapter will focus on the association of different types of HFDs with the psychological and mental health in metabolic, inflammatory, and diet-induced obesity
   https://novapublishers.com/shop/everything-you-need-to-know-about-high-fat-diets/

Department of Biomedical Laboratory Sciences

1. **Asghar, M., & Zeshan, B. (2023). Incidence of fluconazole resistance in candida spp. among immunocompromised patients.** *Rawal Medical Journal, 48***(2), 312-312. Madiha Asghar (DBLS\SHS) Date of Publication: May 2023 HJRS: Y (Null)**
   Objective: To determine fluconazole resistance in Candida spp. Among immunocompromised patients. Methodology: This study included of total 100 Bronchoalveolar lavage fluid samples of cancer patients, which comprised 37 lung cancer, 19 lymphoma, 18 leukemia, 4 oral cancer, 7 GI cancer, 6 bone cancer and 9 breast cancer proved by histology reports. Samples were collected from Jinnah Hospital, Lahore, Pakistan. Sabouraud's dextrose agar was used for the isolation of Candida spp. and further confirmed by Gram staining and germ tube test. Disk diffusion method was used to check the susceptibility against fluconazole.Results: Out of patients, 65 were male and 35 females. Out of 100 samples, 40 were positive for lung cancer, 30 for leukemia and 30 for other malignancies proved by histopathology reports. From the samples, 28 (28%) were positive for Candida spp. and within these positive samples, 12 (42.71%) strains were C. albicans and 16 (57.14%) were non albicans species. Out of these 28 positive strains, 4 (14.85%) were resistant, 2 (7.14%) susceptible dose dependent and 22 (78.57%) sensitive to fluconazole. Conclusion: Isolation of candida spp. other than the Candida albicans and presence of resistance to most common drug that was used for the treatment is making the situation alarming. It needs more research to find out new antifungal drugs and mechanisms of drug resistance among Candida spp.
   https://www.rmj.org.pk/?mno=130011

2. **Ahmad, S., Akram, M., Riaz, M., Munir, N., Mahmood Tahir, I., Anwar, H., . . . Ali Shah, S. M. (2023). Zootherapy as traditional therapeutic strategy in the Cholistan desert of Bahawalpur-Pakistan. Veterinary Medicine and Science, 9(4), 1861-1868. doi: 10.1002/vms3.491. Naveed Munir (BLS/SHS) Date of Publication: July 2023 HJRS: W (Honorable Mention)**
   The use of traditional medicines has tremendously increased over the past few decades. Approximately 80% of the world's population relies on traditional medicines for their primary healthcare needs because of their cost effectiveness and efficiency with no or minimal side effects. Zootherapy refers to the use of medicines that are prepared or derived from animals or from their products. The current study documented the folk knowledge related to the practice of various animal-derived products and ethnozoological based drugs used as medicines by the residents of the Cholistan desert of Bahawalpur (Pakistan). In this regard 46 knowledgeable and reliable elderly people, hakims and spiritual healers ranging from 35–60 years of age having knowledge related to zootherapy were included in the current study. A field survey from February 2006 to November 2007 was conducted by interviewing the selected respondents through a structured questionnaire. They provided knowledge regarding the use of animals and their derived products in traditional medicine. The zootherapeutic knowledge was based on both domestic animals as well as wild animals. A total of 20 animal species were included in the study, among which nine animals were domestic while 11 were wild animals. Among selected animals, nine were mammals, four birds, four reptiles and three insects. It was reported that camel was the most commonly used (n = 32 respondents) among mammals while Pigeon (n = 39 respondents), Spiny-tailed lizard (n = 41 respondents) and Indian honey bee (n = 27 respondents) among birds, reptiles and insects, respectively, have significant use for the treatment of different diseases. Based on this communication

we could recommend that this type of abandoned knowledge should be considered for the management and conservation of faunistic resources. However, the advantageous role of animals and their products was reported but more extensive research is required to explore the bioactive constituents in the raw material of these animals responsible for their beneficial effects.

https://onlinelibrary.wiley.com/doi/full/10.1002/vms3.491

Book Chapter

1. **Akram, M., Egbuna, C., Uche, C. Z., Chikwendu, C. J., Zafar, S., Rudrapal, M., ... Munir, N., & Shimavallu, C. (2023). Trends in modern drug discovery and development: A glance in the present millennium. In** *Phytochemistry, Computational Tools and Databases in Drug Discovery* **(pp. 27-38). Elsevier, https://doi.org/10.1016/B978-0-323-90593-0.00008-3. Naveed Munir (DBLS/SHS) Date of Publication: 2023**
The drug discovery and development process is advancing with time and in-silico research has enabled the identification of new drugs through target identification and validation. In-silico screening, quantitative structure-activity relationship, and quantitative structure–property relationship models are some techniques used to evaluate potential compounds with drug-like properties. The process of discovering new drugs is a time-consuming process spanning many years of hard work and resources. This chapter is an introductory chapter that provides information on recent trends in drug discovery in the post-genomic era. It discusses drug-discovery approaches using computational methods for target identification, validation, and homology modeling.

https://www.sciencedirect.com/science/article/abs/pii/B9780323905930000083

Department of Physical Therapy and Rehabilitation

1. **Nawaz, I., Bukhari, A., Warda Shafique, Q., Aiman, U., Rafique, U., Jabeen, S. I. T. A. R. A., ... & Rafique, H. (2023). Factors Associated With Heel Pain in Young Professional.** *Pakistan Journal of Medical & Health Sciences, 17*(05), 16-16. https://doi.org/10.53350/pjmhs202317516.Sania Maqbool (DPTR/SHS) Date of Publication: May 2023 HJRS: Y (Null)**
Background: Heel pain is a common condition that affects people with all age groups but mostly it is found in young and middle age groups. Different factors are thought to be associated with heel pain such as age, body mass index, height , weight, %age of sitting and standing during most part of the day.**Aim:** To identify the factors associated with heel pain and to measure the frequency of heel pain in young professionals.**Methodology:** It was an Observational cross sectional study design which was conducted in the different office and hospital setting of Lahore. 266 participants were taken after meeting inclusion criteria. Data was collected using a standardized questionnaire. SPSS version 26 was used for data analysis.**Results:** there were 266 participants in current study of which 166(62.4%) reported heel pain. Heel pain was reported majorly be females (77.8%). Among young professionals, heel pain was found to be maximum among the lecturers/Teachers (42.2%), nurses (21.7%), doctors and Physiotherapist (6%) and office workers (24.1%). 44.6% participants found effect of heel pain on their quality of work to some extent and 30.1% have strong impact on their QOW.**Conclusions:** From above results its concluded that heel pain is common among young professionals including lecturers, nurses, teachers and physiotherapist. The main factors associated with heel pain was age , gender , percentage of standing and sitting , job nature are associated with heel pain. The factor that can be modified for decreased incidence of heel pain is percentage of standing and if prolonged standing is required according to job nature then it is suggested to change their pressure on heels i.e. by incorporating some walk or sitting interval between hours of continuous weight bearing on feet.

https://pjmhsonline.com/index.php/pjmhs/article/view/4739

2. **Khalid, F., Khalid, U. A. R., Khan, L. N., Salik, S., Saeed, A., Abdullah, Z., & Maqbool, S. (2023).** *Comparative effect of PNF VS early Dynamic stretching in pain, range of motion and functional status in shoulder joint. Pakistan Journal of Medical & Health Sciences, 17*(04), 193-193. **https://doi.org/10.53350/pjmhs2023174193 . Sania Maqbool (DPTR/SHS) Date of Publication: May 2023 HJRS: Y (Null)**
Background: Burn of shoulder and axillary region are common affecting patient's range of motion and his/her performance in his daily life. Because post burn if treatment is not given, contracture will ultimately form.Aim: To determine the comparative effectiveness of PNF (hold relax) VS early Dynamic stretching exercises for improving pain, range of motion and functional status in the shoulder joint and quality of functional recovery in burn patients. Methodology: A single blinded Randomized clinical trial was conducted at Mayo Hospital, Burn ward. Total 74 patients (Male and Female) were included in the study on the basis of inclusion and exclusion criteria. Participants were randomly allocated in two groups, 32 in each group by odd even method. Group 1 received PNF (hold-relax) protocol while group 2 received Dynamic stretching protocol, both the groups received the treatment along with conventional therapy on alternate days for 4 weeks. Pre and post

treatment assessment VAS, Q-DASH score and ranges of motion were done. Data was analyzed using SPSS 23 version. Paired sample T-test and independent sample T test was used to assess within and between group analysis with having confidence interval CI 95% and p value 0.05. The purpose of paired T-test and independent t-test was to determine the difference within and between the groups in all clinical parameters (Q-DASH score, VAS score and ROM) during both pre and post treatment. Results: According to the findings, VAS, Q-DASH scoring and ranges of affected burn shoulder joint were significantly improved in both groups ie, treated with PNF and Dynamic stretching protocol. However, on group comparison; statistically significant improvement in VAS, Q-DASH scoring and ranges of shoulder were observed in patients treated with PNF as compared to Dynamic stretching with p-value< 0.05.Practical implication: The study provides the opportunity to physiotherapist to get aware of the role of PNF and dynamic stretching in preventing and treating post burn patients. It provides the statistical effectiveness of techniques in increasing the recovery rate of patients by using defined treatment protocol .Conclusion: This study proved that PNF and Early Dynamic Stretching both are effective in improving pain, range of motions and functional status among burn patients. However; PNF (hold relax) was more beneficial for improving functional status and treating pain and range of motion in shoulder joint of burn patients with p-value< 0.05.
https://pjmhsonline.com/index.php/pjmhs/article/view/4607/4556

3. **Fatima, M., Riaz, S., Amir, S. N., Shoaib, S., Saleem, M., Imran, L., & Amir, L. (2023). Comparison of physical performance measures of flexibility, strength & balance of school students with university students.** *Pakistan Journal of Medical & Health Sciences, 17*(03), 82-82. **https://doi.org/10.53350/pjmhs202317382 . Mishkat Fatima, Saba Riaz, Syeda Nimra Amir, Sahar Shoaib, Maheera Saleem, Laiba Imran, Laiba Amir (DPTR/SHS) Date of Publication: March 2023 HJRS: Y (Null)**

Aim: To find out variation in flexibility, strength and balance of university and school students on their dominant and non-dominant sides.Study Design: A Cross section study.Place and duration of study: Data was collected from Lahore grammar school (LGS), Al'Ala school and university of management and technology (UMT), Lahore. After approval of synopsis (RE-092-2021) the data collection was done from the duration of 10 th November 2021 to 15 th February 2022.Methodology: A cross section study conducted on healthy school and university students. The data was collected by non-probability convenient sampling. After verbal Informed consent the data was obtained from school students of grade 7-10 from Lahore Grammar school and Al'Ala international Islamic school and undergraduate's students of UMT by using convenient sampling. Physical performance tests for measuring strength (sit-ups), flexibility (Zipper, sit and reach, dorsiflexion) and balance (Flamingo test) were demonstrated and were asked to perform. Readings were taken of each test.Results: Sit ups excellent results were reported in majority of university students (36%). Sit and reach test was found better in university (32%), zipper test positive results were better in school students. Dorsiflexion test normal values were more in university (18%). Flamingo test showed 45% university students had good balance. There was statistically significant difference in zipper (P= 0.004), flamingo (P= 0.036) on non-dominant side and sit and reach dominant (P= 0.006) and non-dominant side (P= 0.031).Practical implication: The normative data of physical performance measures can help prevent injuries, as these can be used as a reference to detect poor health and lethargy at school and university level. These measures can be used as a reference for primary prevention among university going and school going students. Furthermore, to increase awareness about physical fitness among young population.Conclusion: Both groups showed good physical performance measures. Flexibility test showed better results in School students. Strength test showed better result in university students whereas, balance test reported better in school students.
https://www.pjmhsonline.com/index.php/pjmhs/article/view/4249/4200

4. **Jawa, R., Akbar, M. A., Maqbool, S., Ilyas, T., Arshad, S., Hayder, A., & Siddiqui, O. (2023). Frequency of Musculoskeletal Impairments or Disorders among Covid-19 patients recovered six months back.** *Pakistan Journal of Medical & Health Sciences, 17*(01), 75-75. **https://doi.org/10.53350/pjmhs202317175 . Rabia Jawa, Muhammad Ammar Akbar, Tamknat Ilyas (DPTR/SHS) Date of Publication: February 2023 HJRS: Y (Null)**

Background: COVID-19 is essentially an illness brought about by corona virus. COVID-19 is transmitted primarily by close contact between infected individuals. COVID-19 has been related to myalgia and general weakness in one-quarter to one-portion of suggestive patients. Aim: To recognize the number of Covid-19 recovered patients who at present complain of musculoskeletal impairments. Methods: This was an observational study in which 181 covid-19 recovered patients were surveyed. Data was collected from different hospitals of Pakistan, through self-made questionnaire and analyzed by SPSS version 21.Results: After the collection of data, gender differences exist in musculoskeletal disorders after comparison of both genders with age group 20 to 50 years with 48% are males 58% are females and pie chart shows prevalence of musculoskeletal disorders among covid-19 recovered patients. According to the findings, around 35% of 181 healed patients (with pain in their body parts) have seen a doctor in the last 6 months, while 65% have not visited a hospital to consult a doctor for MSK disease Practical Implication: Musculoskeletal impairments are

leading cause of pain and disability that can lead to deformity if remain untreated or left without prior notice. As Covid-19 infection rate is getting higher day by day and till date vaccination is not available to everyone here. We must ensure that anyone getting infected by the novel Corona can have least negative effects even after patients get cured. Conclusion: Gender differences exist in musculoskeletal problems. We have to compare it with Covid. Here we may say that it may be due to more stress among females, there are more chances of MSK issue among females as compared to males.

https://www.pjmhsonline.com/index.php/pjmhs/article/view/3768/3724

5. **Riaz, S., Sattar, A., Seemal, P., Majeed, R., Naveed, A., Abid, N., & Bashir, S.** (2023). **Comparison of Extracorporeal Shockwave and High-Intensity Laser in Treating Chronic Plantar Fasciitis.** *Pakistan Journal of Medical & Health Sciences, 17*(05), 46-46. https://doi.org/10.53350/pjmhs202317546 . **Saba Riaz, Aroona Sattar, Pakeeza Seemal, Rabia Majeed, Aqsa Naveed, Nouman Abid, Salman Bashir (DPTR/SHS) Date of Publication: May 2023** HJRS: Y (Null)

Background: Plantar fasciitis (PF), an inflammation of the plantar fascia. This study compared the effects of the extracorporeal shockwave and high-intensity laser in reducing pain and enhancing function in chronic plantar fasciitis patients, who have failed to achieve results by the conservative treatment. **Aim:** To explore the best non-invasive treatment option for chronic PF within the scope of physical therapy. Method**:** After registry of trial the data collection was started. A total of45 chronic PF patients were divided, randomly into three groups. Group 1 received BTL-6000 Shockwave therapy (ESWT) , group 2 received Diowave 60W Class IV hot Laser (HILT) and group 3 (the control group) was not given any electrotherapy treatment. All groups were given some exercises for the home plan. The groups were assessed with the Visual Analogue scale (VAS) and foot functional index (FFI) at baseline, post-treatment, and follow-up of 2 months. **Result:** The mean age of participants was 39.66±10.05,38.06 ±12.64 and 37.40±13.18 for ESWT, HILT group and control groups respectively. There was significant difference in VAS and FFI score p=<0.001 across the time. Pre-treatment and post-treatment scores were significantly different but post treatment and follow-up scores were not significantly different for both VAS and FFI score (p=1.00). **Practical implication:** This study will help us to find out chronic Plantar fasciitis treatment within physical therapy and electrotherapy domain. As both these modalities are non-invasive, cost effective and proved as effective treatment for reduction of pain and improvement of pain in chronic plantar fasciitis patients. **Conclusion:** Extracorporeal shockwave have been promising treatment for chronic plantar fasciitis but High intensity LASER therapy effectiveness was not explored a lot in previous literature. The study concluded that both ESWT and HILT are effective in reducing pain and improving function on VAS and FFI, though the ESWT group was found better than both groups in FFI score and VAS across time on the basis of the mean differences across time.

https://pjmhsonline.com/index.php/pjmhs/article/view/4748

6. **Khan, J., Mushtaq, M., Rafiq, S., Zia, S., Qamar, S., Saeed, M., ... & Sukhera, S.** (2023). **Frequency of Urinary Incontinence and its Risk Factors among Pregnant Women. Pakistan** *Journal of Medical & Health Sciences, 17*(01), 11-11. https://doi.org/10.53350/pjmhs202317111 . **Maida Mushtaq (DPTR/SHS) February 2023** HJRS: Y (Null)

Aim: The frequency of urinary incontinence and its risk factors among pregnant women in second and third trimester of Jinnah Hospital and Lady Willingdon Hospital using ICIQ-UI-SF. **Study design:** This is a cross-sectional observational study. **Place and duration:** 350 subjects were included in study by Non-probability/purposive sampling technique from Jinnah Hospital, Lahore and Lady Willingdon Hospital, Lahore and completed in 6 months. **Methodology:** International Consultation on Incontinence questionnaire- Urinary Incontinence- Short Form (ICIQ-UI-SF) was used to evaluate subjects to UI severity. Data was analyzed using SPSS version 21**. Results:** According to ICIQ-UI-SF questionnaire, out of 350 respondents, 11(3.1%) respondents showed slight symptom severity, 44(12.6%) respondents showed moderate symptom severity, 32(9.1%) respondents showed severe symptom severity and 263(75.1%) showed no symptoms at all. On a scale of 10, urinary incontinence affected the quality of life of pregnant females by 6. There was a statistical significance between ICIQ-UI-SF score and parity and number of previous vaginal deliveries (p=.011 and p=.000 respectively).**Conclusion:** In this study it is concluded that considerate number of respondents had symptoms of Urinary Incontinence irrespective of their trimester of pregnancy. There was no association found between disease severity and age of the respondents. Trimester of pregnancy did not have any statistical significance with the symptom's severity, but it was found to have a statistical significance with parity and the number of previous vaginal deliveries.

https://www.pjmhsonline.com/index.php/pjmhs/article/view/3750

7. **Anwar, M., Mughal, M. W., Izhar, N., & Rasheed, M.** (2023). **Effectiveness of Maitland Mobilization Technique in Comparison with Mulligan Mobilization Technique in Management of Frozen Shoulder.** *Pakistan Journal of Medical & Health Sciences,* 17(05), 57-57. https://doi.org/10.53350/pjmhs202317557 . **Mamoona Anwar (DPTR/SHS) May 2023** HJRS: Y (Null)

Background: Frozen shoulder refers to a common shoulder condition characterized by a general limitation of shoulder range of motion in the capsule model. The capsular pattern of the shoulder is characterized by the greatest limitation of passive lateral rotation and abduction. Physiotherapy is the most important part of the conservative treatment of frozen shoulder. **Aim:** To find the role of Maitland mobilization technique in treatment of frozen shoulder with Mulligan's mobilization techniques and its possible effects in early gaining of ROM and pain management. **Methods:** This was a comparative study conducted at the Department of Physical Therapy and Orthopedic Surgery I, King Edward Medical College/Mayo Hospital, Lahore. Subjects were conveniently divided into her two groups, each group containing her 40 patients. In group A, patients were treated with Maitland manipulative therapy. In group B, patients were treated with mulligan mobilization and movement techniques. Patients in both groups were followed for up to 6 weeks and improvements in motor parameters were recorded at each patient's follow-up visit. SPSS was used for data entry and analysis. **Result:** A total of 50 patients participated in this study. The mean age of patients in group A was 46.23 years and the mean age of group B was 45.23 years at the onset of the disease at 6 weeks, 11 patients at 10 weeks, and 2 patients at 12-year intervals. Patients had an onset duration of 6 weeks, 10 patients had an onset duration of 10 weeks, and 6 patients had an onset duration of 12 weeks. Abduction was observed to be significantly improved in patients treated with the Mulligan method compared with those treated with the Maitland mobilization method. **Practical implication:** More specifically, the study will be focused on the examining the shoulder active and passive ROMs and pain reduction before and after the treatment. All measured characteristics of FS patients will be compared with those of the subjects with asymptomatic shoulders. **Conclusion:** In comparison with Mulligan mobilization technique, Maitland mobilization technique is more effective in the management of frozen shoulder.
https://pjmhsonline.com/index.php/pjmhs/article/view/4751

8. **Jamil, M. A. ., Bashir, M. S. ., Noor, R. ., Niazi, R. ., Ahmad, N. ., Ahmad, S. ., & Ahmad, H. U. . (2023). Effects of Core Stabilization Exercises on Low Back Pain, Disability and Back Muscle Endurance in Patients with Lumbar Disc Herniation.** *Annals of King Edward Medical University*, *29*(2), 123–128. **https://doi.org/10.21649/akemu.v29i2.5434. Muhammad Salman Bashir (DPTR/SHS) June 2023 HJRS: Y (Null)**

Background: Lumbar disc herniation is a common musculoskeletal disorder leading to spinal degeneration. Core stability influences lumbar biomechanics, which improves muscle endurance through decreased pain of the lower back leading to minimal chances of disability. Objective: To determine the effects of Core stabilizing exercises on low back pain, disability and endurance of back muscles in Lumbar Disc Herniation patients. Methods: Randomized controlled trial was conducted on 52 patients. it was conducted 3 times a week for 30 minutes for 6 months. Participants allocated into two equal groups by lottery method. Group A was treated with controlled conventional treatment and core stabilizing exercises. Group B received only conventional treatment. This information was collected using NPRS and ODI. Besides this Biering-Sorenson and trunk flexion endurance tests were used. Probability sampling was used. Settings included AMTH, PSRD and NHMC. The study was conducted for 6 months. Ethical permission by ethical review board. data analysis by SPSS. This included male and female patients, age 20 to 60 years with disc herniation. Participants with recent surgery, inflammatory arthritis, cauda equina syndrome and spinal tumor were excluded. Results: After 8-weeks of core stabilization exercises, values of Group A are 1.93 for pain, 16.08 for disability, 1.27 and 40.54 for endurance whereas Group B showed values of 4.74 for pain, 34.08 for disability, 2.15 and 34.81 for endurance. Independent t-test showed significant difference between 2 groups with p value < 0.05. Results of current study showed considerable reduction in low back pain and disability, and a significant increase in back muscles endurance in the treatment group. Conclusion: Core stabilization exercises were effective in improving function, reducing pain, reducing functional disability and enhancing endurance in patients of lumbar disc herniation and lower back pain.
https://www.annalskemu.org/journal/index.php/annals/article/view/5434/3164

9. **Jamil, M. A. ., Bashir, M. S. ., Noor, R. ., Niazi, R. ., Ahmad, N. ., Ahmad, S. ., & Ahmad, H. U. . (2023). Effects of Core Stabilization Exercises on Low Back Pain, Disability and Back Muscle Endurance in Patients with Lumbar Disc Herniation.** *Annals of King Edward Medical University*, *29*(2), 123–128. **https://doi.org/10.21649/akemu.v29i2.5434. Muhammad Salman Bashir (DPTR/SHS) June 2023 HJRS: Y (Null)**

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endurance tests were used. Probability sampling was used. Settings included AMTH, PSRD and NHMC. The study was conducted for 6 months. Ethical permission by ethical review board. data analysis by SPSS. This included male and female patients, age 20 to 60 years with disc herniation. Participants with recent surgery, inflammatory arthritis, cauda equina syndrome and spinal tumor were excluded. Results: After 8-weeks of core stabilization exercises, values of Group A are 1.93 for pain, 16.08 for disability, 1.27 and 40.54 for endurance whereas Group B showed values of 4.74 for pain, 34.08 for disability, 2.15 and 34.81 for endurance. Independent t-test showed significant difference between 2 groups with p value < 0.05. Results of current study showed considerable reduction in low back pain and disability, and a significant increase in back muscles endurance in the treatment group. Conclusion: Core stabilization exercises were effective in improving function, reducing pain, reducing functional disability and enhancing endurance in patients of lumbar disc herniation and lower back pain.

https://www.annalskemu.org/journal/index.php/annals/article/view/5434/3164

10. **Rehman, A., Aslam, M., Iqra Mubeen, Ahmad, M., Zainab, S. R., & Bashir, M. S. (2023). Effectiveness of Pain Release Phenomenon in Chronic Cervical Pain: Pain Release Phenomenon in Cervical Pain.** *The Healer Journal of Physiotherapy and Rehabilitation Sciences*, **3**(6), 587–592. **https://doi.org/10.55735/hjprs.v3i6.163. Muhammad Salman Bashir (DPTR/SHS) June 2023 HJRS: Y (Null)**
Background: Physical therapy intervention is the mainstay for treating chronic neck pain i.e. Non-specific. Despite the availability of several treatment options, there is a lack of agreement on any specific treatment approach for chronic cervical pain. **Objective:** To find the effectiveness of the Pain Release Phenomenon in chronic cervical pain for pain and finding how long those results were sustained by the patient. **Methods:** A quasi-experimental study with a total of 44 patients was conducted in Gulab Devi Hospital and Lifeline Hospital, Lahore for six months. Data was collected using a purposive sampling technique and patients with age between 25 to 45 years having chronic cervical pain for at least two months were included and subjects who had undergone any surgical procedure, having radiculopathy and systemic disease were excluded. After taking written consent from the participants, the pain intensity was measured by a numeric pain rating scale at baseline, then four sessions of pain release phenomenon were applied in a week and the readings were measured after two weeks follow up, then again four sessions were applied in next week and then readings were measured at follow up period after four weeks. The data were analyzed by using SPSS version v20. After assessing the normality by Shapiro Wilk test and Q-Q plot the data were normally distributed as the (p-value>0.05). The repeated measure analysis of variance test was used to analyze the data. The presentation of qualitative variables was in the form of frequency tables and percentages whereas quantitative variables were presented in the form of mean and standard deviation. **Results:** Patients did not differ in baseline pain and disability level initially. Two weeks and four weeks post-intervention receiving pain release phenomenon showed markedly improved functional status (p-value=0.00, confidence interval=95%) and reduction in the level of pain (p-value=0.00, confidence interval=95%). **Conclusion**: This study concluded that the Pain release phenomenon is an effective technique in the improvement of movement and function and also in reducing pain in patients having chronic cervical pain over a total of six weeks and the effects of the treatment last over a period given for follow-ups.

https://thehealerjournal.com/index.php/templates/article/view/163

11. **Zahid, H., Ahmed , K., Ali, M., Bashir , U., Batool, A., & Bashir, M. S. (2023). Muscle Energy Technique Versus Dry Needling of Active Trigger Points in Quadratus Lumborum: A Comparative Study on Functional Disability in Low Back Pain.** *Journal of Health and Rehabilitation Research*, **3**(2), 181–186. **https://doi.org/10.61919/jhrr.v3i2.72. Komal Ahmed, Muhammad Salman Bashir (DPTR/SHS) December 2023 HJRS: Y (Null)**
Background: Lower back pain (LBP) is a prevalent condition that significantly impacts the quality of life and mobility of individuals. Active trigger points in the quadratus lumborum muscle are a common source of LBP, often requiring effective physiotherapeutic interventions. Dry needling (DN) and Muscle Energy Techniques (METs) are two commonly used treatments, though their comparative efficacy has not been extensively studied. Objective: The study aimed to compare the effects of DN and METs on the functional disability of patients with active quadratus lumborum trigger points contributing to lower back pain. Methods: In this randomized controlled trial, 24 patients were equally divided into two groups to receive either DN or METs over a three-week period, with sessions conducted twice weekly. The Modified Oswestry Disability Index (MODI) was employed to measure functional disability at baseline, after the first, third, and sixth sessions. Repeated measures ANOVA was utilized for intra-group and inter-group comparisons. Results: Both interventions showed a decrease in MODI scores, indicating an improvement in functional disability. However, DN was significantly more effective than METs in reducing disability scores (p < 0.05). Notably, no significant difference was found between the post-treatment NPRS and PPT scores within or between the groups. Conclusion: DN appears to be a more effective intervention than METs for reducing functional disability associated with active trigger points in the quadratus lumborum among LBP patients. Despite the efficacy of both treatments, DN may be prioritized as a preferred modality in clinical settings.

https://jhrlmc.com/index.php/home/article/view/72/110

12. **Meer, T. A., Noor, R., Bashir, M. S., & Ikram, M. (2023). Comparative effects of lymphatic drainage and soft tissue mobilization on pain threshold, shoulder mobility and quality of life in patients with axillary web syndrome after mastectomy.** *BMC Women's Health,* **23(1). doi: 10.1186/s12905-023-02762-w. Muhammad Salman Bashir (DPTR/SHS) Date of Publication: November 2023 HJRS: W (Bronze)**

The purpose was to compare the effects of manual lymphatic drainage and soft tissue mobilization on pain threshold, shoulder mobility and quality of life in patients with axillary web syndrome. This randomized clinical trial was conducted on 36 breast cancer patients with developed axillary web; participants were randomly divided into two groups. One group was treated with manual lymphatic drainage; the other group was treated with soft tissue mobilizations in addition to therapeutic exercises, i.e., stretching, strengthening and range of motion (ROM) exercises. The duration of treatment was four weeks (5 sessions/week), with therapeutic exercises as a common treatment protocol. Outcome measures were Breast-Cancer specific quality of life questionnaires, Disabilities of the Arm, Shoulder and Hand (DASH), Numeric Pain Rating Scale (NPRS), Patient Specific Functional Scale (PSFS), Dynamometer and Goniometer. All outcome measure readings were recorded at baseline and the end (4th week) of the treatment. The compliance of the variable distribution with normal distribution was verified using the Shaphiro-Wilk test. Parametric tests were applied, and both groups showed significant effects (p0.05). Two parameters (DASH, PSFS) and one component of the quality of life questionnaire (global health) showed a significant difference (p<0.05). (Manual lymphatic drainage showed more improvement in functional movements. It was concluded that both groups, manual lymphatic drainage and soft tissue mobilization groups were clinically equally effective.

https://link.springer.com/article/10.1186/s12905-023-02762-w#Abs1

13. **Ilyas, T., Wadood, A., Jawa, R., Ali, S., Ayub, R., Maqbool, S., & Qamar, S. (2023). Frequency of Temporomandibular Joint Dysfunction among Undergraduate University Students: A Cross Sectional Study: Frequency of Temporomandibular Joint Dysfunction.** *Pakistan Journal of Health Sciences,* **4(10), 194–197. https://doi.org/10.54393/pjhs.v4i10.997. Tamknat Ilyas, Asma Wadood, Rabia Jawa, Sidra Ali, Rahat Ayub, Saddiqa Qamar (DPTR/SHS) Date of Publication: October 2023 HJRS: Y (Null)**

Temporomandibular joint dysfunction (TMJD) is an umbrella term covering pain and dysfunction of the muscles of mastication (jaw muscles). Disorder of temporomandibular Joint is one of the most common health problems. It is a term used to cover a number of multiple clinical issues related to temporomandibular joint, muscles of mastication and teeth. The trio that effects the arrangement and balance of TMJ, dental occlusion and muscles of mastication revolves mainly around "psychological, postural and structural elements. Objective: To find out Frequency of TMJD among undergraduate university students. Methods: Cross-sectional survey was conducted in duration of 3 months after approval of synopsis across University of Management and Technology (UMT). Self-designed questionnaire and TMJ dysfunction questionnaire was used. The sample size of this study was 200 calculated by Rao software.   It took 9 months' time period to complete the study. Random sampling technique has been used in this study to collect the data. SPSS version 21 was used to analyze data, frequency tables and bar charts were made. Results: Results showed that 63.5% (n=127) were considered themselves chronically fatigued and 77% (n=154) grinded their teeth at night. 64% (n=128) of the students were from health sciences background. This shows the association of prevalence of TMJDs and stress in university students. Conclusions: Study showed high frequency of TMD amongst students due to chronic fatigue, overload of study, poor ergonomics, and working hours, which are associating risk factors for TMD. Stress management & good ergonomics strategies are required.

https://thejas.com.pk/index.php/pjhs/article/view/997

14. **Riaz, S., Mazhar, T., Riaz, S., Batool, A., Khan, A., & Khan, S. (2023). Correlation of Handgrip Strength with Thumb Flexibility, Strength and Pain in Manual Therapists.** *Pakistan Armed Forces Medical Journal,* **73(6), 1699-1702. https://doi.org/10.51253/pafmj.v73i6.9142. Saba Riaz, Tooba Mazhar, Sumbal Riaz, Ayesha Batool, Awishbah Khan, Sadia Khan (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)**

Objective: To find the correlation bwteen hand grip strength with thumb muscle strength, flexibility and thumb pain in manual therapists and to find out the variation of these variables in healthy manual therapists. Study Design: Comparative cross-sectional Study. Place and Duration of Study: Pakistan Society of Rehabilitation and Disability, Jinnah Hospital, Ittefaq Hospital, and Riphah University Pakistan, from Nov 2021 to Jan 2022. Methodology: One hundred thirty-five manual therapists were enrolled. Informed consent was taken from participants. meeting inclusion and exclusion criteria. The questionnaire was filled out using a Dynamometer for Handgrip strength check, a Manual Muscle testing technique for Thumb muscle strength check, a Numeric pain rating scale for Pain intensity, and Goniometry for Flexibility of the Thumb muscles. Results: Results showed that most manual therapists had no wrist pain (99,73.3%) or thumb pain (104,77%). The majority of therapists (116 ,85.9%), had less than normal grip strength of hand, and 58(43%) had maximum thumb strength. There was a positive correlation between grip strength and thumb strength (r=0.234). There was a negative correlation between grip strength and thumb pain (r=-0.077).Conclusion: The study concluded that

most manual therapists did not suffer from wrist and thumb pain. The majority had good thumb muscle strength but poor hand grip strength. Thumb strength positively correlates with grip strength, while thumb pain negatively correlates with handgrip strength.
https://www.pafmj.org/PAFMJ/article/view/9142

15. **Nadeem, F., Hussain, G., Manzoor, N., Masood, F., Hassan, Z., Beenish, D., & Fazal, N.** (2023). **The Association of Cutaneous Allodynia and Impaired Balance with Tension Headache in Young Females with Modern Aesthetic Headscarves Usage.** *Journal of Health and Rehabilitation Research,* **3(2),** 6–13. https://doi.org/10.61919/jhrr.v3i2.52. **Farheen Nadeem, Ghazal Hussain, Nosheen Manzoor, Fizza Masood, Zainab Hassan, Dina Beenish, Nisha Fazal** (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)

Objective: Background: The burgeoning trend of wearing modern aesthetic headscarves has become a cultural mainstay among young females, warranting an examination into its potential health outcomes. This study focuses on the occurrence of tension-type headaches (TTH), a common ailment in this population, and investigates the potential exacerbation of symptoms such as cutaneous allodynia (CA) and balance impairments due to headscarf usage. Existing research has only minimally explored these connections. Objective: The objective of this research was to evaluate the association between the use of modern aesthetic headscarves and the prevalence of CA and balance disturbances in young females diagnosed with TTH. Methods: This cross-sectional survey involved 260 young females from four academic institutions, all of whom fulfilled the International Classification of Headache Disorders, 3rd edition (ICHD-3) criteria for TTH. Data were manually collected and involved the administration of the Allodynia Symptom Checklist-12 (ASC-12) to assess CA and the Romberg test for balance evaluation. The collected data were analyzed using SPSS to establish the relationship between headscarf usage, CA, and balance dysfunction.Results: The investigation discovered that 202 out of the 260 subjects (77.7%) experienced CA with varying degrees of severity: mild (30.8%, n=80), moderate (34.6%, n=90), and severe (12.3%, n=32). Balance impairments were detected in 40% of the participants (n=104). A significant correlation (p<0.01) was observed between the intensity of CA and the degree of balance dysfunction, as analysed by SPSS. Conclusion: The research highlighted a noteworthy link between the use of modern aesthetic headscarves and an increased incidence of CA and balance disturbances in young females with TTH. The data advocates for a heightened awareness and proactive approach to mitigate the potential negative health impacts related to the fashion choice of headscarf wear.
https://jhrlmc.com/index.php/home/article/view/52/87

16. **Ahmed, K., Hussain , G., Khan, H.,** Zahid, H., & Batool, A. (2023). **Assessing the Efficacy of Pressure Algometry in Lower Back Pain: A Comparative Study of Muscle Energy Technique and Dry Needling on Active Trigger Points of Quadratus Lumborum.** *Journal of Health and Rehabilitation Research***, 3(2),** 168–173. https://doi.org/10.61919/jhrr.v3i2.75. **Komal Ahmed, Ghazal Hussain, Hafsa Khan** (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)

Background: The prevalence of chronic lower back pain has serious repercussions for the working population. Myofascial trigger points in the quadratus lumborum muscle are a substantial but sometimes ignored contributor to this pain. These trigger points form as a result of changing or increased muscle demands, acute or long-term strains on the lower back muscles, and so forth. Hyperirritable foci inside tense regions of hypertonic muscle tissue are what distinguish them. The well accepted manual therapy techniques such as dry needling and muscle energy method are used to deactivate trigger points and restore muscular balance to address this issue. Objective: To determine the effects of muscle energy technique and dry needling of active trigger points of quadratus lumborum in lower back pain. Methods: There was a randomised controlled study. Based on inclusion and exclusion criteria, 24 subjects were chosen, divided into groups A and B. Digital algometer was used to measure the sensitivity of the trigger points. Group B underwent dry needling while Group A received the Muscle Energy Technique. Each patient received two sessions every week for three weeks. After the first, third, and sixth therapy sessions, the two groups were evaluated. Data was examined using SPSS version 21.Results: Findings revealed that differences between two groups were statistically significant (p <0.05) and also statistically significant difference were observed within group analysis (p< 0.05) with respect to pain pressure threshold.Conclusion: The study concluded that both Dry Needling and Muscle Energy Technique on trigger points were equally effective in increase pain pressure threshold in lower back pain.
https://jhrlmc.com/index.php/home/article/view/75

17. **Hussain, G.,** Nawaz, A. S., Haroon, M. S., Amon, S. K., & **Khan, H.** (2023). **Prevalence of upper cross syndrome in working female physiotherapists a cross-sectional survey.** *Biological and Clinical Sciences Research Journal,* **2023 (1),** 402. https://doi.org/10.54112/bcsrj.v2023i1.402. **Ghazal Hussain, Hafsa Khan** (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)

Upper crossing syndrome is a common postural dysfunction resulting from the muscles in the body's shoulder girdle/cervicothoracic region having a deficient tone. The muscles typically affected are the upper trapezius and the levator scapula, which is extremely common in physiotherapists. Poor posture is the main driver of

UCS. Researchers have long seen the syndrome, whose work demands much bending and twisting. A cross-sectional study assessed the Upper Cross Syndrome in working female physiotherapists. Two hundred female physiotherapists completed The Oswestry Neck Pain and Disability Questionnaire, administered to individuals aged 23-38 who met the inclusion and exclusion criteria. Significant factors for the prevalence of upper cross syndrome in female physiotherapists were Age, gender, and working hours, all of which posed serious risks for the emergence of UCS. UCS was, nevertheless, very common among female physiotherapists. It was determined that 27% of practicing physiotherapists had Upper Cross Syndrome (UCS). The study found that pain intensity, headache, driving, and work were all significantly associated, with P-values of 0.000, 0.005, and 0.002, respectively, as determined by the chi-square test. This indicates that the results were statistically significant. Additionally, the study revealed that upper cross syndrome was highly prevalent among working physiotherapists, with a prevalence rate of 27%. The prevalence was directly related to the duration and hours of work. Furthermore, there was a strong correlation between work-related musculoskeletal disorders and upper cross syndrome.

https://bcsrj.com/ojs/index.php/bcsrj/article/view/402

18. **Hussain, G., Rasheed, B. F., Rashid, H. H., Ashraf, M., Manzoor, M., Naeem, Z., Kazmi, S. M., & Qamar, S. (2023). Prevalence of Patellofemoral Pain Syndrome and Its association with Knee Stiffness in Sanitary Workers.** *Pakistan Journal of Health Sciences,* **4(11), 44–48. https://doi.org/10.54393/pjhs.v4i11.1139.** Ghazal Hussain, Bibi Fatima Rasheed, Mariyam Ashraf, Maham Manzoor, Zainab Naeem, Syeda Mishal Kazmi, Siddiqa Qamar **(DPTR/SHS) Date of Publication: November 2023** HJRS: Y (Null)

Patellofemoral pain syndrome is an overuse injury that causes pain in the front of knee and it's more common in females. Heavy workload and consistent stress on knee especially in labour work is also affecting male population with this syndrome. It can affect quality of life by limiting functions and it has long term effects. Objective: To determine the prevalence of patellofemoral pain syndrome in sanitary workers who are facing knee stiffness or knee pain. Methods: A sample of 128 participants of age 30-50 years of sanitary workers was included for the survey, according to inclusion criteria. For the selection of participants, convenience sampling was used. Pendulum test, Patellar grind test, and Knee Injury and osteoarthritis outcome score survey for symptoms and pain were used to collect data. An informed consent was signed by the participants stating that personal information of participants is confidential. Results: SPSS version 22 was used to define the descriptive and associated analysis of data. Results showed that there is association between Knee injury and osteoarthritis outcome score symptoms and patellar grind test (p>.0001) while there is no association between knee outcome score pain sign and pendulum test (p=.482). 259 participants reported 71% overall prevalence of patellofemoral pain. Conclusions: It is concluded that male sanitary workers had high prevalence levels of Patellofemoral pain. Preventative measures such as ergonomics training, physical activity should be taken into consideration to enhance quality of life.

https://www.thejas.com.pk/index.php/pjhs/article/view/1139

19. **Anwar, M., Ans Abrar, Yaseen, I., & Hamza, M. (2023). Effectiveness of BBT Versus DBT on Physical Performance, Depression, and Health-Related Quality of Life Among Patients With COPD.** *Journal of Health and Rehabilitation Research,* **3(2), 1167–1172. https://doi.org/10.61919/jhrr.v3i2.250.** Mamoona Anwar, Makhdom Hamza **(DPTR/SHS) Date of Publication: December 2023** HJRS: Y (Null)

Background: Chronic Obstructive Pulmonary Disease (COPD) is a prevalent condition characterized by decreased respiratory function and reduced quality of life. Pulmonary rehabilitation techniques, specifically Buteyko Breathing Technique (BBT) and Diaphragmatic Breathing Technique (DBT), have been suggested to improve these aspects in COPD patients. However, comparative efficacy of these techniques remains uncertain. Objective: This study aimed to compare the effectiveness of BBT and DBT on exercise capacity and quality of life in patients with COPD. Methods: In a randomized clinical trial (WHO Registry of IRCTs: NCT05947227), 48 COPD patients (aged 40-65 years) were enrolled and randomly assigned to either BBT or DBT groups. Both groups underwent respective breathing technique training as part of pulmonary rehabilitation over a 10-month period at Jinnah Hospital, Lahore. Key measurements included the 6-minute walk test (6MWT) for exercise capacity and the St. George Respiratory Questionnaire (SGRQ) for quality of life assessment. The Modified Borg Dyspnea Scale was used to categorize dyspnea severity. Data were analyzed using SPSS software (Version 25), with parametric and non-parametric tests applied for comparative analysis. Results: Both groups showed improvement post-intervention, but DBT demonstrated superior outcomes. Quality of life scores improved from an average of 85.33 (SD=1.110) to 76.06 (SD=4.503) in the DBT group, compared to 87.16 (SD=4.55) to 83.10 (SD=5.76) in the BBT group (p=0.000). Similarly, 6MWT distances showed significant improvement in the DBT group. The DBT group also exhibited a more considerable enhancement in activity scores and dyspnea reduction compared to the BBT group. Conclusion: While both BBT and DBT are effective in improving exercise capacity and quality of life in COPD patients, DBT shows a more significant improvement. These findings suggest that DBT could be a more favorable technique in pulmonary rehabilitation for COPD patients.

https://jhrlmc.com/index.php/home/article/view/250

20. **Naseer, H., Umair Javaid, M., Ahmad Khan, M., & Nadeem, R.** (2023). Effect of Aerobic Exercise with and without Strengthening Exercises on Neuropathic Symptoms in People with Diabetic Peripheral Neuropathy. *Journal of Health and Rehabilitation Research,* 3(2), 412–417. https://doi.org/10.61919/jhrr.v3i2.156. Moeen Ahmad Khan, Rubab Nadeem (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)

Background: The incidence of peripheral neuropathy among chronic diabetic patients is escalating, with a notable rise observed in Pakistan. This trend has been partly attributed to the predominant reliance on pharmacotherapy, while the role of physical exercise in management remains underutilized. Aerobic exercise is widely recommended in clinical guidelines for the treatment and prevention of diabetic complications, and it is hypothesized that the addition of strength training could yield even more benefits. Objective: This study aimed to evaluate the effects of combined aerobic and strength training exercises on neuropathic symptoms in patients with diabetic peripheral neuropathy. Methods: In this randomized clinical trial, 40 patients with diabetic peripheral neuropathy were equally divided into two groups: Group A underwent a combined regimen of aerobic and strength training exercises, whereas Group B engaged in aerobic exercises alone. The effectiveness of these interventions was assessed using the Michigan Neuropathy Screening Instrument (MNSI), Numeric Pain Rating Scale (NPRS), and Clinical Global Impression of Change (CGIC). Data were analyzed using SPSS version 20.0, employing independent t-tests, repeated measures ANOVA, and descriptive statistics for in-depth analysis. Results: Group A demonstrated a significant reduction in MNSI scores with a mean difference of 1.700 and a p-value < 0.001, indicating a substantial improvement in neuropathic symptoms compared to Group B. While both groups showed significant improvements in NPRS and CGIC scores, the differences were not statistically significant, with p-values of 0.599 and 0.330, respectively, and mean differences of 0.1500 and 0.2500 for NPRS and CGIC. The overall statistical analysis revealed a high significance level (p < 0.001) within both groups in all measured outcomes, suggesting considerable improvements post-intervention. Conclusion: The addition of strength training to aerobic exercises significantly enhances the reduction of neuropathic symptoms in diabetic patients. However, for pain relief and overall clinical improvement, both treatment approaches—combined aerobic and strength training or aerobic exercise alone—were equally effective.
https://jhrlmc.com/index.php/home/article/view/156

21. **Farooq, M., Faisal, S., Rashid, H. H., Sharif, K., Habib, H., Khalid, M., & Hassan, Z.** (2023). Frequency of Urinary Incontinence Among Post COVID Males. *Journal of Health and Rehabilitation Research,* 3(2), 174–180. https://doi.org/10.61919/jhrr.v3i2.88. Zainab Hassan (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)

Background: Amid the global health challenges posed by the COVID-19 pandemic, an association with urinary system complications has been identified. Urinary incontinence (UI) has become a significant post-COVID sequela among males, with substantial implications for their quality of life. Objective: The study aimed to quantify the frequency and delineate the severity of urinary incontinence in post-COVID male patients, as well as to document the prevalence of associated lower urinary tract symptoms. Methods: A cross-sectional observational study was executed, engaging 400 male post-COVID patients aged between 45 to 64 years from three hospitals in Lahore. Participants were selected via non-probability convenience sampling and provided data through the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) and Male Lower Urinary Tract Symptoms (ICIQ-MLUTS). Statistical analyses were performed using SPSS version 21. Results: The prevalence of urinary incontinence among the participants was high, with 367 (91.75%) reporting some degree of UI. In terms of severity, moderate UI was the most common, affecting 248 (67.5%) of those with UI, followed by slight UI in 82 (22.5%), and severe UI in 37 (10%) participants. The study identified urgency (reported by 133 participants or 33.3% 'occasionally' and 132 or 33% 'most of the time') and postvoid dribbling (reported by 159 participants or 39.8% 'most of the time') as the most frequent symptoms. Notably, there were no reports of very severe urinary incontinence. Conclusion: The study concludes a high prevalence of urinary incontinence among male patients post-COVID-19, with the majority experiencing moderate severity. These findings underscore the importance of including urinary incontinence assessments in post-COVID patient care and may inform the development of targeted interventions to improve patient outcomes.
https://jhrlmc.com/index.php/home/article/view/88

22. **Siddiqa, A., Khalid, M., Tarar, A., Sohail, K., Iftikhar, H., Hassan, Z., & Hussain, S. A.** (2023). Kinesiophobia and Artificial Joint Awareness After Total Knee Arthroplasty. *Journal of Health and Rehabilitation Research,* 3(2), 88–92. https://doi.org/10.61919/jhrr.v3i2.61. Zainab Hassan (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)

Background: Total Knee Arthroplasty (TKA) is a commonly performed surgical procedure designed to alleviate pain and disability from knee arthritis. This study aims to explore the psychological aftermath of TKA, focusing on Kinesiophobia (fear of movement) and joint awareness. Objective: To investigate the relationship between Kinesiophobia and the awareness of an artificial joint in patients post-TKA. Methods: This cross-sectional study

involved 64 patients aged 45-64 who underwent TKA 6-12 months prior. Exclusion criteria included other lower extremity surgeries, infection, or history of TKR revision or dislocation. The Forgotten Joint Score (FJS) and the Tampa Scale for Kinesiophobia (TSK) were used for evaluation. Data analysis was performed using SPSS. Results: The study revealed a significant negative correlation between FJS and TSK scores (r = −0.375; p = 0.002), indicating that higher Kinesiophobia levels correlate with increased artificial joint awareness. Additionally, 20.31% of participants had Kinesiophobia and 79.69% had severe Kinesiophobia, with a notable female predominance (84.4%). The mean FJS score was 28.63 (±22.469), and the mean TSK score was 41.10 (±18.68), suggesting a moderate level of Kinesiophobia with wide variability among participants. Conclusion: The study concludes a significant negative relationship between Kinesiophobia and artificial joint awareness post-TKA, highlighting the psychological impact of TKA on patients. These findings emphasize the need for considering psychological factors in post-operative care and rehabilitation.
https://jhrlmc.com/index.php/home/article/view/61

23. **Tarar, A., Faisal, S., Zia, M. U., Sharif, K., Saqib, F., Hassan, Z., & Hussain, S. A. (2023). Translation and Validation of Tampa Scale for Kinesiophobia in Urdu Language for Patients with Chronic Low Back Pain.** *Journal of Health and Rehabilitation Research,* **3(2), 68–73. https://doi.org/10.61919/jhrr.v3i2.87. Zainab Hassan (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)**
Background: Chronic Low Back Pain (CLBP) significantly impacts patients' quality of life and is often associated with kinesiophobia, the fear of movement due to pain. The Tampa Scale for Kinesiophobia (TSK) is a recognized tool for assessing this condition, but there is a need for a version tailored to Urdu-speaking populations. Objective: This study aimed to translate and validate the TSK into Urdu for patients with CLBP, ensuring its reliability and cultural relevance in the Pakistani context. Methods: This descriptive cross-cultural linguistic validation study followed Bombardier, Beaton, and Guillemin's guidelines. The TSK underwent forward and backward translation by two independent translators, a professor of Urdu literature and a medical professional. A final version was created and reviewed by bilingual experts, then validated by a panel of 20 physical therapists. This validated version was tested on 150 patients to determine the reliability of the Urdu version of the instrument. Results: The Urdu version of the TSK achieved a Cronbach's alpha of 0.986 post-translation and 0.817 after testing with the target population. The inter-item correlation varied between 0.443 to 0.987. The intra-class correlation coefficient, indicating test-retest reliability, ranged from 0.1 to 0.8, demonstrating high reliability. Conclusion: The Urdu version of the TSK is a valid and reliable tool for assessing kinesiophobia in patients with CLBP. It exhibits good construct validity, high internal consistency, as well as good test-retest reliability and low to moderate responsiveness.
https://jhrlmc.com/index.php/home/article/view/87

24. **Ilyas , T., Chaudary, M., Mushtaq, M., Masood, F., & Muhammad Jabbar. (2023). Perception of Online Learning on Academic Performance of UMT Students, Lahore.** *Journal of Health and Rehabilitation Research,* **3(2), 132–136. https://doi.org/10.61919/jhrr.v3i2.56. Tamknat Ilyas, Muqadas Chaudary, Maida Mushtaq, Fizza Masood, Muhammad Jabbar (DPTR/SHS) Date of Publication: December 2023 HJRS: Y (Null)**
Background: With online learning becoming an established facet of modern education, understanding its reception among specific student populations is crucial. This study offers a critical perspective on E-learning's impact by focusing on the academic performance of undergraduates at the University of Management and Technology (UMT), Lahore. Objective: The objective was to explore the differential effects of online learning on two distinct student groups within UMT, those in the Doctor of Physical Therapy (DPT) and Doctor of Nutritional Sciences (DNS) programs, thereby assessing the broader implications for academic performance. Methodology: A purposive sampling strategy was employed to conduct a cross-sectional survey with 200 UMT students, equally split between the DPT and DNS programs. The survey consisted of 26 closed-ended questions designed to capture students' attitudes toward online learning. Results: The survey elucidated a spectrum of responses: 12% of students strongly endorsed online learning, 30% were satisfied, and 31% remained ambivalent. In terms of learning quality, 32% perceived an improvement, with 14.5% strongly concurring. Neutral responses were evident in 31.5% of participants, while 18.5% disagreed and 8% strongly rejected the premise that online learning enhanced educational quality. Notably, 12% strongly affirmed satisfaction with E-learning. Conclusion: The prevailing sentiment toward online learning among UMT students is one of cautious optimism, characterized by a majority indicating approval or neutrality. However, the notable minority exhibiting disapproval suggests a need for a reassessment of online pedagogical methods. The study underscores the importance of developing adaptive teaching strategies that are responsive to the diverse needs and preferences of the student body, aiming to elevate academic performance across all sectors of the university.
https://jhrlmc.com/index.php/home/article/view/56

Department of Clinical Services

1. **Zulfiqar, R., Shoaib, M. S., Fatimah, A., Rana, F. M., Maqbool, S., Safdar, K., ... & Amin, R. (2023). Comparison of Repeated Task Oriented Training for the improvement of motor function with mirror Therapy and Conventional Treatment On upper limb in patients with stroke-A Randomized Controlled Trial (RCT).** *Pakistan Journal of Medical & Health Sciences, 17*(05), 13-13. https://doi.org/10.53350/pjmhs202317513 **. Arooj Fatimah (DCS/SHS) Faiqa Mehmood Rana, Sania Maqbool (DPTR/SHS) Date of Publication: May 2023 HJRS: Y (Null)**

   Background: This study's goal is to illustrate how mirror treatment can be used with someone who has upper-extremity hemiparesis three months after suffering a cerebrovascular accident (stroke). These patients frequently fail to use their affected upper extremity to its full extent, possibly as a result of the" learned nonuse phenomenon. On each weekday of the 9-day intervention period, the patient performed tasks with the paretic upper extremity for 6 hours while being closely watched. Methods: Study population was patients from Mayo hospital Lahore. Study design was Randomized Controlled Trial. RCT:. 34 patients who met the requirements for inclusion were examined in this study. Before beginning any physical examination, each participant in this study gave their written, informed consent. Patients were divided equally into two groups. The Wolf Motor Function Test and the Numeric Pain Scale were used to measure pain and motor function on the first day. Group A received treatment using mirror therapy, whereas Group B received traditional care. Results: Mirror therapy was significantly effective in lowering pain and boosting functional activity in stroke patients, as evidenced by the comparison of the pre-and post-treatment scores on the NPRS and WMFT for groups A and B. Practical Implication: Stroke leads to multiple dysfunctions depending upon severity of lesion. It may decrease the range of motion and leads to functional dependency or disability. Physical therapy is important in the management of stroke including Strengthening, Stretching, ROMs and Manipulation and Mirror Therapy. This study provided an opportunity to share my personal experience with community. This study was conducted purely in clinical setting of Physiotherapy Department Mayo Hospital, Lahore.Conclusion: The study has proved that mirror therapy is more effective when combined with conventional treatment in management of stroke as compared to only use of conventional treatment.
   https://pjmhsonline.com/index.php/pjmhs/article/view/4738

School of Pharmacy (SPH)

1. **Alhajjaji, A., Kurdi, A., Faqeh, S., Alansari, S., Abdulaziz, A., Cheema, E., . . . Ali, M. (2023). Experiences of COVID-19 Recovered Patients: A Qualitative Case Study from a Hotspot in Saudi Arabia.** *Qualitative Report,* **28**(1), 269-284. doi: 10.46743/2160-3715/2023.5582**. Ejaz Cheema (SPH) Date of Publication: January 2023 HJRS: X (Clay)**

   Background: COVID-19 is highly contagious and can have fatal outcomes in the elderly and those with comorbidities. Social distancing is highly recommended by the World Health Organization to prevent the spread of the disease. However, it is difficult to maintain social distancing in highly populated areas where people live in close proximity. Such high-risk areas have the potential to become hotspots for the disease spread, should one person therein contract the disease. Nakkasah is one such area in the Makkah city of Saudi Arabia which has been a hotspot in this pandemic. This study aims to qualitatively explore the experiences of COVID-19 recovered patients residing in this area. Methods We employed semi-structured face-to-face interviews with people living in Nakkasah, above 18 years of age, and recovered from COVID-19. An interview guide was developed, validated, piloted, and minor changes were made. Two trained students conducted the interviews in the Arabic language in a semi-private area of the community center. The interviews were audio-recorded, with informed consent from interviewees, transcribed verbatim, and thematically analyzed later. Results Eleven eligible COVID-19 recovered people (two female and nine male) agreed to be interviewed, and their verbal informed consent was audio recorded. The mean interview time was 24 minutes. Thematic analysis generated 30 subthemes, which were categorized into seven overarching themes: information about COVID-19; life during COVID-19 illness; spreading of COVID-19; precautionary measures; interventions that helped in recovery; impact of COVID-19 on life; support received during COVID-19 illness. Conclusion Experiences of people from the hotspot who had recovered from COVID-19 highlighted how life had been like in the hotspot under lockdown especially with having been afflicted with the infection, factors that facilitated their recovery, and the way their lives were and have been affected due to COVID-19. https://nsuworks.nova.edu/tqr/vol28/iss1/16/

2. **Fatima, M., Habib, A., Khan, S., Butt, M. H., Mallhi, T. H., Khan, A. Q., . . . Masood, I. (2023). Knowledge, Attitude, Practice, Behavior and Risk Perception of COVID-19 Pandemic among Medical and non-Medical University Students.** *Disaster Medicine and Public Health Preparedness, 17*(6). doi: 10.1017/dmp.2022.1. **Abdul Qayyum Khan (SPH) Date of Publication: 2023 HJRS: W (Honorable Mention) Brief Report**

Objective: Coronavirus disease 2019 (COVID-19) pandemic has substantially affected students around the globe due to the closure of educational institutes. However, student involvements and contributions are important in combating the disease; for this reason, the current study was designed to assess the knowledge-attitude-practice (KAP), preventive behavior, and risk perception among university students. Methods: A cross-sectional survey-based study was conducted among medical and non-medical university students, from April 1 to June 30, 2020. The 68-item questionnaire was used to evaluate responses using statistical approaches (Student's t-test, regression-analysis, and corelation analysis) by considering a P-value < 0.05). Most of the respondents (72%) believed that COVID-19 will be effectively controlled through precautionary measures. In correlation subgroup analysis, a significant relationship (P = 0.025) between knowledge and positive attitude were indicated. Fear and knowledge of COVID-19 emerged as strong predictors (P < 0.001) of preventive behaviors towards disease. Conclusion: This study demonstrated satisfactory knowledge, positive attitudes, and suitable practices among students toward COVID-19. University students can be involved in public education to aid the health authorities in achieving the targets of educational campaigns with maximum population coverage. https://www.cambridge.org/core/journals/disaster-medicine-and-public-health-preparedness/article/abs/knowledge-attitude-practice-behavior-and-risk-perception-of-covid19-pandemic-among-medical-and-nonmedical-university-students/3FE12E8D6F4F840352F637CAFEB596E8

3. **Alshehri, A. A., Hindi, A. M. K., Cheema, E., Sayeed Haque, M., Jalal, Z., & Yahyouche, A. (2023). Integration of pharmacist independent prescribers into general practice: a mixed-methods study of pharmacists' and patients' views.** *Journal of Pharmaceutical Policy and Practice, 16*(1). doi: 10.1186/s40545-023-00520-9. **Ejaz Cheema (SPH) Date of Publication: January 2023 HJRS: Y (Null)**

Background: Since 2015, the National Health Service (NHS) has funded pharmacists to work in general practice (GP practice) to ease workload pressures. This requires pharmacists to work in new roles and be integrated effectively in GPs. Independent prescribing is a key part of the GP pharmacist role, but little is known about pharmacists' integration into GP practice as well as patients' perceptions and experiences of the care provided by GP pharmacists. This study aims to explore the perceptions of pharmacist independent prescribers (PIPs) about their integration into GP practice and gain insight into patients' perceptions about the care provided to them by pharmacists. Methods:

A mixed-methods study comprising semi-structured interviews with PIPs (n = 13) followed by questionnaire-based assessment of patients' (n = 77) evaluation of pharmacists' care was conducted between December 2019 and March 2020. Quantitative data were analysed using descriptive statistics. Interviews and open comments of the survey were thematically analysed. Results: Pharmacist independent prescribers reported undertaking a range of patient-facing and non-clinical roles. Lack of understanding about PIPs' clinical role and working beyond their clinical area of competence were some of the barriers to their integration into GP practice. Most patients were satisfied with the consultations they received from pharmacists and reported confidence in the pharmacist's recommendations about their health conditions. However, a few patients (14%) felt they would still need to consult a general practitioner after their appointment and 11% were not sure if a further consultation was needed. Conclusions:

Pharmacist independent prescribers provide a range of clinical services for the management of long-term conditions which appear to be recognised by patients. However, there is a need to address the barriers to PIPs' integration into GP practice to optimise their skill-mix and patient-centred care. https://joppp.biomedcentral.com/articles/10.1186/s40545-023-00520-9

4. **Aun, A., Hanif, S., Ali, I., Razzaq, S., Basheer, E., Bedar, R., . . . Ali Syed, M. (2023). Optimization of ranitidine hydrochloride based on stability performance in directly compressible immediate and sustained release formulations.** *Pakistan journal of pharmaceutical sciences,* **36(2), 525-533 10.36721/PJPS.2023.36.2.REG.525-533.1. Sobia Razzaq (SPH) Date of Publication: December 2023 HJRS: Y (Null)**

Ranitidine hydrochloride (RTD), a moisture-sensitive drug, has issues of stability during shelf life especially when formulated through wet granulation method. In current study, RTD was blended with non-hygroscopic excipient like ethyl cellulose and compressed using direct compression method. The physical and physicochemical characteristics were evaluated including hardness, thickness, diameter, friability, weight variation, disintegration, dissolution and accelerated stability study to optimize findings. Subsequently, the optimized formulation was characterized for Fourier Transform Infrared (FTIR) analysis and in vitro drug release kinetics. The physical characterization was unaffected by polymer variation while the friability and weight variation were within the USP limits. In vitro drug release depicted that the release rate was sustained by increasing the amount of ethyl cellulose, with a 10% increase of ethyl cellulose 99.09% drug was released. FTIR analysis exhibited no interaction among the ingredients of the optimized formulation (E2). The optimized formulation followed

Hixson-Crowell release kinetics. Formulation A5 displayed immediate release characters as plain uncoated formulation. Accelerated studies showed no significant change in the drug content. The RTD was successfully sustained to be released up to 6 h and accelerated stability showed that the optimized formulation (E2) containing 4% starch 1500 and 10% of ethyl cellulose, respectively, was stable up to 6 months.
https://openurl.ebsco.com/EPDB%3Agcd%3A15%3A6825215/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A163059654&crl=c

Book Chapter

1. **Abdullah, Khan, F., Ali, G., Naveed, A., Shah, M. A., Saleem, U., & Aman, W. (2023). Phytonutrients standardization for effective therapeutic outcomes** *Phytonutrients and Neurological Disorders: Therapeutic and Toxicological Aspects* **(pp. 19-31). Waqar Aman (SPH) Date of Publication: July 2023**
A large number of scientific studies have shown the health benefits of phytonutrients as antioxidants, in reducing the risk of diabetes, cardiovascular diseases, obesity, and cancer. Inspite of the health benefits, lack of standardization and quality control issues has been noted. It has raised concerns among scientists, health professionals, and regulatory bodies. This has led to highlight the need for the establishment of a system to ensure safety, efficacy, and quality of these phytonutrients and food supplements before marketing. The safe and effective use of phytonutrients can be ensured through standardization. The robust standardization techniques include high-performance liquid chromatography column chromatography, physical parameters, and bioassay are among the few to ensure consistent composition and pharmacological activity.
https://www.sciencedirect.com/science/article/abs/pii/B9780128244678000103

Institute of Aviation Studies (IAS)

1. **Miralles, P., Thangavel, K., Fulvio Scannapieco, A., Jagadam, N., Baranwal, P., Faldu, B., Batul,B., . . . Stepanova, D. (2023). A critical review on the state-of-the-art and future prospects of machine learning for Earth observation operations.** *Advances in Space Research, 71*(12), 4959-4986. **doi: https://doi.org/10.1016/j.asr.2023.02.025. Beenish Batul (IAS) Date of Publication: June 2023 HJRS: W (Bronze)**
The continuing Machine Learning (ML) revolution indubitably has had a significant positive impact on the analysis of downlinked satellite data. Other aspects of the Earth Observation industry, despite being less susceptible to widespread application of Machine Learning, are also following this trend. These applications, actual use cases, possible prospects and difficulties, as well as anticipated research gaps, are the focus of this review of Machine Learning applied to Earth Observation Operations. A wide range of topics are covered, including mission planning, fault diagnosis, fault prognosis and fault repair, optimization of telecommunications, enhanced GNC, on-board image processing, and the use of Machine Learning models on platforms with constrained compute and power capabilities, as well as recommendations in the respective areas of research. The review tackles all on-board and off-board applications of machine learning to Earth Observation with one notable exception: it omits all post-processing of payload data on the ground, a topic that has been studied extensively by past authors. In addition, this review article discusses the standardization of Machine Learning (i.e., Guidelines and Roadmaps), as well as the challenges and recommendations in Earth Observation operations for the purpose of building better space missions.
https://www.sciencedirect.com/science/article/pii/S027311772300145X

School of Media and Communication Studies (SMCS)

1. **Ittefaq, M., Ahmad Kamboh, S., Iqbal, A., Iftikhar, U., Abwao, M., & Arif, R. (2023). Understanding public reactions to state security officials' suicide cases in online news comments.** *Death Studies*, *47*(4), 499-508.**doi: 10.1080/07481187.2022.2101074. Azhar Iqbal (SMCS) Date of Publication: March-April 2023 HJRS: W (Platinum)**
Little is known about public reactions to state security officials' suicide in Muslim countries like Pakistan. To explore readers' reactions in online comments, we analyzed 1,765 comments related to 10 news stories about suicide published in five mainstream English newspapers. The findings revealed six themes: stress, depression, and mental health issues; controversial investigation reports and misinformation; need for stronger accountability to address corruption in the country; criticizing media and security institutions; sympathy for the deceased and their families; and suicide and Islam. We recommend that suicide prevention organizations should monitor audience comments to devise and suggest resources for the public.
https://www.tandfonline.com/doi/full/10.1080/07481187.2022.2101074

2. **Ittefaq, M., Ejaz, W., Jamil, S., Iqbal, A., & Arif, R. (2021). Discriminated in society and marginalized in media: Social representation of Christian sanitary workers in Pakistan.** *Journalism Practice*, **17(1), 66-84. Doi: 10.1080/17512786.2021.1939103. Azhar Iqbal (SMCS) Date of Publication: January 2023 HJRS: W (Gold)**
Sanitary workers are globally marginalized both in media and society. Such discrimination is often amplified when such essential workers belong to a religious minority in Muslim majority societies such as Pakistan. Drawing from the frameworks of social representation and social identity theories, this study uses the qualitative method of in-depth interviews with 30 Christian sanitary workers to shed light on the perception of representation of Christian sanitary workers in Pakistan's mainstream media. Upon analyzing the data, three distinct themes emerge: (a) a lack of mainstream media representation, (b) excessive negative media representation, and (c) cognizance of the effects such representation yields. This investigation revealed that sanitary workers believe that they do not have any representation in Pakistan's mainstream media to voice their issues. Moreover, they have serious reservations about their polemic social representation and voice concerns regarding the media that often amplify such depictions. Despite being less educated, the respondents in the study appear to understand the influence of media in a democratic and multicultural society. Therefore, they expect traditional media to highlight their genuine issues (i.e., joblessness, health-related problems, and fair treatment in society), all of which, in their view, can make their life a lot easier.
https://www.tandfonline.com/doi/full/10.1080/17512786.2021.1939103

3. **Ashraf, A., & Aslam, M. J. (2023). An Effectiveness of Online Adverts on the Purchasing Behavior and Cultural Change among University Students.** *Journal of Media and Entrepreneurial Studies,* **3, 54-64. Mian Jawed Aslam (SMCS) Date of Publication: February 2023 HJRS: Y (Null)**
This research article is an analysis of the Effectiveness of Online Adverts on Purchasing Behavior and cultural change among Students at the University of Central Punjab, Lahore, Pakistan. The main research hypothesis is, "It is perceived as online advertshelp in promoting purchasing behavioramong Students of the University of Central Punjab, Lahore." This study is conducted on a quantitative survey research design, for this purpose representative sample size of 160 undergraduate and graduate students aredrawn using a stratified sampling technique. To document and analyse the research objectives of purchasing behaviorof students and the role of online adverts in promoting new trends and glamour which resultantly become agents of social change, distinct statistical tests i.e. ANOVA and one sample t-test are used. The findings of the study reveal that there is a significant relationship between online adverts and purchasing behaviorof students moreover online adverts also promote new trends and glamour which helps in bringing and maintaining social change.
https://jmes.pk/index.php/JMES/article/view/24/17

4. **Rehman, A., Khan, S. , & Zia, A. (2023). Cognitive Science and Learning Environment in Rural Areas of Punjab.** *Journal of Social Sciences Review,* **3(1), 222–234. https://doi.org/10.54183/jssr.v3i1.123. Anjum Zia (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**
There is a difference in the learning environment between rural and urban areas. When compared with rural areas, urban areas are always found to have better facilities with regards to learning. When it comes to academic achievements and career development, science is the most preferred field of study. Parents and students, particularly in rural areas, have developed the belief that science is the only path to a successful future career. This study explores the cognitive sciences and learning environment in rural Punjab. For this purpose, rural areas of Punjab (Sargodha, Mianwali, and Rajanpur) have been selected. The current study implies qualitative research methods, i.e., in-depth interviews. While using the purposive sampling technique, a sample size of 12 respondents (4 students, 4 parents, and 4 teachers) has been defined. Findings of the study reveal that students in rural Punjab are highly inclined to study science, but the study environment in rural Punjab is of the transmissive type. Students face challenges while studying science in a transmissive environment. According to one study, there is a need in rural Punjab for proper facilities that can help students study science in a more teacher-student friendly environment.
https://ojs.jssr.org.pk/index.php/jssr/article/view/123

5. **Basit, A., Zia, A. & Toor, I. S. (2023). Pakistani Private TV News Channels' Coverage to Military Operation 'Zarb-e-Azb': A Comparative Analysis of the Viewers' Perception.** *Global Strategic & Security Studies Review*, **VIII(I), 1-14. https://doi.org/10.31703/gsssr.2023(VIII-I).01. Abdul Basit, Anjum Zia (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**
The military operations have exacted serious effects on the socio-psychological structure of society which has led to an overall tense environment. The aim of this study was to explore the public's perspective on Pakistani private TV news channels' coverage of military operation 'Zarb-e-Azb'. The research sought to understand the public's consumption habits of this coverage, assess the extent to which it fostered a sense of national integration and examine the media's role during the operation. The results showed that the private TV news channels made an effort to portray the ground battle accurately. From the viewers' perspective, the coverage boosted the Pakistani military's morale, improved relations between civil and military groups, and fostered a sense of national unity. Furthermore, viewers believed that the operation effectively eliminated terrorism.

https://www.gsssrjournal.com/current-issue/8/1/2023

6. **Zoha, Z., Anjum, Z., & Shaukat, R. (2023). Paranormal Investigations Shaping Youth's Beliefs in Pakistan.** *Journal of Academic Research for Humanities*, *3*(1), 78-87. **Anjum Zia (SMCS) Rozeen Shaukat (ORIC) Date of Publication: March 2023 HJRS: Y (Null)**

Paranormal beliefs are superstitious beliefs. The media is broadcasting programs on television calming paranormal beliefs, and these programs are famous among the youth in Pakistan. This rationale provides a notion to look for paranormal investigation shows broadcasted on Pakistani television channels, shaping the youth's beliefs in Pakistan.   This is a quantitative study and cross sectional survey designed is used. The data for this study was collected from the students of six universities in Lahore, in total 630 students with arts and science, through a structured questionnaire. The study results indicated a statistically significant association between watching paranormal content and the influence on the paranormal beliefs of youth in Pakistan. The paranormal belief is stronger for those having prior related experience. Whereas these beliefs are more common in girls as compared to boys. Furthermore, a difference in beliefs between science and art students also exists. Therefore, it is recommended that the mass media should take responsibility as youth accept paranormal claims without logical thinking. Future research should be conducted to investigate paranormal beliefs among religious and non-religious people watching paranormal investigation shows. A qualitative inquiry is recommended for more in-depth insights to generalize the investigating phenomenon.
https://jar.bwo.org.pk/index.php/jarh/article/view/148

7. **Ahmed, S. I., & Zia, A. (2023). The Social Media Interactivity in the Perspective of Media Ecology.** *Global Digital & Print Media Review,* VI (I), 1-9. https://doi.org/10.31703/gdpmr.2023(VI-I).01. **Anjum Zia (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**

This study looks at the media ecology theoretical framework to explore the impact of social media interactivity on users. This study argues that different age groups impact differently via social media interactions it's all depends on their demographics such as age, qualification, and socioeconomic status. The findings confirms that social media interactivity happened due to individual gratification but it creates an impact on the human environment as media ecology claimed. This study uses the qualitative technique of face-to-face in-depth interviews with a total of 16 participants to achieve its goals, and it presents its findings using inductive thematic analysis. The study came to the conclusion that both Digital Natives and Digital Immigrants' social behavior and self-concept are impacted by their frequent use of social media platforms.
https://gdpmrjournal.com/article/the-social-media-interactivity-in-the-perspective-of-media-ecology

8. **Nasir, N.U.A., Zia, A., & Arshad, A. (2023). Influence of Pakistani Dramas on the Lifestyle of Female University Students of Lahore.** *Global Digital & Print Media Review, VI*(I), 67-85. https://doi.org/10.31703/gdpmr.2023(VI-I).06. **Noor Ul Ain Nasir, Arooba Arshad, Anjum Zia (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**

The aim of this research study is to analyze the Impact of Pakistani Dramas on the lifestyle of Female youth, particularly among the females of the universities of Lahore. This research has been conducted to determine the effects of Pakistani Dramas on different factors of the lifestyle of female youth. The research has been investigated through the Survey method using a questionnaire as a tool of data collection and the data of this research study was collected from the female youth of two well- known universities of the Lahore i.e., University of Management and Technology (UMT) and University of Lahore (UoL). It has targeted 390 females aged 16-25 years who are viewers of Pakistani dramas. In this study, Cultivation Theory has been applied and the respondent's consumption pattern has been investigated. The findings of the study indicate that Pakistani TV dramas have a strong influence especially the way dramas are presented.
https://www.gdpmrjournal.com/article/influence-of-pakistani-dramas-on-the-lifestyle-of-female-university-students-of-lahore#

9. **Nasir, N. U. A., Basit, A., & Ahmad, M. S. (2023). The Portrayal of Women in TV Advertisements and its Impact.** *Global Sociological Review, VIII*(I),64-84. https://doi.org/10.31703/gsr.2023(VIII-I).06. **Noor Ul Ain Nasir, Abdul Basit, Muhammad Sumair Ahmad (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**

The portrayal of perfect images of women in television advertisements has been studied extensively in Western media. However, women's representation in Pakistani advertisements has received little attention. Therefore, this research study was intended to explore the influence of the portrayal of perfect idealized images appearing in television advertisements and their associated effects on the mental health of women. A survey was conducted and a questionnaire was filled out by 360 female students from the University Management and Technology. The participants were asked about the perfect images of models and about their experiences being exposed to such images. Furthermore, the researcher employed the social comparison theory in order to provide the theoretical framework of the study. The results suggested that the majority of women agreed that they get disappointed after watching models having slim bodies, spotless skin and fair

complexion in the Pakistani advertisements. The findings concluded that such portrayal is Psychologically harming women.
https://www.gsrjournal.com/search-article/title/portrayal

10. **Saleem, N., Khalid.A., Arif.M.(2023) Perception of Youth Regarding the Credibility of TV News Channels in Pakistan.** *Pakistan Journal of Social Research (PJSR)* **,5 (1), 302-307. https://doi.org/10.52567/pjsr.v5i01.1008 . Aemen Khalid (SMCS) Date of Publication: March 2023 HJRS: Y (Null)**

Television is considered a powerful mass medium, which is not only meant for dissemination and analyzing the news but also has a strong impact on the social, cultural, and political approach of the audience. The boom in the TV industry of Pakistan in the early 21st century has resulted in the massive popularity of private news channels among viewers. The Urdu transmission of these channels is one of the reasons for popularity as the national language is spoken and understood by the majority population all over the country. However, the credibility of the content remains an issue always. The purpose of this research is to find out the perception of youth regarding the credibility of leading TV news channels Dunya News, ARY News, and Geo News. The study examines the youth's perception regarding the credibility of news content. It also seeks to find out to what extent, prime-time talk shows of these channels, "On the Front", "Off the Record" and "Capital Talk" are considered credible among youth considers. The present study is survey research in which data was collected from the undergraduate students of public and private sector universities of Lahore. Data were analyzed through Descriptive Statistics. Further, T-test was applied to find out the difference in perception based on demographic characteristics. The results show that the youth is more interested in watching talk shows rather than news bulletins. TV news channels are popular among youth due to a better understanding of the Urdu language, but with compromised credibility. The viewers believe that every TV channel has a certain agenda and it gives coverage to every news with a political bias. This biasedness has raised a question about the credibility of news channels among young viewers.
https://pjsr.com.pk/ojs/index.php/PJSR/article/view/1008

11. **Sheherbano, K., & Saeed, M . (2023). Crazy Girls: Female Delinquency in Pakistani Movies. International** *Journal of Media and Information Literacy, 8***(1), 99-105. Muzammil Saeed (SMCS) Date of Publication: June 2023 HJRS: Y (Null)**

Scholars have argued that films are being widely used as a source of entertainment and cultural communication in this modern world. No doubt, COVID-19 pandemic has greatly impacted film industry, but it has also increased digital mobility of content across borders to the large audience through sophisticated online media services. Now, through the production of content for streaming services this powerful medium of storytelling has become the center of attraction for global population to introduce new trends in a society. These trends effectively empower society particularly women empowerment is significant through this medium, however, regardless of their advantages, films produced also exhibit negative factors against cultural and societal norms. This study is based on the quantitative content analysis of six Pakistani films on aired in last decade during 2015 to 2019 to identify the frequency and evidence between films and female delinquency. Content was analyzed under three categories, dressing, language, and behavior, about female lead and female support characters. Data resulting from this analysis reveals diversity in female characters according to the culture and status. But, in nutshell, portrayals of female lead and female young support characters were not with accordance to the Pakistani culture.
https://ijmil.cherkasgu.press/journals_n/1687957731.pdf

12. **Saeed, M., & Gilani, S. I. A. (2023). Expansion and existence of Sufi orders in South Punjab, Pakistan.** *AL-ASAR Islamic Research Journal, 3***(2). Muzammil Saeed (SMCS) Date of Publication: June 2023 HJRS: Y (Null)**
Global spread of Sufism is an old phenomenon. Sufis for the propagation of Islam traveled through trade routes and migrated with Muslims armies. Migration and resettlement of Sufi saints to the sub-continent has left a significant impact on the Islamic religiosity of the region by pursuing spiritual philosophy and practices based on love to God and human beings. Further, their descendants strengthened these religious, spiritual and moral values of Islam in sub-continent. Sufis entered in South Asia through Sindh, and in early history of Islam interior Sindh and its main cities of that time like Multan and Uch became junction of Sufi immigrants. Several noble families settled in the capital of South Punjab, Multan, and its surroundings that altered the region in the hub of illustrious mystics. These mentors propagated Sufi ideology with local values and spread it among the masses considerably which enhanced the circle of Islamic followers and lovers in the locality. This study focuses the development of Chishtiyya, Suhrawardiyya, Qadiriyya and Naqshbandiyya Sufi orders and their due expansion and existence in South Punjab, Pakistan.
https://alasr.com.pk/ojs3308/index.php/alasar/article/view/126

13. **Hashmi, S.,** Khan, M. H., & Amer, M. (2023). Islamophobic Discourses in India During COVID-19 Pandemic: A Case of Tablighi Jamaat. *Journal of Intercultural Communication Research,* 52(4), 419-439. doi: 10.1080/17475759.2023.2198537. **Shehmeen Hashmi (SMCS) Date of Publication: July 2023 HJRS: Y (Null)**

Islamophobia is a hot issue in the world nowadays. This study aimed to analyse the discourses which were produced against Muslims and Islam during the novel coronavirus outbreak in India, where the Muslim minority group Tablighi Jamaat was targeted and held responsible for spreading the virus. The study employed Critical Discourse Analysis to analyse selected tweets from Indian politicians, government dignitaries, and common Indian users to find out Islamophobic themes and ideological structures in their discourses. The researcher hypothesizes that Islamophobia is an integral feature of Indian political communication which is also obvious in their discursive and rhetorical devices. The researcher purposively selected 50 of the most controversial tweets by Indian politicians, government officials, and common Indian Twitter users against Muslims and Islam and carried out a critical discourse analysis through political discourse strategies by Wodak's (2014). The findings of the study reveal that Indians use discriminatory language against Muslims and Islam to create a difference of "us versus them" and by using anti-Islamic strategies and Islamophobic remarks against the Muslims of India and propagating a common belief in Indians that Muslims and Islam are the main culprit of the COVID-19 outbreak in India.

https://www.tandfonline.com/doi/full/10.1080/17475759.2023.2198537

14. **Saeed, I., &** **Munir, F.** (2023). Effect of the Flipped Science Classroom on Academic Achievement of Grade Seven Students. *Pakistan Journal of Educational Research and Evaluation (PJERE),* 11(1). **Iqra Saeed (SMCS), Farhat Munir (Education/SSSH) Date of Publication: June 2023 HJRS: Y (Null)**

This pilot study was carried out in a local secondary school to measure the effectiveness of digital literacy in terms of flipped classroom teaching. A grade seven science class was purposefully flipped and compared with traditional teaching classroom arrangement to evaluate the student's academic achievement. The population of study comprises all male and female 259 students of class seven, first term of academic session. Study sample was further divided into two groups: two sections of boys (61 male students) and two sections of girls (66 female students) were randomly selected as the experimental group, the flipped classroom. The remaining four sections (132 students) performed as a control group, the traditional classroom. Instructional strategies were the independent variable. Student's achievement grades in pretest, ongoing posttest assessments and term exam were dependent variables. Scores of pretest were compared with posttest ongoing assessments and school term exams. The analysis was made through t-test and ANCOVA. At the end of the thirteenth week, a Likert scale survey was conducted to evaluate the student's perception regarding the learning environment in flipped class. The results indicated that" (i) there is a statistically significant difference between achievement scores of the flipped class compares to traditional class students. Flipped class students achieved better results than conventional class learners. (ii) Analysis indicated that there is no significant difference in achievement scores among male and female students of the experimental and control group. (iii) Likert scale survey results showed students increased involvement, mutual interaction and in-depth learning in flipped classroom environment. This study is a contribution to a positive change in the prevailing education system of Pakistan by transferring a deeper understanding of the importance of student-centered learning. The technological tools motivate student of this age to collaborate academically and socially to become a self-standing, curious and creative learner.

http://111.68.103.26//journals/index.php/PJERE/article/view/7331

15. **Naz, S.,** **Khalid, A.,** & Saeed, R. (2023). Role of Electronic Media in The Globalization of Culture. *Journal of Journalism, Media Science & Creative Arts,* 3(1), 101-116. **Aemen Khalid (SMCS) Date of Publication: June 2023 HJRS: Y (Null)**

Human history depicts that man always endeavored to build relations with other human beings as well as societies. Because of technological advancement and improvements in means of communication, the speed to build relationships with other nations or people has been increased which gives birth to globalization. Advanced technologies of means of communication for example internet and satellite television have joined the people globally. Media is playing a role in the emergence of global culture and urban regions of the world have a resemblance and cosmopolitan culture is emerging. The whole world has been transformed into a global village. The media process of homogenizing the World Cultures is continuing. This study revolves around the media as an agent of globalization of culture. This research explores how media has played a role in the transformation of world cultures into global cultures. The study is qualitative in nature so, qualitative methods are used for data collection. It is analytical and descriptive in nature. For the analysis of data, analytical model is used. Secondary data is used for research. A different point of view is taken from previous studies. This technique is supported to construct an objective approach to the problem and to derive a conclusion to give recommendations.

https://jjmsca.com/index.php/jjmsca/article/view/51

16. **Naz , D. S. ., Saeed , D., & Khalid , A.** (2023). Coverage of Pakistan –America Relations in News Papers (A Study of Editorials of The Washington Post, Wall Street Journal, Dawn and The Nation During 01 March 2018 to 31. *Pakistan Journal of Media Sciences, 4(1),* 72–78. Retrieved from https://media-sciences.com/index.php/pjms/article/view/185. **Aemen Khalid (SMCS) Date of Publication: June 2023** **HJRS: Y (Null)**

The present research, Coverage of Pakistan-America Relations in Newspapers on Pakistan and America: (A Study of Editorials from March 1 to March 31, 2018) revolves around the study of relations between Pakistan and America. For the present study, two newspapers from America, "The Washington Post, Wall Street Journal", and two newspapers from Pakistan, ", Dawn and The Nation", from March 1 to 31. The primary objective of the study is to analyze the role of print media in reflecting and directing the foreign policies of America and Pakistan. Content analysis is used to identify the meaning of the content. Editorials about America-Pakistan relations of the selected newspapers are studied. The findings of the research indicated that Pakistani newspapers gave more space to Pakistan-America relations as compared to American newspapers, and the American press tried to influence its government to take a stricter stance towards Pakistan on issues of Afghanistan and terrorism.

https://media-sciences.com/index.php/pjms/article/view/185

17. **Khan, S. ., Sheikh, M. A. ., Aslam, M. J. ., & Tariq, M. .** (2023). Photographic Reportage of War on Terror: A Perspective of Mainstream Print Media in Pakistan. *Pakistan Journal of Humanities and Social Sciences,* 11(3), 3272–3286. https://doi.org/10.52131/pjhss.2023.1103.0611. **Muhammad Jawed Aslam (SMCS) Date of Publication: September 2023** **HJRS: Y (Null)**

The current study focuses on the depiction of 'war on terror' in Pakistan's mainstream print media in 2014-15. After the APS (Army Public School, Peshawar) assault in December 2014, there was a large number of sensitive contents shared on media. This research examines visual content published in leading newspapers of Pakistan, namely, Dawn, Daily Jang, and Nawa-i-Waqt from December 2014 to November 2015. The researchers examined the front and back pages of the chosen newspapers for specific photojournalistic evidence during a set period of time. For this research, quantitative content analysis and simple random sampling method was used. According to the findings of the study, the frequency of negative pictures related to the 'war on terror' is higher in Pakistan's print media. In addition, when compared to English print media, the Urdu press has a higher frequency of graphic content connected to the war on terror. It's also been noted that the mainstream print media (Dawn, Jang, and Nawa-e-Waqt) aren't doing a good photojournalism related to war on terror. When compared to the English press in Pakistan, the Urdu press provides greater sensationalism and dramatization in terms of pictorial coverage of the incident.

https://www.journals.internationalrasd.org/index.php/pjhss/article/view/1651

18. **Zia, A., & Khan, M. M.** (2023). Addressing Contract Cheating in Pakistani Higher Education: Strategies for Upholding Academic Integrity. *Journal of Professional Research in Social Sciences,* 10(2), 84-98. **Anjum Zia, Marium Masud Khan (SMCS) Date of Publication: December 2023** **HJRS: Y (Null)**

Contract cheating has strained the higher education system worldwide, Pakistan is no exception. However, unlike Canada, UK, USA, Pakistan has limited research related to the issue under discussion. The presence of contract cheating has undermined the academic integrity and academic credibility of higher education in Pakistan. This paper sheds light on the role of Quality Assurance Cells in higher educational institutions including University of Management and Technology, University of the Punjab, Lahore College for Women University and Minhaaj University in addressing this issue and proposes recommendations to foster academic integrity. This paper tries to investigate this complex issue, offering strategies to the institutions for addressing it and fostering a culture of academic integrity. In a pursuit to comprehend contract cheating and devise strategies to eradicate it, this study draws upon Albert Bandura's Social Cognitive Theory. The main assumption of this theory is that behavior is learned through observational learning, personal agency, and self-regulation, influenced by both individual and environmental factors. Applying Social Cognitive Theory to the context of contract cheating allows for a comprehensive understanding of the issue, the factors contributing to it, and the strategies that universities can utilize to mitigate its occurrence. The current study was qualitative in nature. The researchers conducted in-depth interviews of Directors of Quality Assurance s of the universities mentioned above. The responses were thematically analyzed. The participants were asked about the various reasons that compelled the students to engage in contract cheating and how universities can combat it. As per the majority, to combat contract cheating, institutions must adopt a comprehensive framework. This paper recommends five pivotal areas for Pakistani higher education institutions to anticipate when devising strategies against contract cheating. Institutions must design a policy that prevents, detects, and intervenes in contract cheating. This strategy should align with Pakistan's unique cultural and academic landscape. Existing policies/guidelines need to be reviewed to clearly tackle contract cheating. Policies should highlight the consequences of such actions and strengthen institutional commitment to maintain academic integrity. Comprehending students' motivations for contract cheating is very important. Institutions should create platforms for open discussions and offer support services that address academic pressures, fostering ethical

behaviors. Assessment methods must evaluate students' understanding and critical thinking instead of simple information replication. Applying various assessment formats like presentations and group work can discourage contract cheating. Educators significantly influence academic integrity. Offering professional development opportunities equips them to detect and prevent contract cheating, cultivating a culture of academic integrity. The issue of contract cheating necessitates collaborative efforts from Pakistani higher education institutions to inculcate a culture of academic integrity. Moreover, approval and implementation of HEC's draft policy concerning the prevailing issues are proved to be a turning point in Higher Education. By concentrating on multidimensional strategies, institutions can not only address contract cheating concerns but also nurture ethical scholars and professionals.
https://www.ojs.mul.edu.pk/index.php/JPRSS/article/view/355

19. **Nasir, N. U. A., Shehzadi, A., & Zia, A.** (2023). Portrayal of Women Empowerment in Pakistani Drama: A Case of Ghisi Piti Mohabbat. *Research Journal for Societal Issues,* 5(4), 93–116. **https://doi.org/10.56976/rjsi.v5i4.164.** Noor Ul Ain Nasir, Anam Shehzadi, Anjum Zia (SMCS) Date of Publication: December 2023 HJRS: Y (Null)
The research study explores/ analysis the portrayal of women empowerment in Pakistani drama "Ghisi Piti Mohabbat". The drama is on aired on leading Pakistani drama channel ARY Digital.Furthermore it examines women empowerment under the following categories. The main categories will be Decision Making, Social Mobility, Confident and Financial or Economic Independence. The study analysis the portrayal of women in Pakistani drama by using qualitative method of discourse analysis in order to find out the contextual meaning of dialogues used in drama "Ghisi Piti Mohabbat". Liberal feminist theory was employed as the theoretical frame work for the study. The finding of the study might suggest that women are shown/ represented in confidence, self-made and strong character, and shown as taking ownership of decision they take on the life. Finding further might suggest that women face many societal pressures throughout their life.
https://rjsi.intellisocieties.com/index.php/Research/article/view/164

Conference Proceedings

1. **Nisar , N. ul A.** (2023). Revisiting Relationship between Journalism (S) and Society in the Digital Age for Common Good. In *AMCAP- PU International Media Conference.* Noor Ul Ain Nasir (SMCS) Date of Publication: 8-9, February 2023
The qualitative research study analysis the representation of women centric roles that are leading towards women empowerment in Pakistani drama Industry. Especially the drama's that are on aired on leading Pakistani drama channel ARY Digital. Furthermore, it examines women empowerment under the following categories. The main categories will be Decision Making, Social Mobility, Confident and Financial or Economic Independence. The study analysis the portrayal of women in Pakistani drama by using qualitative method of discourse analysis in order to find out the contextual meaning of dialogues used in drama "Ghisi Piti Mohabbat". Liberal feminist theory was employed as the theoretical frame work for the study. The finding of the study might suggest that women are shown/ represented in confidence, self-made and strong character, and shown as taking ownership of decision they take on the life. Finding further might suggest that women face many societal pressures throughout their life.
https://amcap.net/website/page/amcap-pu-2023-international-media-conference

Institute of Liberal Arts (ILA)

Department of Linguistics and Communications

1. **Haroon, S., Aslam, M., & Saleem, T.** (2023). Exploring the cross-linguistic functioning of the Principles of WH-Movements: The case of Pakistani ESL learners. *Cogent Arts & Humanities*, 10(1), 2174518. doi: 10.1080/23311983.2023.2174518. Sidra Haroon (DLC/ILA) Date of Publication: Jan-Dec 2023 HJRS: W (Honorable Mention)
This is a cross-linguistic study conducted with Pakistani learners of English in the classroom setting. This study aimed to explore whether the UG Principles of WH-movement supported or restricted Urdu-speaking learners in forming direct WH-questions in English. For data collection, a sample of 260 students was selected using convenience sampling from ten (10) private and four (04) public sector secondary schools from Lahore. To address the research questions of this study, frequency data were collected through Grammaticality judgment Tasks with thirty-six (36) WH-questions in Urdu. Each Urdu sentence is followed by two English translations (T1 & T2). The statistical analysis showed that UG Principles of WH-movement were fully available to Pakistani ESL learners whose L1 was Urdu. The study has important implications for the UG researchers in that more cross-linguistic studies are needed to verify Chomsky's Hypothesized UG regarding non-English languages. The study also suggests revisiting the Critical Period Hypothesis. Besides, the teachers and materials developers of English

grammar in non-native settings like Pakistan should rethink the role of direct instruction of rules and carrier content in teaching WH-questions to learners of English as a second language.
https://www.tandfonline.com/doi/full/10.1080/23311983.2023.2174518

2. **Rafi, M. S., & Moghees, A. (2023). Writing challenges, causes, and strategies to facilitate the doctoral dissertation-writing process: A qualitative analysis.** *International Social Science Journal, 73*(247), 139-156. **doi: 10.1111/issj.12367.** **Amnah Moghees (DLC/ILA) Date of Publication: March 2023** **HJRS: X (Clay)**
This study grows out of the absence of literature on an in-depth understanding of dissertation-writing challenges, facilitating strategies, and causes to develop a more profound understanding of Pakistani doctoral students. This is primarily qualitative research. One of the largest private universities was selected as a case to collect the data. The data were based on 12 Pakistani doctoral dissertations, 49 evaluation reports from 13 countries, mainly from the state-run universities, and a survey questionnaire responded to by 12 PhD graduates. The data were codified for commonly emerging categories and themes based on the methodological approach of Clarke and Braun (2017). The data revealed that the doctoral students faced challenges concerning mechanics of writing, developing an argument in a coherent whole, and structural organization of the dissertation. The examiners recommended the doctoral students to copyedit/proofread the dissertation to overcome mechanics of writing problems, build the argument logically, use formal language, write transition sentences to knit the texts coherently, embed citations to support the claims, and uniform the structure of the dissertation. Five causes of writing difficulties emerged from the survey questions. Despite a mismatch between the academic resources and research support provided to Pakistani doctoral students, their research work is deemed par with foreign universities, which encourage native-like English. It is hoped that this study will help doctoral students improve their dissertation-writing quality.
https://onlinelibrary.wiley.com/doi/full/10.1111/issj.12367

3. **Sajjad, M. W. (2023) Contesting the Milad: Deobandis and Barelvis in British India and contemporary Pakistan, Contemporary South Asia, 31:2, 207-221. doi: 10.1080/09584935.2023.2180486.** **Mohammad Waqas Sajjad (DLC/ILA) Date of Publication: March 2023** **HJRS: W (Bronze)**
This article examines Deobandi and Barelvi discourses on the *milād*, the celebration of the Prophet Muhammad's birthday, an important marker of Barelvi identity and a primary site of contestation. It argues that *milād* indicates a significant development in the discourses of conflict between the 'ulamā (religious scholars) of the two traditions as they have moved from subtle debates into categorically oppositional ones in Pakistan. This includes diverging from the opinions of 'ulamā of the past, given the present competitive context. The *milād* is a site, event, and ritual in which both groups of 'ulamā situate themselves as orthodox lovers of the Prophet, and the other as disrespectful or *bidatī*, bringing innovations into Islam. This also shows Islam as a discursive tradition, as both the conflict on and the practices of *milād* find historical precedents to justify positions in the present, while demonstrating changes in emphasis, contestations, and perceptions of self and other over time. As a result, when the Deobandi and Barelvi traditions have come to oppose and embrace the *milād*, in almost absolute terms in Pakistan today, they are also demonstrating subtle but significant developments in South Asian Islam over the past century.
https://www.tandfonline.com/doi/full/10.1080/09584935.2023.2180486

4. **Sajjad, M. W. (2023). Writing History in Deobandi-Barelvi Polemics: Conflicting Views of Shah Ismail and Fazl-e-Haq Khairabadi.** *South Asia: Journal of South Asian Studies*, 1-16. **https://doi.org/10.1080/00856401.2023.2200085.** **Mohammad Waqas Sajjad (DLC/ILA) Date of Publication: May 2023** **HJRS: W (Gold)**
The Deobandi-Barelvi conflict in South Asia is conventionally over religious beliefs and practices. However, it also has an earlier dimension, encompassing the early nineteenth century theological debate between Shah Ismail and Fazl-e-Haq Khairabadi. Deobandi and Barelvi polemicists rewrite this history to establish their own tradition and identity within a particular narrative of the past, linked to the family of Shah Waliullah. The Barelvis portray their founder, Ahmed Raza Khan, as belonging to the tradition of both Waliullah and Khairabadi, and against Ismail, while the Deobandis highlight Ismail's orthodoxy. In doing so, polemicists rewrite the past and ensure that the dimension of history is a significant aspect of their conflict today as distinct oppositional identities are created.
https://www.tandfonline.com/doi/full/10.1080/00856401.2023.2200085

5. **Sajjad, M. W. (2023). Prioritizing Religious Freedoms: Islam, Pakistan, and the Human Rights Discourse.** *Muslim World Journal of Human Rights,* 20 (1):47-68. **https://doi.org/10.1515/mwjhr-2023-0005.** **Mohammad Waqas Sajjad (DLC/ILA) Date of Publication: May 2023** **HJRS: X (Null)**
Religious freedoms of minorities in Muslim-majority countries such as Pakistan are compromised due to structural issues as well as social and historical concerns. For instance, the abuse of the blasphemy law has led to minority communities facing threats and violence. And in a country where religious scholars are often absent from, if not against, discourses about human rights, the religious rights of minorities remain a secular

and hence culturally unsound discourse. There is thus a need for two parallel movements. One, an awareness within Muslim communities about the need to engage with religious freedoms, and hence the modern human rights regime, as an essentially Islamic process requiring reform from within. And two, the human rights structure also giving religion its due since religious freedoms are part of, and engender, many other rights as well. In this article, a case is made for this dual process, by exploring the work of scholars of Islam such as Abdullahi An-Na'im and Khaled Abou El Fadl as well as the insecurities of religious scholars in Pakistan who have reacted to human rights as a western agenda.
https://www.degruyter.com/document/doi/10.1515/mwjhr-2023-0005/html#APA

6. **Hafsa, G., Ahmad, S., & Shah, A**. **(2023). Communication Perspectives in Academic Settings: Employees' Perception Approach.** *Human Nature Journal of Social Sciences, 4***(2), 331-343.** **Shumaila Ahmad, Amina Shah (DLC/ILA) Date of Publication: 2023** **HJRS: Y (Null)**

    Aim of the Study: Human communication is a very complex phenomenon which involves social and cognitive processes. It affects not only the attitudes of participants but also the pattern of communication (Yate, 2009). Interpersonal communication in the educational institutions is a serious issue. This sector develops human resource that finally joins other departments of society. Therefore, consolidation of the society covertly depends upon the success of educational institutions. The intended study is embedded in the CCO theory (Communicative Constitution of Organizations) by Robert McPhee and OIT theory (Organizational Information Theory) by Karl Edward Weick. Methodology: The study is qualitative and exploratory in nature. Main objective of the study is to explore relationship between the strategic management and an effective communication. Moreover, it is intended to explore the internal and external factors which affect interpersonal communication. Finally, to suggest measures for effective communication in academic settings. The present study is qualitative and interpretive in nature. Population of the study is 8 female colleges of district Khushab. The area is further delimited to four colleges. As per the convenient sampling technique, eight employees (two from each college) are selected as sample. Data is collected through open ended interview and interpreted by the researcher with reference to the theoretical perspective of the study. Findings: The results express strong relationship between the strategic management and an effective communication. The results also provide guideline that how human resource can be optimally utilized by a carefully designed management strategy. The study proved that healthy communication environment in educational settings is necessary for the consolidation of the institution. Conclusion: The study concludes that a well synchronized and strategic manger, with carefully designed management strategy, takes the lead in developing a healthy communication environment.
    http://hnpublisher.com/ojs/index.php/HNJSS/article/view/432

7. **Naeem, W., Ahmad, S., & Haroon, S.** **(2023). Impact of Online Language Games on teaching of Single and Double Prepositions through Primary Level Students of Lahore.** *Annals of Human and Social Sciences, 4***(2), 18-24. https://doi.org/10.35484/ahss.2023(4-II)03 .** **Shumaila Ahmad, Sidra Haroon (DLC/ILA) Date of Publication: 2023** **HJRS: Y (Null)**

    This study is aimed at finding the impact of online games on teaching single and double preposition at primary level students to find potential evidence if the use of preposition gets improved in the students or not. The nature of the study was quantitative. Quasi-experimental research design was used for the study. This study involved only one experimental group. Pre-test Post-test were conducted to determine improvement of in learning of single and double prepositions after the intervention of online language games were introduced. Achievement test consisted of multiple-choice questions. Paired t-test was used to evaluate the significance of the difference in the outcome of experimental group. Result of this study suggested that online language games lay a significant impact on learning of double and single preposition by the primary level students. Results also further reflected that although both the genders showed improvement in their learning of single and double preposition after being taught via online language games but female students produced more significant results as compared to their male counterparts.
    https://ojs.ahss.org.pk/journal/article/view/188

8. **Amin, A., Javed, H., & Haroon, S.** **(2023). Functional Morphology: Patterns Rules Sets for Morphological Parsing of Urdu Regular Verbs. Pakistan Languages and Humanities Review, 7(2), 207-216. https://doi.org/10.47205/plhr.2023(7-II)18 .** **Anam Amin, Sidra Haroon (DLC/ILA) Date of Publication: June 2023** **HJRS: Y (Null)**

    Affixation of Urdu regular verbs give multiple patterns providing various verbs, varying in meaning and use regarding aspect and gender following similar root verb. Taking into consideration the pattern variations in verbs the aim of this study was to identify morphological patterns of regular Urdu verbs, whereas objective of this research was to explore morphological patterns of stemming in case of Urdu verbs. A corpus of more than 1500 regular verbs is developed. 16 rules sets were developed following 13 different affixation patterns. Out of which 7 specific rules combinations were designed following these combinations in relation to 1 root verb. According to functional morphology these rules set follow a morphological parser for Natural language

processing (NLP). The results are significant to design Urdu database of regular verbs corpus for Urdu NLP. This morphological implementation can be used to develop Urdu data base dealing with Functional Morphology and lexicology while dealing Urdu regular Verb forms.
https://ojs.plhr.org.pk/journal/article/view/410

9. **Binth e Zia. A., Dar, M. B., & Shah, A.** (2023). Challenging Patriarchal Stereotypes: A Study of Female Identity in Manju Kapur's Difficult Daughters. Human Nature Journal of Social Sciences, 4(1), 216-222. Atifa Binth e Zia, Maidah Basit Dar, Amina Shah (DLC/ILA) Date of Publication: March 2023 HJRS: Y (Null)
    Aim of the Study: This paper explores the conflict between traditional ideologies of Indian Patriarchy and an anti-traditional struggle for individual space in Manju Kapur's *Difficult Daughters*. The protagonist, Virmiti, encounters her submissive position within a male-controlled society as well as struggles for a new identity for marginalized women in *Arya Samaj* Indian family. **Methodology:** In this paper we employ the theoretical concept of gender being a cultural product by Nancy J. Chodorow (1995). By applying this theory, this paper argues that, the cultural specific norms for a female are considered gender normative while Virmiti performs gender non-conformity within a gender biased society and "operate[s] psychologically" (Chodorow, 1995) to define her identity. **Findings:** Virmiti fights for her own space and individuality by criticizing the division between male and female roles in a phallocentric Indian culture. **Conclusion:** So this paper discusses that challenging patriarchal stereotypes is not an easy task rather a woman has to strive hard against patriarchy to construct her new identity.
    http://hnpublisher.com/ojs/index.php/HNJSS/article/view/337

10. **Saeed, B., Shafi, S., & Masood, M. H.** (2023). Exploring Identity and Belonging in the Context of Partition of 1947: A Social Identity Theory Analysis of Train to Pakistan'by Khushwant Singh. *Global Language Review, VIII* (1*)*. http://dx.doi.org/10.31703/glr.2023(VIII-I).20 . **Muhammad Hamzah Masood (DLC/ILA) Date of Publication: March 2023 HJRS: Y (Null)**
    This study explores the theme of identity and belonging in Khushwant Singh's novel, 'Train to Pakistan', by investigating how the characters develop their sense of identity and belonging within the socio-political context of the Partition of India in 1947. The study employs a qualitative research methodology, analyzing the novel through close reading and thematic analysis. The study applies the Social Identity Theory to examine the novel's categorization, social comparison, and identification processes. The research reveals that religious, cultural, and national affiliations significantly influence the characters' identities and sense of belonging. It highlights the complexities of identity construction during conflict and demonstrates that characters' identities are subject to external categorizations. However, the study also observes the characters' agency in negotiating their identities and challenging societal expectations. The study explores identity dynamics, emphasizing the importance of social and contextual factors in shaping individual and collective identities, particularly within historical and cultural narratives.
    https://www.glrjournal.com/previous-issues/8/1/2023

11. **Latif, F., Razaq, R., Nijabat, A., & Sohail, M.** (2023). ACADEMIC WRITING CHALLENGES: PERSPECTIVES OF MASTERS AND DOCTORAL STUDENTS. *Pakistan Journal of Society, Education and Language (PJSEL), 9*(2), 205-212. **Aasma Nijabat (DLC/ILA) Date of Publication: June 2023 HJRS: Y (Null)**
    The ability to write and communicate in English is a crucial skill for the academic success of students. Therefore, improving one's command of vocabulary knowledge is essential for advancing English language skills. Despite the importance of English academic writing, many students in Pakistan struggle with this skill at postgraduate level. Thereby, this study was undertaken to address the challenging areas of academic writing among postgraduate students by using a qualitative technique and to provide recommendations based on them. All of the master's and doctoral students who were enrolled in the universities of Multan City were included in the population of this study, and 18 students were chosen using convenient sampling to participate in this study via semi-structured interviews. The findings revealed that students encounter a number of academic challenges, which include a lack of awareness of plague words and phrases usage, grammatical mistakes, improper usage of pronouns, and lack of cohesion among sentences. Based on the results, it is vital for educational institutions and policymakers to recognize these challenges and take steps to address them by improving English language instruction and providing resources to support academic writing skills.
    https://pjsel.jehanf.com/index.php/journal/article/view/1154

12. **Abbasi, A. M., Butt, B., Mahmood, S., Niazi, S., Junaid, S. S., Lakhani, H. Y., & Channa, M. A.** (2023). An investigation into the acquisition of English grammatical morphemes by young Sindhi high school ESL learners. *Cogent Arts and Humanities,* 10(2). doi: 10.1080/23311983.2023.2281019. **Bisma Butt (DLC/ILA) Date of Publication: Nov 2023 HJRS: W (Bronze)**
    The present study aims to explore the acquisition order of eight English grammatical inflectional morphemes, i.e., plural –s, possessive -s', third person singular, present tense-s, past tense-ed, present participle-ing, past participle-en, comparative-er, and superlative-est by young Sindhi ESL (English as second language learners)

learners at the high school. The study aimed to test the hypothesis that the high school English learners do not follow the universal order of grammatical morphemes and to investigate the effect of linguistic interference of L1 (Sindhi) in the acquisition order of English grammatical morphemes. The primary instrument used for data collection in this study was written essays. The time gap between first and second samplings was around three months. A mixed methods research design was utilized. The study used an exploratory-descriptive-qualitative methods coupled with a quantitative as per the objectives of the study corresponding to the research questions. A convenience sampling technique was employed to select participants from 10th Grade level. Specifically, the data was analyzed using the Dulay and Burt (1974) scoring method. The statistical tests were utilized to test the null hypothesis. The data confirmed that they indeed do not follow the universal order of grammatical morphemes. There exists the effect of linguistic inference of L1 in the acquisition order English grammatical morphemes. Finally, the finding is not in line with the sequence as determined by Dulay and Burt (1974), and Brown (1973).

https://www.tandfonline.com/doi/full/10.1080/23311983.2023.2281019

13. **Khan, M. M., Fatima, T., & Khan, A. A. (2023). An Exploration of Codeswitching and Borrowing in Pakistani YouTube Vlogs.** *Global Language Review,* **8**(I), 139-149.https://doi.org/10.31703/glr.2023(VIII-I).4. Maimoona Maliha Khan, Tehreem Fatima, Arshad Ali khan (DLC/ILA) Date of Publication: March 2023 HJRS: Y (Null)

Pakistan YouTube is an increasingly popular platform for sharing creative digital content. Vlogs, in particular, are becoming more and more commonplace as Pakistani creators share their stories with the world. Along with these stories come unique practices of code-switching and borrowing between various languages such as English, Urdu, Punjabi, and other scripts. This article explores how code-switching and borrowing in Pakistan YouTube vlogs convey speakers' identities, employ humour, and add emphasis while impacting the audience's perceptions. By analyzing the reasons behind why speakers code-switch and borrow, the impact of code-switching and borrowing on the audience, and how it reflects broader patterns this paper aims to provide insights into how code- switching and borrowing can influence the way we experience digital media. With the rise of digital media nowadays, YouTube has quickly become a popular platform for vloggers to express themselves.

https://glrjournal.com/article/an-exploration-of-codeswitching-and-borrowing-in-pakistani-youtube-vlogs#

14. **Khan, A. A., Khalid, A., & Saleem, T.** (**2023). The evidence of Embedded Language islands: the case of Pashto-English codeswitching.** *International Journal of Multilingualism*, 1-24. **https://doi.org/10.1080/14790718.2023.2212907.** Arshad Ali Khan, Amina Khalid, Tahir Saleem (DLC/ILA) Date of Publication: May 2023 HJRS: W (Gold)

This study investigates the function and morphosyntax of English Embedded Language (EL) islands in Pashto-English bilingual data, using the Matrix Language Frame model to explore the role of the two languages in codeswitching and the pragmatic force behind the selection of EL islands. A dataset of 14 hours was collected from AVT Khyber, a YouTube channel covering a wide range of talking shows and interviews. The research question is how EL islands figure in the overall clause structure of Pashto-English codeswitching. The study finds that English EL islands in Pashto-English codeswitching follow the structure dependency rule of the Embedded Language to retain well-formedness with the overall grammatical frame of the Pashto language. Most of the EL islands are fixed expressions and the multiword are collocated with each other. In most cases, EL islands are used as their counterparts in the Pashto language and lack the same pragmatic force. The study provides insights into the pragmatic and morphosyntactic aspects of EL islands in the Pashto-English bilingual context and contributes to the understanding of codeswitching phenomena in bilingual communities.

https://www.tandfonline.com/doi/abs/10.1080/14790718.2023.2212907?journalCode=rmjm20

15. **Saeed, A., Zafar, A., & Khan, A. A. (2023). The Indecisive Role of English and Urdu in Multilingual Pakistan.** *Global Social Sciences Review*, 8(2), 133-142. https://doi.org/10.31703/gssr.2023(VIII-II).13, Amna Saeed, Aamna Zafar, Arshad Ali Khan (DLC/ILA) Date of Publication: June 2023 HJRS: Y (Null)

The paper explores Pakistani graduate EFL learners' attitudes towards the increasing significance of the English language at national and global levels in the contemporary world. The analysis adopts a qualitative style, using twenty interviews to gain painstaking insights into the learners' linguistic attitudes. The research scrutinizes the socio, contextual and cultural factors that impact Pakistani learners' perceptions of English. The study reveals that while Pakistani learners appear uncertain about English in addition to its culture, they have adopted the educational and social functions of the language. The outcomes indicate the linguistic imperialism and symbolic capital of English, as individuals contemplate it as essential for socioeconomic advancement in Pakistan. The study's results can help academicians and officials assess the potential impacts of English on the roles of local languages, particularly in Pakistan's education system.

https://www.gssrjournal.com/current-issue/8/2/2023

16. **Butt, B.,** Anwar, B., Abbasi, A. M., Bakhsh, I., & **Tariq, S. (2023). Covert nominals and argument ellipsis in Punjabi.** *Cogent Arts & Humanities, 10*(1), https://doi.org/10.1080/23311983.2023.2167321, **Bisma Butt (DLC/ILA) Shahnila Tariq (Applied Psychology/SPP) Date of Publication: May 2023 HJRS: W (Honorable mention)**

The focus of the study is to find out the potential identity of null arguments in Punjabi. However, the paper provides different patterns of interpretations of null arguments present in Punjabi by keeping in view the propositions of Takahashi (2012, July). The special focus is given on the phenomenon named as Argument Ellipsis (AE), which is used as syntactically mediated process for investigating the relationship of verbal agreement and scrambling with AE in null argument language Punjabi. It was observed that AE in Punjabi licenses the null arguments on direct and indirect objects, subjects and selected PPs. The study finds out by observing and manipulating different configurations of subject-object agreement in Punjabi that there is no role critically played by verbal agreement in order to restrict AE. The research also specifies that scrambling approach for licensing is also not reliable predictor for AE in Punjabi. However, bare nouns approach is more appropriate for the analysis of AE in Punjabi as the bare nouns license the sloppy interpretations, which are marked either indefinite or definite nouns for null arguments in Punjabi. This approach can be tested for further cross linguistic examination of AE, and hopefully it would be regarded as the only underlying cause of argument ellipsis for future studies.

https://www.tandfonline.com/doi/full/10.1080/23311983.2023.2167321

17. **Qureshi, N. A.,** Amir, S., Anjum, F., Nishtar, Z., & Lodhi, K. **(2023). Psychological Factors Associated with Mass Failure of Students in English Language in Secondary Schools in Pakistan.** *Harf-o-Sukhan,* **7(3), 296-306. Naheed Ashfaq Qureshi (DLC/ILA) Date of Publication: September 2023 HJRS: Y (Null)**

The mass failure of students in English language exams in secondary schools in Pakistan is a pressing issue with far-reaching implications for both individual academic success and the overall educational system. This study examines the role of psychological factors in contributing to this phenomenon, employing a random sampling technique with a sample size of 300 teachers and utilizing a 5-point Likert scale tool. The research delves into the multifaceted aspects of psychological factors, encompassing self-esteem, motivation, and test anxiety, that are interconnected and significantly impact students' performance. Through a systematic analysis, the study explores the complex relationship between these psychological elements and the prevalence of mass studentfailures in English language exams. The random sampling technique ensures a representative and unbiased selection of 300 teachers from the target population. These educators provide valuable insights into the psychological challenges faced by students andthe influence of these factors on academic outcomes. The 5-point Likert scale tool serves as a structured means to gauge and quantify teachers' perceptions and assessments of students' psychological well-being and its connection to their performance. Findings from this study reveal the critical significance of addressing psychological factors in the educational landscape of Pakistan. The results may lead to actionable recommendations for policymakers and educators to develop interventions aimed at bolstering students' self-esteem, motivation, and mental well-being while mitigating the impact of test anxiety. Such initiatives can contribute to a more supportive learning environment and, ultimately, improve the English language proficiency of secondary schoolstudents. In sum, this research seeks to shed light on the psychological dimensions of mass student failures in English language exams, demonstrating the pivotal role of self-esteem, motivation, and test anxiety in shaping academic outcomes. By employing a random sampling technique and the Likert scale tool, it offers a comprehensive perspective on the challenges faced by students in Pakistan's secondary schools and proposes pathways for positive change within the educational system.

https://harf-o-sukhan.com/index.php/Harf-o-sukhan/article/view/867/839

18. **Amir, S.,** **Qureshi, N. A.,** Anjum, F., Nishtar, Z., & Lodhi, K. **(2023). Use of emoji to exemplify students' attitude towards e-learning during covid-19.** *International Journal of Contemporary Issues in Social Sciences,* **2(4), 257–262. Retrieved from https://ijciss.org/index.php/ijciss/article/view/146. Naheed Ashfaq Qureshi (DLC/ILA) Date of Publication: December 2023 HJRS: Y (Null)**

This paper aims to talk about in what way emojis can define undergraduate students' attitudes towards e-learning during COVID-19. As electronic learning is growing at a noticeable rate to carry out the teaching-learning process, according to the current scenario, amid COVID-19, e-learning is the only solution to carry on the teaching and learning process. Educationists worldwide have switched to it in the hope of continuing efforts to teach their learners. According to Wagner (2008), e-learning makes reachable supplementary prospects for communication between the student and teacher amid content conveyance. According to Davis (1989), any individual can adopt any changes in technology depending upon their thoughts and opinions about how this new technology will benefit them. An emoji is a visual representation of an emotion, object, or symbol. To conduct the research, an activity worksheet was used in which students were supposed to use an emoji to define their attitude toward e-learning during COVID-19. They were also supposed to briefly express how that Emoji depicts their attitude by using adjectives and the way they feel about their e-learning experience. The sample size of 150 students has been analyzed by exploring theories of e-learning,

especially Constructivism by McPherson and Nunes (2004) and Connectivism by Siemens and Downes (2004), along with the valuable viewpoint of various theorists regarding e-learning. Learners have used different emojis and adjectives to express their attitudes towards this modern process of learning. Data analysis revealed an unexpectedly not-so-positive attitude of students towards e-learning; for many, it is an unsatisfying, problematic, and anxious experience. Teachers play a key role in educational settings. Their perception and ability to use e-learning can also affect learners' attitudes towards e-learning. Although this research represents an effort to discover the attitude of undergraduate students towards e-learning during the COVID-19 environment, there were some limitations as well. Additionally, this research will open vistas for researchers who are interested in e-learning and the use of emojis.
https://ijciss.org/index.php/ijciss/article/view/146

19. **Naeem, T., Shah, H. S., & Tasneem, M.** (2023). **A Study of Application of AIDA Model on Pakistani Advertisements.** *International Journal of Islamic Studies and Culture (IJISC),* **3 (3), 24-34.** Tamsila Naeem, Misbah Tasneem (DLC/ILA) Hassan Shakeel Shah (ITC/SSSH) Date of Publication: September 2023 HJRS: Y (Null)

This qualitative study analyses an application of AIDA Model, used for persuasion in Pakistani advertisements which are produced in Pakistani culture to persuade the people of Pakistan. In the process of advertisement, the selection of suitable words and the ability of conciseness added with other persuasive devices are required to convey the message where the audience is not only the listeners but are the customers of their product. This paper aims at the discovery of the dynamic process in which the words are used not only to communicate but to influence the target audience. Five ads of different products were selected for analysis through random sampling approach. It was found that all the ads are made in consideration of different techniques, which include rhetorical devices, dramatic element, jingles and highly selected words with their highly intended meaning. It was found that all the ads strictly observe persuasive model, AIDA. It was concluded that emotional as well as logical appeals, both are important to construct quality ads.
https://ijisc.com.pk/index.php/IJISC/article/view/635

20. **Tabassam, Z. A.,** Naeem, T., **& Shah, H. S.** (2023). **Stylistic Analysis of Pakistani Diasporic English Writer through Leech and Short Model.** *Shnakhat,* **2(3), 159-174.** Tamsila Naeem (DLC/ILA) Hassan Shakeel Shah (ITC/SSSH) Date of Publication: September 2023 HJRS: Y (Null)

This qualitative descriptive research attempts to explore the stylistic characteristics in which a language is examined and discussed of selected novel Their Language of Love (2013) written by Bapsi Sidhwa by applying Leech and Short Model presented in 2013. Highly relevant excerpts are selected through purposive sampling technique. The assorted excerpts are interpreted by highlighting the stylistic features, used by the novelist. The findings show that Bapsi Sidhwa uses literary devices as tool to make her writings attractive and interesting for her readers. She tries to gain attention of her readers through the use of specific literary devices. Hypothetically, this study is likely to give academic support by elevating the understanding of literary texts relating to the learning of stylistics piloted by the teachers and the scholars of Linguistics and Literature.
https://shnakhat.com/index.php/shnakhat/article/view/192

21. **Yasir, H. S. M., Riaz, A., & Malik, S.** (2023). **Writing Practices of English as a Second Language: The Exploration of L1's Influence.** *Pakistan Social Sciences Review*, **7(3), 140–152. https://doi.org/10.35484/pssr.2023(7-III)12.** Hafiz Syed Muhammad Yasir, Aqsa Riaz, Sobia Malik (DLC/ILA) Date of Publication: September 2023 HJRS: Y (Null)

The research aims at exploring the writings of English as L2, and influence of Urdu as L1 with the help of the data based on the written essays on "Pakistani Culture", collected from 15 university undergraduate students who are pursuing their study at the University of Management and Technology, Lahore and completing their graduation in different academic fields. These students belong to the same native languages i.e. Urdu and they use English language as L2. The theory of 'second language acquisition' proposed by Krashen (1981) will be used. Furthermore, to support the analytical procedure, different perspectives are taken into account presented by Villanueva (1989) which elaborates on the language levels as affected by L1. The paper focuses on the collected essays by exploring the influence of Urdu language. Findings reveal the influence of L1 (Urdu) in the writings of English language (L2) under the integration of code-switching, morphological inclination of L1 as well as wrong phonetic effect of L1 on L2's orthography. This study analyzes these elements of L1's influence in the writings of L2.
https://ojs.pssr.org.pk/journal/article/view/312

22. **Roshin, I., Shafi, S., &** Masood, M. H. (2023). **Enhancing ESL Classroom Management and Language Proficiency: A Gamification Approach in Pakistani Universities. GUMAN, 6(4), 221-234.** Muhammad Hamzah Masood (DLC/ILA) Date of Publication: December 2023 HJRS: Y (Null)

The integration of gamification principles into English as a Second Language (ESL) courses within Pakistani universities is transforming the landscape of classroom management. This qualitative research explores the

innovative and engaging use of gamified techniques to enhance ESL classroom management, fostering student motivation, participation, and language proficiency. Within the context of Pakistani higher education, this study investigates the potential of gamification to create a dynamic and immersive learning environment. Through interviews with thirty (30) ESL instructors, it uncovers valuable insights into the effectiveness of gamified approaches in the Pakistani educational landscape. Pakistani universities should utilize gamification to create vibrant, motivating, and highly effective ESL learning environments, thus enhancing language acquisition outcomes, promoting student engagement and participation, and enriching the educational experience for students. By offering evidence-based recommendations, this study empowers ESL instructors and educational policy-makers to leverage gamification as a potent tool for ESL classroom management. https://guman.com.pk/index.php/GUMAN/article/view/649

Book Chapter

1. **Khan, A., & Sajjad, M. W. (2023) Between a Rock and a Hard Place: Pakistan's Foreign Policy, Saudi Arabia, and Iran. Vol. 2023. Contributions to International Relations (pp. 293-306).** Mohammad Waqas Sajjad (DLC/ILA) Date of Publication: July 2023

Pakistan shares complicated but necessary ties with Iran and Saudi Arabia – two countries involved in a multilayered conflict in the Middle East. The bilateral relations with Pakistan are historical, and there are deep religious, cultural, and social affinities. And there are issues of security and economic interdependence as well. However, given the conflict between Saudi Arabia and Iran, Pakistan has to follow a policy of neutrality toward both. This means that it has to carefully balance its relationships and find opportunities to grow ties with one without antagonizing the other. In this chapter, these dynamics are explored, as recent concerns in Pakistan's ties with Iran and Saudi Arabia are highlighted to show the complicated situation for Pakistan in this regard. https://link.springer.com/chapter/10.1007/978-3-031-32432-1_18#chapter-info

Department of English and Literary Studies

1. **Wafee, C., e Nao, M., & Sikandar, M. H. (2023). Attitudes and L2 Motivation among Burushaski-native Learners of Urdu.** *Pakistan Languages and Humanities Review, 7*(2), 680–690. **https://doi.org/10.47205/plhr.2023(7-II)61.** Charisma Wafee, Mah-e-Nao, Maha Hijab Sikandar (DELS/ILA) Date of Publication: June 2023 HJRS: Y (Null)

The attitudes towards a particular language, be it a first or a second/foreign language, are a potential reflection of its standing in the social hierarchy of languages. The study aimed to investigate the attitudes of young Burushaski-natives towards Burushaski and Urdu as a second language as well as their L2 Motivational Self System. Employing a quantitative approach, attitude and motivation data were elicited through adaptations of Attitude/Motivation Test Battery and Dörnyei's Attitude/Motivation questionnaire. Results suggested that Urdu held a significant instrumental value while Burushaski was considered culturally important. It was also found that both attitudinal and motivational scales included may not have been measuring distinct constructs of motivation for learning Urdu, suggesting invalidity of Dörnyei's model. However, the socio-contextual scale of national interest proved to be an effective contributor in overall L2 motivation. https://ojs.plhr.org.pk/journal/article/view/478

2. **Shafiq, Z. & Iqbal, S. (2023). A Cross-linguistic Analysis of Punjabi Versus English Gender-System. Global Sociological Review, VIII(II), 1-8. https://doi.org/10.31703/gsr.2023(VIII-II).01.** Zunaira Shafiq (DELS/ILA) Safia Iqbal (KRSS/ORIC) Date of Publication: June 2023 HJRS: Y (Null)

The current study aimed to compare the grammatical notion of gender in Punjabi versus English. To identify the similarities and differences in gender systems of both the languages in question, multiple instances of Punjabi and English gender rendering terms and phrases were selected and compared through a comparative analytical approach. It was a text-based study that revealed that not only Punjabi nouns but also verbs and adjectives take gender markers, unlike English and also that Punjabi does have some gender-neutral words and epicenes, just like English. Findings hold implications for novice researchers attempting to explore Punjabi in terms of its gender system. https://www.gsrjournal.com/article/a-crosslinguistic-analysis-of-punjabi-versus-english-gendersystem#

3. **Faheem, M. A., Asif, M., & Ahmed, S. (2023). Islamophobia and (Wes)toxification: A Hermeneutical and phenomenological reading of John Updike's TERRORIST.** *Pakistan Languages and Humanities Review*, *7*(2), 448–454. **https://doi.org/10.47205/plhr.2023(7-II)39.** Muhammad Afzal Faheem, Muhammad Asif (DELS/ILA) Date of Publication: June 2023 HJRS: Y (Null)

This research takes up the dialectical presentation of Terrorist by John Updike to underscore the actively mediating presence of the reader(s) in treating meaning as an event. Drawing on Rosenblatt's 'aesthetic

mode' of reading, this paper argues that the determinate and indeterminate meaning(s) of Terrorist perpetuate Islamophobia, ethnocentrism, and Eurocentrism in the (mis)informed reader. The central character of Terrorist, Ahmad, is systematically indoctrinated by the Imam, Shaikh Rashid, and simultaneously manipulated by the CIA operative, Charlie Chehab, to deliver 'Hutama' on the nonbelievers/Americans. The dialectical presentation of Terrorist invites the reader to see the Imam as inciting Ahmad to advance his suicidal mission. At the same time, there is some sort of balancing act at work with the CIA's active incitement to Ahmad to blow up Lincoln's Tunnel. While the 'West' here is also implicated in violent jehad and the hijacking of Ahmad's critical orientation, the primary mover is the Muslim prayer leader, and by extension, the place of worship, the mosque, the act of worship itself. So, as informed readers participate in the dialectics of meaning construction, they do so not in isolation, but in the (overbearing) presence of existing views, representations and prismatic constructions of Islam. In this sense the reader is (mis)informed to maintain and support stereotypes of Islam, which Terrorist is superficially questioning.
https://ojs.plhr.org.pk/journal/article/view/445

4. **Hussain, M., Asif, M., & Khanda, G. (2023). The Comprehension of Situation Bound Utterances among Students of English in Pakistan.** *Periodicals of Social Sciences, 3*(1), 50-60. **Muhammad Asif (DELS/ILA) Date of Publication: January - June 2023 HJRS: Y (Null)**

Situation-bound utterances (SBUs) are classified as "highly conventionalized, prefabricated pragmatic units whose occurrences are tied to standardized communicative situations" (Kecskes, 2000, p. 606). This paper investigates the comprehension of SBUs among students of English in Pakistan. In a non-native English context, how much do Pakistani students of English know about English SBUs? This study further explores the frequency of SBUs' comprehension among students. Finally, the current study investigates the target language bias in the use of SBUs. The data were collected from 60 Pakistani students of English departments at the International Islamic University Islamabad, Pakistan. Written SBUs situations and multiple-choice data collection techniques were employed to elicit data. The collected data were analyzed using frameworks that Kecskes (2000) introduced. The results reveal that Pakistani students enrolled in English departments use various SBUs; however, they perceive and comprehend the meanings of these utterances from literal perspectives. The findings show the influence of prior knowledge of the target language in using the SBUs among Pakistani students.
https://psocialsciences.com/poss/index.php/poss/article/view/47

5. **Faheem, M. A., Asif, M., & Ahmed, S. (2023). Islamophobia and (Wes) toxification: A Hermeneutical and phenomenological reading of John Updike's TERRORIST.** *Pakistan Languages and Humanities Review, 7*(2), 448-454.http://doi.org/10.47205/plhr.2023(7-II)39. **Muhammad Afzal Faheem, Muhammad Asif, Sameer Ahmed (DELS/ILA) Date of Publication: April 2023 HJRS: Y (Null)**

This research takes up the dialectical presentation of Terrorist by John Updike to underscore the actively mediating presence of the reader(s) in treating meaning as an event. Drawing on Rosenblatt's 'aesthetic mode' of reading, this paper argues that the determinate and indeterminate meaning(s) of Terrorist perpetuate Islamophobia, ethnocentrism, and Eurocentrism in the (mis)informed reader. The central character of Terrorist, Ahmad, is systematically indoctrinated by the Imam, Shaikh Rashid, and simultaneously manipulated by the CIA operative, Charlie Chehab, to deliver 'Hutama' on the nonbelievers/Americans. The dialectical presentation of Terrorist invites the reader to see the Imam as inciting Ahmad to advance his suicidal mission. At the same time, there is some sort of balancing act at work with the CIA's active incitement to Ahmad to blow up Lincoln's Tunnel. While the 'West' here is also implicated in violent jehad and the hijacking of Ahmad's critical orientation, the primary mover is the Muslim prayer leader, and by extension, the place of worship, the mosque, the act of worship itself. So, as informed readers participate in the dialectics of meaning construction, they do so not in isolation, but in the (overbearing) presence of existing views, representations and prismatic constructions of Islam. In this sense the reader is (mis)informed to maintain and support stereotypes of Islam, which Terrorist is superficially questioning.
https://ojs.plhr.org.pk/journal/article/view/445

6. **Saba, T., & Siddiqui, B. (2023). Portrayal of the 'Other': Tracing the Linguistic Imperialism in English Textbooks of Matric and Intermediate.** *Journal of Development and Social Sciences, 4*(2), 95-109. http://dx.doi.org/10.47205/jdss.2023(4-II)10. **Bushra Siddiqui (DELS/ILA) Date of Publication: March 2023 HJRS: Y (Null)**

The notion of linguistic imperialism analyzes the dominance of the language used by the powerful over other languages of the world. This linguistic imperialism endangers the other indigenous languages of the world and promotes the myths about the necessity of learning English language. It also tends to promote Western ideologies and culture. The present study has focused on the ways English language has imperialized the education system of Pakistan and the ideological and cultural objectives of English-speaking countries. The data, for the current study, consists of English text books for Matriculation and Intermediate to evaluate their role in moulding the young minds and also the use of different linguistic devices that are employed in the

books to influence the cultural ideologies and lifestyles of Pakistanis. Phillipson's Linguistic Imperialism (1992) serves as a theoretical background for thematic analysis of the texts. The findings reveal that the prevalence of linguistic imperialism in the selected textbooks not only enhances the influence of English speaking people but also promotes their socio-cultural ideologies.
https://ojs.jdss.org.pk/journal/article/view/440

7. **Saba, T., Siddiqui, B., & Hussain, S. I. (2023). A Hermeneutic Comparative Analysis of Sufi Verse Narrativities: Contriving Meaning through Metaphorization and Personification in the Ghazals of Abadi and Niaz.** *Pakistan Languages and Humanities Review, 7*(2), 12–25. https://doi.org/10.47205/plhr.2023(7-II)02. **Bushra Siddiqui (DELS/ILA) Date of Publication: March 2023** HJRS: Y (Null)

This study interprets Sufi narratives and perceptions of the participants to evaluate how metaphors and personifications are applied to add meaning to the text. The ghazals by Shad Azeem Abadi (Trans. Abadi, 2008) and Hazrat Shah Niaz (Trans. Sag-e-dar-Niaz, 2009), were selected to hold a dialogue between what was said and what was understood. For this purpose, the three tenets of the Hermeneutic approach i.e. hermeneutic situation, hermeneutic circle, and fusion of horizons, proposed by Gadamer (1994) were taken as a theoretical framework. The hermeneutic study explored the use of metaphors and personifications to unveil the hidden meaning of Sufi Kalaams. Twenty perceptions, ten for each ghazal, were selected for hermeneutic analysis of the 'fusion of horizons' to trail the influence of metaphors and personifications upon listeners apart from the musical form of these ghazals. Nevertheless, the poetic text has aroused personal stories and novel perspectives for some listeners as hermeneutics provides expediency to others' perspectives, and whenever a text is interpreted something personally important emerges out of the text whenever the reader interprets it.
https://ojs.plhr.org.pk/journal/article/view/395

8. **Maqsood, A., Anwar, S., Butt, M., & Iqbal, M. (2023). A Psychoanalytical Study of Sorayya Khan's Noor With Reference to Freud's Traumatic Neurosis.** *Journal of Policy Research, 9*(1), 237-242. DOI: https://doi.org/10.5281/zenodo.7908760. **Minaam Butt (DELS/ILA) Date of Publication: March2023** HJRS: Y (Null)

This study examines the horrors of war and its impact on the major characters in Sorayya Khan's Noor by applying Freud's concept of traumatic neuroses, in which she states that in traumatic war neuroses, the ego defends itself against outer dangers, whereas in transference neuroses, the ego has its libido as its enemy. In this novel, she explores the history, anxiety, rape, violence, panic situations, mutilation, and repressed memories, all of which are unsettling and even painful for the characters. Those who were traumatized during the war sustained permanent injuries, which contributed to their postwar depression. This paper is also noteworthy because it demonstrates how depression transforms a man into an aberration. Not only that, but it has looked at what causes PTSD and other post-traumatic reactions, particularly some that have just recently been identified as psychosomatic diseases brought on by conflict. Using psychiatric intervention and neurotic anxiety brought on by certain traumatic situations, this article also assesses the characteristics of the chosen work, Sorayya Khan's Noor.
https://jprpk.com/index.php/jpr/article/view/233

9. **Safdar, M., & Yasmin, M. (2023). Repositioning sexuality of spatially mobile Muslim women in Kamila Shamsie's broken verses.** *National Identities, 25*(3), 247-264. doi: 10.1080/14608944.2022.2150755. **Muhammad Safdar (DELS/ILA) Date of Publication: May 2023** HJRS: W (Bronze)

By drawing on the concept of performatively created third space, we examine how spatially mobile Muslim women in *Broken Verses* negotiate and challenge heterosexual identity in Pakistan. We argue that the women expand the meanings of national identity through practical hybridity and alternating between feminist reinterpretations of the Quran, cultural norms and universalist individualist consciousness – constructing a third space subjectivity. We foreground third space epistemology to read the gender and sexual subjectivity of mobile Muslim women situated in the heteronationalist setting which is influenced by the emergence of conservative religiosity and increased social and spatial mobility.
https://www.tandfonline.com/doi/full/10.1080/14608944.2022.2150755

10. **Mahmood, W., Abbas, W., & Rehman, F. (2023). Revealing the Unrevealed: An Investigation of Gothic Marxism in Ayesha Muzaffar's Jinnistan.** *Pakistan Languages and Humanities Review*, *7*(3), 681–691. https://doi.org/10.47205/plhr.2023(7-III)59. **Warisha Mahmood, Warda Abbas (DELS/ILA) Date of Publication: September 2023** HJRS: Y (Null)

The research paper dissects the major characters along with their encounters with the ghosts in their daily life routine revealing the unrevealed political cards behind their narration endeavoring to achieve the utilitarian cause of contemporaryPakistani horror literature. Capitalism being an immortal malice has its own set of traumas attached to it and any revolution beyond that is believed to have its own kind of traumatic risks. The theory of 'Gothic Marxism' has been kept under scrutiny to sketch the fears aroused after apprehending the unconsciousness of capitalism which plagues a society through a particular cultural

expression. All these dilemmas being clearly witnessed in the ideologies of laymen by anatomizing the genre of horror fiction depict the blind following of the unauthentic beliefs and cultural superstitions, leading the proletariats being processed into the corporeal fragility of capitalism. The cause ultimately compels to capture an aesthetic capacity along with a culturally therapeutic effect in the selected short stories of Abu's Jinn by Ayesha Muzaffar, through colossal fears engraved into cultural imaginations, on a mass level and their shift resonating with anxieties of rapid economic development historically.
https://ojs.plhr.org.pk/journal/article/view/627/524

School of Professional Psychology (SPP)

Department of Clinical Psychology

1. **Mukhtar, S. (2023). COVID-19 feminist framework and biopsychosocial-spiritual perspective for social workers and mental health practitioners to manage violence, abuse, and trauma against children, women, BIPOC, and LGBTQIA+ during and post-COVID-19.** *International social work*, *66*(1), 93-106. doi: 10.1177/00208728211067158. **Sonia Mukhtar (Clinical Psychology/SPP) Date of Publication: January 2023 HJRS: W (Bronze)**
This article explains the integrated implementation of a COVID-19 Feminist Framework (CFF) and biopsychosocial-spiritual perspective (BPSS-P) on the inclusive equitability of social service providers, practitioners, and policy-developers on global platforms. Mechanisms of CFF and BPSS-P entail the process to address/mitigate institutional inequities, mental health issues, violation of human rights, race/sex/gender-based violence, abuse, and trauma amid COVID-19. This discourse is about raising consciousness, collective liberation, wellbeing, and equality for women, children, BIPOC, LGBTQIA+, and gender-diverse people. This article further discusses social workers and mental health practitioners' uniqueness for short-term and long-term support for emotional, cognitive-behavioral, and psychosocial repercussions on the individual and community levels.
https://journals.sagepub.com/doi/full/10.1177/00208728211067158#con

2. **Iqbal, F., Naqvi, G., Saleem, S., & Zahra, S. T. (2023). Mothers' overprotection and eating problems in college students: a mediating role of emotion dysregulation.** *Journal of Postgraduate Medical Institute, 37*(1), 46-52. doi: 10.54079/jpmi.37.1.3119. **Farah Iqbal, Ghuncha Naqvi, Sadia Saleem, Sayyeda Taskeen Zahra (Clinical Psychology/SPP) Date of Publication: March 2023 HJRS: Y (Null)**
Objectives: To find out the disordered eating behavior and its relationship with mother overprotectiveness and emotion dysregulation and to find out the mediating role of emotional dy regulation between mother's overprotection and eating problems. Methodology: Correlational research design was used in this research. Through multistage sampling, data was collected from 300 college students (Men=166, Women=134). Three measures were used in this study which were EMBU-A, Eating Disorder Examination Questionnaire and Emotion Regulation Scale. Pearson product mo-ment correlation was conducted to determine relationship among disordered eating behavior, mother's overprotectiveness and emotional dysregulation. Mediation analysis was carried out by Hayes model bootstrapping approach. Results: Correlation analysis revealed that mother's overprotection and emotion dysregulation were significantly positively correlated with eating problems (r = .13, p < .05) and eating problems (r = .24, p < .001). Moreover, emotion dysregulation significantly mediated the relationship of mother overprotection and eating problems = .21, SE = .05,. Conclusion: Emotions can shift the focus of eating behaviors while considering the role of gender and maternal bonding during the adolescence period. A healthier relationship demands positive maternal practices that helps in decreasing the prevalence of disturbed eating behaviors. Based on the results awareness needs to be created among mental health professional to arrange seminars and trainings for students and parents from both gender regarding the consequences of disordered eating behavior in their children.
https://www.jpmi.org.pk/index.php/jpmi/article/view/3119

3. **Jabeen, A., Ijaz, A., & Fatima, S. (2023). Mental health trainees: Experience of online classes during COVID-19 pandemic.** *Rawal Medical Journal, 48*(1), 213-215. **Ayesha Jabeen, Asma Ijaz, Sana Fatima (Clinical Psychology/SPP) Date of Publication: March 2023 HJRS: Y (Null)**
Objective: To determine experiences of mental health trainees with their online classes. Methodology: It was an online cross-sectional study carried out during month of June, 2020. The sample comprised of 231 mental health trainees of BS (n = 114) and MS (n = 117) programs of a private university of Lahore. A google doc. consisting of 15 statements was prepared to for online delivery of their classes. Results: 45% students responded on "to some extent to no difficulty" experience of smooth running of online lectures. On the item of overall satisfaction with delivery of online lectures, 50% students (out of 114) from BS program and 51% students (out of 117) from MS program rated on "not at all" Although satisfaction was high on the online availability of teacher

for the counselling of students however, on understand lectures Only 14% students showed highest level of satisfaction. Conclusion: Online classes remained a big challenge for trainees and it was associated with lack of satisfaction in terms of their own learning, evaluation comprehension and health issues.
http://www.rmj.org.pk/fulltext/27-1603085517.pdf

4. **Fatima, S., Shams, A., Saleem, S., & Sayyeda Taskeen Zahra. (2023). A study of perfectionism and self-harm in medical and nursing students: the mediating role of perceived social support.** *Journal of Postgraduate Medical Institute, 37*(2), 125–9. https://doi.org/10.54079/jpmi.37.2.3145. Sana Fatima, Aqsa Shams, Sadia Saleem, Sayyeda Taskeen Zahra (Clinical Psychology/SPP) Date of Publication: May 2023 HJRS: Y (Null)
Objective: To find out the mediating role of perceived social support between perfectionism and self-harm in medical and nursing students. **Methodology:** This Cross-sectional research design using questionnaires was conducted in the government and private medical universities of Pakistan (Lahore). The total 250 number of participants were chosen by using multi-stage sampling techniques, in which two strata were made, MBBS (145) and nursing students (105). The participants belonged to private and government sector with the age range 18-25 years. There are different characteristics of students that, these students had sense of responsibility, compassionate with their work and they are truthfulness to commitments. To determine the association, Perfectionistic Tendencies Scale (PTS), Multidimensional Perceived Social Support (MDSPSS) and Self-harm Tendencies Scales (SHTS) were used respectively. Statistical results of this research were analysed by using SPSS.**Results.** The findings highlighted that there was a significant positive association between perfectionism and self-harm tendencies (r=.171, p=.05) in students. Respectively, mediation analysis showed that perceived social support is significantly mediated between perfectionism and self-harm tendencies in students (B = .21, SE = .08, p< .001) **Conclusion:** Perceived social support act as significant shield for perfectionists to prevent from self-harm and mental health issues.
https://www.jpmi.org.pk/index.php/jpmi/article/view/3145

5. **Karamat, A., Hafeez, Q. U. A., Zahra, S. T., & Saleem, S. (2023). Reassurance Seeking Behavior and Interpersonal Difficulties in University Students: Mediating Role of Self-Esteem.** *Pakistan Journal of Psychological Research, 38*(1), 31-49. doi: 10.33824/PJPR.2023.38.1.03. Anum Karamat, Qurat-ul-Ain Hafeez, Sayyeda Taskeen Zahra, Sadia Saleem (Clinical Psychology/SPP) Date of Publication: March 2023 HJRS: X (Null)
The current study intended to investigate the role of self-esteem as a mediator between reassurance-seeking behavior and interpersonal difficulties in 300 university students (50% men and 50% women) aged between 18-30 years (M = 20.72, SD = 1.88). Measures consisted of the Reassurance Seeking Behavior Scale (Hafeez, 2020), Self-Esteem Scale (Zafar et al., 2012), Interpersonal Difficulty Scale (Saleem et al., 2014), and a demographic proforma. According to the results, reassuranceseeking behavior was positively correlated with low self-esteem, anxious self-esteem, and interpersonal difficulties. Low selfesteem and anxious self-esteem were also correlated positively with interpersonal difficulties. Furthermore, low self-esteem and anxious self-esteem significantly mediated the relationship between reassurance-seeking behavior and interpersonal difficulties in university students. The results of the study provide implications for mental health professionals in terms of developing structured prevention programs and taking preventative precautions to mitigate the devastating impacts of interpersonal difficulties.
https://pjpr.scione.com/newfiles/pjpr.scione.com/753/2023-38-1-3-753_3.pdf

6. **Khadim, R., Ahmad, A., & Saleem, S. (2023). Development of Relational Turbulence Scale for Young Married Individuals.** *Pakistan Journal of Psychological Research, 38*(2), 249-265. https://doi.org/10.33824/PJPR.2023.38.2.15 . Rabia Khadim, Armish Ahmad, Sadia Saleem (Clinical Psychology/SPP) Date of Publication: June 2023 HJRS: X (Null)
The present study was intended to develop a measure of relational turbulence for the young married individuals in Pakistan's cultural framework. In the first phase of developing scale, 19 semistructured interviews were taken from married individuals. The married individuals were taken with inclusion criteria of 1-5 years marital duration and age between 21-40 years to generate an item pool that encompassed 45 items. Based on connection, similarity or matching themes, 29 items were finalized after 11 experts' validation and piloted on 8 participants. To determine psychometric properties of scale, Relational Turbulence Scale (RTS) was presented along with demographic sheet to 156 young married individuals (67 men, 89 women) with age range 21-40 years. Principal Component Analysis of RTS comprised of three different factors namely Lack Understanding, Apprehensions, and Lack of Support. Moreover, RTS was found to have high internal consistency (. 83), test-retest reliability. 83 (p<. 001), split half reliability of. 82 (p<. 001), and acceptable convergent validity. Furthermore, results are discussed in context of factor structure of RTS, demographics, and risk factors as predictors of RTS in cultural context.
https://pjpr.scione.com/newfiles/pjpr.scione.com/842/2023-38-2-4-842.pdf

7. **Mushtaq , R. ., Hasan, S. S., & Khadim, R. (2023). Lived Experiences of Adults about Religious Orientation and Spirituality.** *Journal of Professional & Applied Psychology, 4*(2), 266–280. https://doi.org/10.52053/jpap.v4i2.187. **Rehana Mushtaq, Rabia Khadim (Clinical Psychology/SPP) Date of Publication: June 2023 HJRS: Y (Null)**

The current research aimed to explore the experiences of young and middle-aged adults having internal religious orientation and high spirituality. The purposive sample consists of 8 participants with a distribution of 4 young and 4 middle-aged adults. These 8 participants were drawn from a total sample of 20 participants, based on their high scores on a religious orientation scale, the spirituality wellness test. A semi-structured interview was designed, consisting of 23 questions based on previous literature. Interpretative Phenomenological Analysis (IPA) was used to analyze the data. The results of the study indicated that young adults who have internal religiousness and a high level of spirituality reported that humans suffer for their deeds. This research has wide implications in the field of positive psychology and the psychology of religion. https://iprpk.com/ojs/index.php/jpap/article/view/187

8. **Mushtaq, R., & Saleem, S. (2023). Parental Rejection and Attention Deficit and Hyperactivity Disorder Symptoms in University Students: Role of Trait Impulsivity.** *Pakistan Journal of Psychological Research, 38*(2), 295-308. https://doi.org/10.33824/PJPR.2023.38.2.18. **Rehana Mushtaq, Sadia Saleem (Clinical Psychology/SPP) Date of Publication: June 2023 HJRS: Y (Null)**

The aim of the current study is to explore the mediating role of impulsivity between parental rejection and attention deficit and hyperactivity disorder (ADHD) symptoms in university students. Sample consisted of 310 university students (38% men and 62% women) with the age range of 18-24 years (M= 20.12, SD= 1.6) who were given a demographic performa, My Memories of Upbringing EMBU-A (Arrindell et al., 1999), Temperament Scale (Durrani et al., 2017) for University Students, and Attention Deficits Hyperactive Symptoms Scale (Mushtaq et al., 2021). Pearson Product Moment correlation was carried out to investigate the relationship between parental rejection, impulsivity, and symptoms of ADHD. Mediation analysis was carried out through Process Macro to determine the mediating role of impulsivity between parental rejection and symptoms of ADHD in university students. The findings indicated that impulsivity partially mediated in the association between parental rejection and symptoms of ADHD in university students. https://pjpr.scione.com/cms/abstract.php?id=845

9. **Anwar, S., Rana, H. (2023). Spiritual intelligence and psychological wellbeing of Pakistani University students. Curr Psychol. https://doi.org/10.1007/s12144-023-04717-8. Hina Rana (Clinical Psychology/SPP) Date of Publication: May 2023 HJRS: X (Null)**

The objective of this study was to find out the predictive role of spiritual intelligence for psychological wellbeing in university students and also to assess gender differences. For that reason, data of *N*= 250 (*M* age = 21.8; *SD*= 1.9) students of undergraduate programs was taken from different universities of Pakistan. Due to COVID-19 pandemic, data was collected online (google form) by using purposive sampling technique and sample was comprised of 77 men and 173 women. Spiritual Intelligence (King, 2008) and Ryff's 42-item Psychological Wellbeing Scale (Ryff, 1989, Muzzafar & Rana, 2019) were utilized for measuring variables of the study. Results were analyzed via SPSS (version 21), Hierarchical Regression and t-Test were carried out. The study results revealed that spiritual intelligence is a significant positive predictor of psychological wellbeing. It was also found that male students have high level of spiritual intelligence and psychological wellbeing in comparison to female students. Results of this study provide an implication for instructors as well as educationists to design activities which provide facilitation in increasing spiritual intelligence of students. https://link.springer.com/article/10.1007/s12144-023-04717-8#citeas

10. **Tabassum, A., Sadia, R., Huda, S., & Khan, S. (2023). Infertility-related Stress and Marital Satisfaction among Pakistani Infertile Individuals.** *IUB Journal of Social Sciences, 5*(1), 71-81. https://doi.org/10.52461/ijoss.v5i1.1807 . **Sadia Huda (Clinical Psychology/SPP) Date of Publication: June 2023 HJRS: Y (Null)**

Infertility is a reproductive health problem that is widely researched with reference to numerous psychological concerns faced by infertile individuals. Childless couples face numerous personal and social consequences with every passing day. Among them, immediate family members' expectations to carry on the family's name significantly weigh down marital union in the form of marital dissatisfaction among infertile individuals. Therefore, the relationship between stress related to infertility and its impact on the marital union, individuals (N= 150) of 18-40 years (M= 29.19, SD= 5.59) were taken from Rawalpindi, Islamabad, and Attock. The sample was approached at infertility centers, hospitals, offices, and their homes using snowball and purposive sampling techniques. Fertility Problem Inventory (FPI) and ENRICH Marital Satisfaction (EMS) Scale was administered on the sample. The results established satisfactory Cronbach alpha reliabilities (α=. 63 to α=. 93) for all scales. Hypotheses testing revealed that stress due to infertility negatively affects the marital satisfaction of infertile individuals and accounted for a 7% variance. Lastly, non-significant gender differences were observed across the variables of the study. These findings would be helpful in understanding the dynamics of

stress, faced by childless individuals and would be beneficial in the investigation of cultural buffering factors. Non-significant gender differences across infertility-related stress further highlight the significance of devising and providing intervention-based programs and therapies for both men and women to cope with the stress and strengthen the marital union of infertile individuals.
https://journals.iub.edu.pk/index.php/joss/article/view/1807

11. **Khurshid, H., & Jabeen, A.** (2022). Learning with Trisomy 21: Life Skills Training of a Child with Down's Syndrome. *Annals of King Edward Medical University, 28*(4). https://doi.org/10.21649/akemu.v28i4.5270 . **Halima Khurshid, Ayesha Jabeen** (Clinical Psychology/SPP) Date of Publication: January 2023 HJRS: Y (Null)
Trisomy 21 is one of the commonly identified genetic causes of Intellectual Disability. Such children experience a lack of attention and neglect by parents and teachers due to their slow response to intervention, which sometimes becomes demotivating for caregivers. However, with the recent medical advances and institutional support, avenues have been opened to help overcome the challenges related to Down's Syndrome. The present case study highlights the life skills training of a 7-year-old child with Down's Syndrome, studying in a special education institute of Lahore. The post-assessment showed that consistent practice of behavior modification procedures led to significant improvements in the adaptive functioning of the child.
https://www.annalskemu.org/journal/index.php/annals/article/view/5270

12. **Bashir, U., & Rehman, S.** (2023). A Scale Development for Assessing the Drive for Muscularity Among Pakistani Bodybuilders. *Annals of Abbasi Shaheed Hospital and Karachi Medical & Dental College, 28*(2), 67-73. https://doi.org/10.58397/ashkmdc.v28i2.448 . **Umaiza Bashir, Sadia Rehman** (Clinical Psychology/SPP) Date of Publication: May 2023 HJRS: Y (Null)
Objective: The study was devised to develop the indigenous scale of drive for muscularity among Pakistani bodybuilders Method: To explore the manifestation of drive for muscularity phenomenological approach was used, in which open ended question was asked from the 35 gym user men from different gyms. A list of the 28 most frequently reported items after initial screening was generated. For empirical validation Through 4 expert coaches of the gym were approached then pilot study was administered. In main study 211 bodybuilders were included for test the psychometric properties of indigenous scale. Results: On the basis of Eigen value> 1, the 26 items were extracted. Exploratory factor analysis revealed 2 factors of developed scale. The descriptive label was assigned to each factor on the basis of commonality of items termed as "muscle enhancing behaviors" and "thoughts and desires" related muscular body. A significant positive correlation was found between Drive for Muscularity Inventory and Drive for Muscularity Scale. Drive for Muscularity Inventory was also found to be a valid and reliable scale (test-retest reliability= 0.82 and split half reliability= 0.87) with acceptable psychometric properties. Conclusion: Indigenous developed Drive for muscularity scale found to have high internal consistency, construct validity, split-half reliability, and test–retest reliability.
https://www.annals-ashkmdc.org/index.php/ashkmdc/article/view/448

13. **Mukhtar, S.** (2023). Public Health Aspects of Domestic/Intimate Partner Violence Abuse and Trauma (DIVAT) during COVID-19 Quarantine: Imbalanced Power Dynamic and Sexual, Emotional, and Psychological Abuse. *Asia-Pacific Journal of Public Health,* 35(4), 301-303. doi: 10.1177/10105395231164439. **Sonia Mukhtar** (Clinical Psychology/SPP) Date of Publication: April 2023 HJRS: X (Honorable Mention)
This article examines predisposing, precipitating, perpetuating, and protective factors of/for Domestic/Intimate Partner Violence Abuse and Trauma (DIVAT) during COVID-19 lockdown and quarantine, specifically imbalance power dynamic, sexual abuse, and emotional and psychological manipulation. This article further presents public health and Sustainable Development Goals (SDGs) to protect women's rights through humanistic ways of solidarity. And finally, it discusses solution-focused and trauma-informed responding to public health paradigm through mental health counseling for survivors of abuse.
https://europepmc.org/article/pmc/pmc10083713

14. **Munir, F., Saleem, S., & Zahra, S. T.** (2023). Executive Functioning and Distress Tolerance: A Moderating Role of Age and Family System. *Pakistan Journal of Psychological Research,* 38(3), 373-389. doi: 10.33824/PJPR.2023.38.3.22. **Farwa Munir, Sadia Saleem, Sayyeda Taskeen Zahra** (Clinical Psychology/SPP) Date of Publication: 2023 HJRS: X (Null)
The current research was aimed to explore the moderating role of age and family system in the association with deficits in executive functioning and distress tolerance in university students. The cross-sectional research design was used and a stratified sample of 170 university students was taken in terms of gender, family system, and age. Barkley Deficit in Executive Functioning Scale (Barkley, 2012) and Distress Tolerance Scale (Azhar et al., 2018) was given to participants with a demographics sheet. The result of the study claimed that deficits in executive functioning, age and family system were significant positive predictors of distress tolerance in university students. Moreover, in early adulthood, the conditional effect of deficits in executive functioning on distress tolerance was more statistically significant than in middle adulthood. However, the effect was nonsignificant in late adulthood. Furthermore, the conditional effect of deficits in executive functioning on

distress tolerance is significant in university students from nuclear family system and non-significant in students from joint family system. The study would be helpful to understand the issues of university students and to provide counselling to them. Besides, early and timely identification of risk and protective factors of deficits in executive functioning would prevent serious consequences in university students.
https://pjpr.scione.com/newfiles/pjpr.scione.com/929/2023-38-3-1-929.pdf

15. **Rani, S., Saleem, S., & Zahra, S. T. (2023). The mediating role of self esteem in personality and mental health problems in university students with traumatic experiences.** *Journal of Postgraduate Medical Institute,* **37(2), 135-139. doi: 10.54079/jpmi.37.2.3159.** **Samia Rani, Sadia Saleem, Sayyeda Taskeen Zahra (Clinical Psychology/SPP) Date of Publication: May 2023** **HJRS: Y (Null)**
Objective: The current study explores the mediating role of self-esteem in the relationship of extraversion and mental health problems in traumatized university students. Methodology: Out of a total of 265 individuals, 215 potential participants were selected for further procedures based on their response to the "happened to me" item on the Life Event Checklist. This sample comprised 215 university students, of which 31% were male and 69% female, with ages ranging from 18 to 26 years (M= 20.78; SD= 2.46). The Self-Esteem Scale for University Students, Big Five Personality Inventory, and the Depression Anxiety Stress Scale were employed to measure the participants' self-esteem, extraversion, and mental health issues, respectively. Results: Correlation analysis outcomes revealed a positive relationship between extraversion and self-confidence (r =.136, p < .05*), as well as between anxious self-esteem and mental health problems (r = 541, p <.001***). Additionally, findings also demonstrated a negative relationship between extraversion and anxious self-esteem (r = 257, p < .001***), extraversion and mental health problems (r = 218, p < 05*), and self-confidence and mental health problems (r = 138, p < .05*). Nevertheless, elements such as low self-esteem, resilience, and sociability did not demonstrate a significant connection with extraversion or mental health problems. Following these obser-vations, mediation analysis disclosed a significant mediating role of both anxious self-esteem and self-confidence in the relationship between extraversion and mental health issues.
https://jpmi.org.pk/index.php/jpmi/article/view/3159

Book Chapter

1. **Daud, A. H., Mahmood, Z., & Abdi, Y. A. A. (2023). Chapter 32 - Khat chewing and cognitive behavioral therapy. In C. R. Martin, V. B. Patel & V. R. Preedy (Eds.),** *Handbook of Lifespan Cognitive Behavioral Therapy* **(pp. 395-402): Academic Press.** **Zahid Mahmood (Clinical Psychology/SPP) Date of Publication: February 2023**
Khat (*Catha edulis*) is a green plant that grows in Eastern Africa, Southern Africa, and the Arabian Peninsula. The khat leaves and shoots are chewed to attain a euphoric state. Khat contains cathinone and cathine which have stimulant properties and have similar impacts as amphetamine. These chemicals affect the users by decreasing appetite and sleep as well as increasing intellectual efficiency, and hyper-alertness. High consumption and chronic use of khat causes a series of damage to physical and mental health. Besides damaging health, khat use has adverse socio-economic effects on individuals, families, and society at large. The habit of khat chewing is a neglected area of research and very limited therapy protocols are available. Yet, cognitive behavior therapy (CBT) has been shown to be effective in leading to a decline in both khat consumption time and mental health problems. Decreasing conception time improves an individual's well-being by enhancing sleep and everyday functioning. Together, the increased everyday functioning and the enhancement of mental health enable the khat users to take care of day-to-day activities, which later decreases relapse chances.
https://www.sciencedirect.com/science/article/abs/pii/B9780323857574000353

Department of Applied Psychology

1. **Hassan, H., Tariq, K., Nasir, M., & Ayub, S. (2023). Personality Traits, Self-Control, and Sexting Attitudes Among Young Adults.** *Pakistan Journal of Psychological Research, 38*(1), 147-164. **Hareem Hassan, Kainat Tariq, Mamoona Nasir, Sumaira Ayub (Applied Psychology/SPP) Date of Publication: Jan-March 2023** **HJRS: X (Null)**
The present study investigated the relationship between personality traits, self-control, and sexting attitudes in young adults. Convenient sample of 254 young adults with an age range of 18-30 years (M = 22.28, SD = 2.70) were taken from different universities and professional fields in Pakistan. The self-constructed demographic sheet, Brief HEXACO Inventory (de Vries, 2013), Brief SelfControl Scale (Tangney et al., 2004), and Sexting Attitude Scale (Weiskkerch & Delevi, 2011) were used to assess the study variables. The results revealed that honesty-humility and self-control had a negative relationship with fun and carefree aspect of sexting attitude in young adults. Moreover, honesty-humility, conscientiousness and self-control had a positive, whereas emotionality had a negative relationship with perceived risk aspect of sexting attitude in young adults. Furthermore, honesty-humility and self-control also had a negative relationship with relational expectations aspect of sexting attitude. Results also indicated that self-control negatively predicted fun and carefree and

positively predicted perceived risk domains of sexting attitudes; while, honesty-humility negatively predicted relational expectations in young adults. Results showed significant differences in working and non-working young adults in terms of personality traits, self-control, and sexting attitudes. The study providing an in-depth understanding of the widespread phenomenon of sexting highlighting some of the major mental health concerns associated with the sexting behavior among youth.
https://pjpr.scione.com/newfiles/pjpr.scione.com/760/2023-38-1-10-760_2.pdf

2. **Mushtaq, A., & Mehmood, H.** (2023). Impact of Job Crafting Intervention on Psychological Empowerment, Work Engagement, and Affective Well-being in Teachers. *Journal of Professional & Applied Psychology, 4*(2), 98–116. https://doi.org/10.52053/jpap.v4i2.138. Asma Mushtaq, Haziq Mehmood (Applied Psychology/SPP) Date of Publication: June 2023 HJRS: Y (Null)

Organizations are under a lot of pressure to survive in the ever-changing world of competition. Human resources are a critical aspect for which there is no substitute. Job crafting is a component that can assist employees to improve the positive aspects of their work while reducing the negative aspects' impact. The study's main goal is to see how a job crafting intervention affects employees' psychological empowerment, work engagement, and affective well-being. It is a quasi-experimental design including both experimental and control groups. The population consists of teachers. Job crafting intervention was provided to the employees. It consists of six core elements including three sessions and pre-post testing taking a total of the six-week time period. Pre-testing and post-testing were done by using the Job Crafting questionnaire developed by Tims et al. (2012), Psychological Empowerment Scale (Spreitzer, 1995), Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2006) and Job-related Affective Well-being Scale, JAWS (Van Katwyk et al., 2000). A paired sample t-test was run to see the effect of job crafting intervention on job crafting, psychological empowerment, work engagement, and affective well-being. The results were positive and significant. The relationship between job crafting, psychological empowerment, work engagement, and affective well-being was also assessed and there was a positive and significant correlation. The job crafting training can make it achievable to initiate employees' active job crafting behavior and work engagement. Employers should recognize the need to assist and motivate staff to maximize their resources and meet their challenges.
https://iprpk.com/ojs/index.php/jpap/article/view/138

3. **Khan, A., Mehmood, H., & Huda, S.** (2023). Grit and Academic Burnout among Accountancy Students in Pakistan: Mediating Role of Academic Resilience. *Journal of Professional & Applied Psychology, 4*(2), 200–212. https://doi.org/10.52053/jpap.v4i2.158 . Ayesha Khan, Haziq Mehmood, Sadia Huda (Applied Psychology/SPP) Date of Publication: June 2023 HJRS: Y (Null)

The intended focus of this study on the accountancy students in Pakistan is due to the pressure to excel academically combined with a heavy workload, high academic pressure and frequent examinations leads to high levels of academic burnout among accountancy students. The present study was carried out to identify the relationship between grit, academic resilience and academic burnout among accountancy students. Data was comprised of 400 accountancy students of which 202 were males and 198 females who were recruited through purposive sampling technique. Their age ranged from 19-26 years *(M* = 22.09*; SD* = 2.06). Three scales were used to collect responses from participants; Academic Resilience Scale (ARS-30) (Cassidy, 2016), Copenhagen Burnout Inventory (Campos et al., 2013) and 12-Item-Grit Scale (Duckworth et al., 2007). The correlation analysis revealed significantly positive relationship between grit and academic resilience while significantly negative correlation with academic burnout. Moreover, the linear regression analysis established grit as the strongest negative predictor of academic burnout while mediation analysis observed the role of academic resilience between grit and academic burnout. The present research is helpful in understanding the role of these variables and their impact on accountancy students. The findings of the study would help in developing effective counseling and resilience enhancement interventions to facilitate accountancy students to deal with their academic burnout.
https://iprpk.com/ojs/index.php/jpap/article/view/158

4. **Sohail, A., Tariq, S., Naseer, H. S., & Ali, S.** (2023). Development of Love for Nature Scale. *Pakistan Journal of Humanities and Social Sciences, 11*(2), 1946–1954. https://doi.org/10.52131/pjhss.2023.1102.0491. Aroob Sohail, Shahnila Tariq, Hafiza Shamnaz Naseer, Shafqat Ali (Applied Psychology/SPP) Date of Publication: June 2023 HJRS: Y (Null)

This topic was chosen to learn the behavior of people in the spring season, greenery approaches when flowers blossom and spread joy. How nature influence their behavior. Many researchers have found that spending time in nature can benefit with mental health problems such as anxiety and sadness. Without a doubt, Nature is the best medicine for curing any ailment or human behavior (mental health). Other than this, how many people agree with nurture too. In-depth interviews method was use in the study to understand behavior of people. Total 120 students interviewed from Lahore Punjab with age range 60-85. Results showed that total 32 items of love for nature scale (LNS) with four factors identified on the bases of EFA. It based on Likert scale. The internal reliability of the four factors was good that is .60 to .83. Inter-correlation of the subscales showed

that all factors are inter-correlated however; aesthetic love indicated on-significant relationship with seasonal factor. LNS based on Pakistani culture so it may provide help on indigenous bases and for researchers to identify factors linked with nature and its relatedness with humans. Further studies are required to validate LNS and to investigate any other factor that may link with nature and human behavior. The Quran could utilize as guidance for those who are suffering emotional pain, and it attempts to help them attain an expressive quality of life. 'There is no disease that Allah has created, except that He also has created its treatment'
https://journals.internationalrasd.org/index.php/pjhss/article/view/1387

5. **Naqvi, G., Shahzad, A., Farhan, H., & Mahmood, I. (2023). COVID-19 Fear and Suicidal Ideation among Young Adults during Pandemic: Mediating Role of COVID-19 related Media.** *Pakistan Journal of Applied Psychology (PJAP), 2*(2), 157-165. https://doi.org/10.52461/pjap.v2i2.1210 . **Ghuncha Naqvi, Aiman Shahzad, Hira Farhan Applied Psychology/SPP) Date of Publication: March 2023** HJRS: Y (Null)
The current study was conducted to find out the impact of COVID-19 fear and COVID-19 related social media on suicidal ideation and to find out the mediating role of COVID-19 related social media in the association of COVID-19 fear and suicidal ideation. For this purpose cross-sectional research design was used and data of 200 participants were collected through purposive sampling. Participants were selected from Multan, Sargodha, Lahore and Faisalabad. Social Media Use Scale, The fear of COVID-19, Scale and Suicidal Ideation Attributes Scale were administered to the participants through google form. Data were analyzed using SPSS 21.0. The results revealed that COVID-19 fear positively and significantly predicted suicidal ideation while COVID-19 related social media negatively and significantly predicted suicidal ideation. Mediation analysis revealed that COVID-19 related social media played the role of suppressor between COVID-19 fear and suicidal ideation. Moreover, the results of standardized indirect effect was found to be significant. Implications of the study along with its limitations were discussed and recommendations for future research have been suggested. This study will help to create awareness among young adults about the positive and negative role of social media, and can also be helpful for their counselling to cope with fear and suicidal thoughts.
https://journals.iub.edu.pk/index.php/pjap/article/view/1210

6. **Qureshi, A., Tariq, S., & Mubeen, B.** (2023). **Social Support as Predictor of Life Satisfaction in Older Adults.** *Journal of Professional & Applied Psychology, 4*(1), 53-60. https://doi.org/10.52053/jpap.v4i1.121 . **Amarah Qureshi, Shahnila Tariq, Beenish Mubeen** (Applied Psychology/SPP) Date of Publication: March 2023 HJRS: Y (Null)
Social support plays an important role in the satisfaction with life in older adults. The purpose of present research was to find the social support as predictor of life satisfaction in older adults. Main hypothesis of the study was social support (significant others, family and friends) would be positive predictor of life satisfaction in older adults. Two more sub-hypotheses were also formulated. Correlational cross sectional research design was used with convenient sampling technique. Total 100 participants were selected which consisted of 50 couples from both nuclear and joint family system. The Multidimensional Social Support Scale (Zimet et al., 1988) and Satisfaction with Life Scale (Diener et al., 1985) were used. The results revealed social support including, significant others, friends and family, had positive relationship as well as positive predictor of life satisfaction in older adults. Moreover, older adults from joint family system were found to be more satisfied as compared to the older adults from nuclear family. Findings have significant implications in Pakistani culture for the purpose of counselling.
https://iprpk.com/ojs/index.php/jpap/article/view/121

7. **Durez, I., Hameed, H., & Bilal, A.** (2023). **Online Gaming, Impulsiveness, Aggression and Academic Performance among University Students.** *Journal of Peace, Development and Communication, 07*(02), 229–239. https://doi.org/10.36968/JPDC-V07-I02-18 . **Iqra Durez, Humera Hameed, Ahmed Bilal (Applied Psychology/SPP) Date of Publication: June 2023** HJRS: Y (Null)
The current study was aimed to find out that how online gaming affect the student's impulsiveness, aggression and academic performance for that purpose Game Addiction Scalefor Adolescents Lemmens & Valkenburg (2009), The Plutchik Impulsiveness Scale Plutchik & Praag (1989) and Buss-Perry Short- Form Aggression Questionnaire Smith & Bryant (2001) was used to measure the effect between variables. The quantitative method was used for current study. The study was carried out on 250 students by using purposive sampling strategy. The results of Pearson product moment correlation showed that online gaming was found to have strong positive correlation with impulsiveness also Pearson product moment correlation revealed that age was found to have negative significant relationship with gender, semester GPA and CGPA. Gender was found to have positive significant relationship with semester GPA and CGPA. The results of hierarchical multiple regression analysis showed that online gaming only have a strong influence on student's impulsiveness it has no effect on aggression or academic performance.
https://pdfpk.net/pdf/wp-content/uploads/2023/07/508-18.pdf

8. **Kashaf Maqbool, Bilal, A., Arham Fatima, & Mehroze Farooq Khan.** (2023). Emotional Investment, Commitment and Quality of Life in Pre-Marital Relationships among Young Adults in Pakistan. *Applied Psychology Review,* 1(1), 1-19. https://doi.org/10.32350/apr.11.01. **Kashaf Maqbool, Ahmed Bilal, Arham Fatima, Mehroze Farooq Khan** (Applied Psychology/SPP) Date of Publication: January 2023 HJRS: Y (Null)

The purpose of the current research was to explore the relationship between emotional investment, commitment, and quality of life in pre-marital relationships in youth. The cross-sectional survey design was used. In total, 150 men and women participated in the research. Investment Model Scale, Relationship Assessment Scale, Quality-of-Life Scale, and Pre-marital Sexual Permissive Scale were used to assess the study variables. Findings revealed that men demand women to engage more in sexual relationships as a marital requisite which is why most male partners convince their female partner to have sex as a commitment to marriage. Furthermore, emotionally satisfying relationships promote positivity and vice versa impacting academic achievement whilst promoting anxiety, depression, and low self-esteem among both men and women. Also, women have more negative mental health in their pre-marital relationships as compared to men. Researchers also found that care, happiness, and empathy in the relationship have positive effects on mental health of young adults. This research will enable young adults and marital counselors alike in dealing with the complexities of premarital relationships.
https://journals.umt.edu.pk/index.php/apr/article/view/2200

9. **Saheem, F., & Ayub, S.** (2023). EMOTIONAL EXHAUSTION AND QUALITY OF LIFE AMONG RESCUE WORKERS: MODERATING ROLE OF SOCIAL SUPPORT. Journal of Postgraduate Medical Institute, 37(4), 304-310. doi: 10.54079/jpmi.37.4.3253. **Farhan Saheem & Sumaira Ayub** (Applied Psychology/SPP) Date of Publication: November 2023 HJRS: Y (Null)

Objective: To determine the moderating role of social support in determining the relationship between emotional exhaustion and the quality of life among rescue workers. Methodology: Correlational research was conducted. Purposive sample of 170 rescue workers as calculated by as calculated by G power formula. The age range of the sample was 22-46 years (M = 31.7, SD = 5.05). The data were collected from rescue offices of three districts of Punjab including Layyah Bhakkar, Jhung and one district Dera Ismail Khan of Khyber Pakhtunkhawa using demographic information sheet and related assessment meas-ures. Data were analyzed using SPSS-26. Pearson product moment correlation and moderation through multiple hierarchical regression analyses to test the hypotheses. Results: Emotional exhaustion found to be positively related to secondary traumatic stress (r= 0.24, p < 0.01) and burnout (r= 0.21, p < 0.01) subscales of quality of life in rescue workers. It was also found that social support showed negative relationship with secondary traumatic stress (r= -0.22, p < 0.01) and burnout (r= -0.36, p < 0.01), while positive relationship with compassion satisfaction (r= 0.22, p < 0.01). Further, emotional exhaustion positively (β =.22, p < .01) and family support negatively (β =- .21, p <.01) predicted the burnout and secondary traumatic stress. The results showed significant interaction effect of family support and emotional exhaustion (β = -.97, p < .05) in predicting secondary traumatic stress in rescue workers.
https://jpmi.org.pk/index.php/jpmi/article/view/3253

School of Architecture and Planning (SAP)

Department of City and Regional Planning

1. **Qalb, A., Arshad, H. S. H., Nawaz, M. S., & Hafeez, A.** (2023). Risk reduction via spatial and temporal visualization of road accidents: a way forward for emergency response optimization in developing countries. *International Journal of Injury Control and Safety Promotion, 30*(2), 310-320. doi: 10.1080/17457300.2022.2164312. **Aqsa Qalb, Hafiz Syed Hamid Arshad, Muhammad Shafaat Nawaz, Asra Hafeez** (City & Regional Planning/SAP) Date of Publication: March-June 2023 HJRS: W (Bronze)

To achieve an effective emergency response and road safety, this study aims to assist a semi-automated dynamic system to analyze and predict the spatial distribution and temporal pattern of road crashes. Kasur, an intermediate city of Pakistan, was selected and data including location, time and reasons of accidents for five years (2014–2018) was utilized. Radar charts, Getis-Ord Gi* statistic, Moran's I spatial auto-correlation, and time series indices were engaged to present temporal, spatial and spatial-temporal variation of accidents, using python-based tools and jupyter notebook. A dynamic user interface was created using Github and Tableau to visualize a real-time zoom-able spatiotemporal variation of accidents. The results explain that out of 12 months, October faces the peak while April sees the least of road accidents. 7am is the peak hour for accidents and the weekends record a significantly higher number of road accidents as compared to weekdays. The city core witnesses the major hotspot areas with huge cluster of accidents. The findings contribute towards a well-informed decision support system, the knowledge of spatial analytics and its application in road safety science, and the preparedness of the rescue agencies for rapid response to reduce the impacts of road accidents.
https://www.tandfonline.com/doi/full/10.1080/17457300.2022.2164312

2. Parvez, M. A., Rana, I. A., Nawaz, A., & Arshad, H. S. H. (2023). The impact of brick kilns on environment and society: a bibliometric and thematic review. *Environmental Science and Pollution Research, 30*(17), 48628-48653. doi: 10.1007/s11356-023-26011-. Hafiz Syed Hamid Arshad (City & Regional Planning/SAP) Date of Publication: April 2023 HJRS: W (Silver)

Bricks have a long history of being utilized as a construction material across the globe. The production processes involved in the manufacture of bricks have a significant impact on the environment, human health, economy, and society. This study conducts a thematic and bibliometric analysis to provide an in-depth review of the effects of brick kilns on humans and the environment. The PRISMA framework was used to identify relevant articles from the Web of Science database, resulting in the selection and critical review of 348 articles. The bibliometric analysis included an evaluation of historical growth, keywords, citation and co-citation, organizations, and countries. The articles were published in 213 journals, written by 1396 authors from 670 institutions in 66 countries. Thematic analysis revealed that brick kilns have a negative impact on the environment, including soil damage, and cause health problems for kiln workers and animals. Modern slavery and societal issues also persist in developing countries. The current research is focused on finding alternative materials for brick manufacturing, improving industry energy efficiency, managing waste, and technological advancements, such as the implementation of the zigzag or Hoffmann kiln to reduce pollution. In developing countries, utilizing waste from other industries in brick production can effectively lower production costs. While developed countries have embraced advanced technologies for brick production, it is recommended that developing countries adopt awareness campaigns to encourage the upgrading of kilns to cleaner and more sustainable systems. Future research directions should aim to support brick kiln owners in adopting such systems.
https://link.springer.com/article/10.1007/s11356-023-26011-7

3. Rana, I. A., Arshad, H. S. H., Jamshed, A., Khalid, Z., Younas, Z. I., Bhatti, S. S., & Ahmad, J. (2023). The impact of psychological distance to climate change and urban informality on adaptation planning. *Urban Climate, 49*. doi: 10.1016/j.uclim.2023.101460. Hafiz Syed Hamid Arshad (City & Regional Planning/SAP) Date of Publication: May 2023 HJRS: W (Gold)

Climate change adaptation planning involves adjusting to the impacts of climate change and taking action to mitigate its adverse effects. Psychological distance, the separation between one's self-perception and actual events, can play a significant role in an individual's readiness to adapt to climate change impacts. This study aims to investigate the socioeconomic factors associated with psychological distance to climate change in formal and informal settlements of Lahore, Pakistan. Using a literature review, data indicators were selected and grouped into the psychological distance dimensions of spatial, temporal, social, and hypothetical. A questionnaire survey was conducted in the study area, resulting in a total of 400 responses. Descriptive statistics and sampled paired t-tests were used to measure differences between responses from formal and informal communities, and multivariate regression models were developed to identify socioeconomic factors associated with psychological distance to climate change. The results of the study indicate a significant difference between formal and informal settlements in spatial distance and hypothetical dimensions. Additionally, household size, average household income, number of children, and past experiences with extreme weather conditions were found to be significant factors. The study recommends that these factors be taken into account when engaging with the public, communicating risks, and devising relevant policies for effective adaptation planning.
https://www.sciencedirect.com/science/article/pii/S2212095523000548

4. Zia, A., Rana, I. A., Arshad, H. S. H., Khalid, Z., & Nawaz, A. (2023). Monsoon flood risks in urban areas of Pakistan: A way forward for risk reduction and adaptation planning. *Journal of Environmental Management, 336*, 117652. https://doi.org/10.1016/j.jenvman.2023.117652. Hafiz Syed Hamid Arshad (SAP) Date of Publication: June 2023 HJRS: W (Platinum)

Climate change poses a significant threat to sustainable urban development. Heavy rainfall has led to severe urban flooding, disrupting human life and causing widespread damage. This study aims to examine the impacts, preparedness, and adaptation strategies related to monsoon flooding in Lahore, Pakistan's second-most populous metropolitan area. Using Yamane's sampling method, a total of 370 samples were surveyed and analyzed using descriptive analysis and chi-square tests. The results indicate that houses and parks were the most commonly damaged properties, with common impacts including roof collapse, house fires, seepage, and wall dampness. These impacts not only caused physical damage but also disrupted basic amenities and damaged roads, resulting in significant socioeconomic costs. Despite these challenges, residents adopted a variety of adaptation strategies such as the use of temporary tarps, moving household appliances to upper floors, and shifting to tiled floors and wall paneling to mitigate damage. However, the study highlights the need for further measures to reduce flood risks and promote adaptation planning in order to effectively address the ongoing challenges posed by climate change and urban flooding.
https://www.sciencedirect.com/science/article/abs/pii/S0301479723004401

5. **Malik, S. (2023). Beneficiary Expectation from Low-Income Housing Projects: A Post-Occupancy Evaluation Study from Punjab, Pakistan.** *Annals of Human and Social Sciences, 4*(2), 599-614. http://doi.org/10.35484/ahss.2023(4-II)55. **Sana Malik (SAP) Date of Publication: May 2023 HJRS: Y (Null)**
The Pakistani government has been promoting affordable housing projects for low-income households for the last thirty years. It is important to appraise the low-income housing projects from the perceptions of beneficiaries being the ultimate users of such facilities in urban settings. This paper presents an analytical study on the experiences of beneficiaries from the application process to possession of housing units in two different models of affordable housing in the Punjab region, Pakistan. It is challenging to link their experiences as post occupancy evaluation (POE) regarding the application process, living experience, and governance of such housing projects. Analysis was done using inductive reasoning by data collection through focus group discussions. The findings show and confirm that quality of life in a low-income housing environment is a combination of multiple factors which influence the mind of households from the inception of projects till the possession and continue in the post-occupancy phase as well. The funding and execution of projects need to consider the end user demand by the inclusion of targeted beneficiaries in the planning, design, and regulation of the housing projects to ensure the resident's housing satisfaction in terms of provision of all allied facilities, infrastructure, experience, and quality of living.
https://ojs.ahss.org.pk/journal/article/view/272

6. **Pervaiz, S., Tariq, F., & Tariq, S. (2023). Emerging Patterns in Roadside Landscape: A Case Study of Lahore Ring Road.** *Global Social Sciences Review, VIII,* 355-363. https://doi.org/10.31703/gssr.2023(VIII-II).32. **Samirah Pervaiz, Fariha Tariq (SAP) Saroosh Tariq (ORIC) Date of Publication: June 2023 HJRS: Y (Null)**
Lahore is a conurbation that has experienced many vicissitudes throughout its existence. Streets and roads have given a route for transportation. This development has introduced new components like underpasses, overhead bridges and a periphery Ring Road. The current study has analyzed the landscape of Lahore Ring Road over a period of four years. The focus of the study is to comprehend the landscape design along the first segment of this road. In order to track the changes in the landscape at this time, visual surveys of the Lahore Ring Road were conducted at interval of four years. The field observations were compared to the digital data to draw comparisons between the two sets of visual evidence. There is already one Ring Road in Peshawar. Given that Rawalpindi is developing a Ring Road, which will eventually include landscape, this analysis assumes greater significance.
https://www.gssrjournal.com/search-article/title/Emerging-Patterns-in-Roadside-Landscape:-A-Case-Study-of-Lahore-Ring-Road

7. **Malik, I., Jamil, F., & Mujahid, B. (2023). Analytical Study of Ablution Spaces: Case Analysis of Mosques in Lahore, Pakistan.** *Annals of Human and Social Sciences, 4*(1), 104-122. https://doi.org/10.35484/ahss.2023(4-I)11 . **Ilyas Malik, Farah Jamil, Beenish Mujahid (SAP) Date of Publication: March 2023 HJRS: Y (Null)**
Online education has been turned into an effective opportunity for students, especially after COVID-19. This paper aimed to investigate the liking and disliking factors of school-going children with special perceived by their parents and to compare the liking and disliking of school-going special needs children. The quantitative research approach was applied by the researchers to complete the study. 40 parents of school-going children with special needs residents of Lahore city were selected as a sample by using a stratified sampling technique for this research. One close-ended self-constructed reliable questionnaire (Cronbach Alpha=. 84) was used by the researchers. The results found liking to do activities in the school more than disliking (liking score= 83.7500 and disliking score= 52.5500). There is no significant difference in parental views based on their gender about the liking (t=. 388, df= 38 and p=. 700) and disliking factors (t=. 788, df= 38, and p=. 436) and there are no significant differences in the liking and disliking of students with special needs based on their disabilities about going to school. Researchers recommended that reinforcement should be given to the special needs students to maintain their likeness for attending school.
https://ojs.ahss.org.pk/journal/article/view/132

8. **Tahir, S., & Khilat, F. (2023). Condition assessment of historic chamba house, Lahore before and after conservation.** *Quarterly Journal of the Pakistan Historical Society, 70*(2). **Sibgha Tahir, Faiqa Khilat (SAP) Date of Publication: June 2023 HJRS: Y (Null)**
Heritage does not only include monumental buildings like forts and mosques; but also includes small-scale residential buildings, which reveals the living style of people who used to own that place. Chamba House is one of the small-scale hidden edifices located in the heart of Government officer Residence (GOR) Lahore, Pakistan. It is one of the few buildings constructed under the Indo-Saracenic style developed during the British Raj in Lahore. The house has been a residence to many nobles and still welcomes many tourists. The first impression of the Chamba House is a palace standing between the lush green trees of GOR in a very good condition, but from a closer look, it has many natural and manmade damages over the time. The study reveals the details of its architectural style, ornamentation, and most importantly the conservation carried out in 2020

of the deteriorating structures and the causes of its decay. The research identifies the conservation condition assessment that will help the authorities to mark it and that can further be saved in the same condition. The research was carried out with the aim to highlight this significant monument and condition analysis before and after the areas repaired/conserved were documented and also those areas were photographed and added to the paper.

http://phs.com.pk/index.php/phs/article/view/305

9. **Shahid, M., & Khilat, F.** (2023). Maryam Zamani Mosque, Lahore: A Little Pearl in Treasureof Mughul Architecture. *Quarterly Journal of the Pakistan Historical Society, 71*(1). **Mahnoor Shahid, Faiqa Khilat** (SAP) **Date of Publication: March 2023 HJRS: Y (Null)**

As compared to earlier Muslim architecture in India, Mughul architecture has been more delicate, graceful and luminous. These characteristics aroused the interest of the Muslim and non-Muslim architects around the world in the buildings of the Mughul era. For the Mughuls, architecture and its principles, was not confined to just a particular type of building, as they introduced to India a number of gardens, tombs, mosques and forts etc. This paper studies one of the mosques of Mughul era belonging to Jahangir's period which was named after his mother Maryam Zamani. The mosque presented specific features which became a precedent for many mosques constructed afterwards. The composition of arches, provision of bulbous domes, cupolas decorated with calligraphy and fresco paintings, etc. gifted South Asia marvel pieces of Mughul architecture. The exemplary principles of symmetry, balance and proportion imbue a complete ideology and meaning in Islamic architecture. This marvelous and meaningful symbol of mosque architecture is still a source of attraction and learning for architects, craftsmen and general tourists visiting the Walled City of Lahore. The paper is a humble effort to carry an appraisal study and put on record all the beautiful features of Maryam Zamani Mosque of the Mughul era.

https://www.phs.com.pk/index.php/phs/article/view/277

10. **Ahmad, A., & Khilat, F.** (2023). Reviving the Forgotten, Diminishing Glory of Sikh Heritage: A Case Study of Haveli Ranjit Singh Gujranwala, Pakistan. *Journal of Art, Architecture and Built Environment, 6*(1), 94-113. https://doi.org/10.32350/10.32350/jaabe.61.05. **Ayesha Ahmed, Faiqa Khilat** (SAP) **Date of Publication: June 2023 HJRS: Y (Null)**

Heritage is the legacy of the past, a memoir of history, pride, and inspiration cherished by one generation and passed to the next generations. It elucidates the glory and value, architectural significance, continuity, and identity; which define who we are. Despite the importance of heritage, it's never guaranteed to survive and be passed on to the next generations at its best. Many of the glories of past got buried under the layers of time, forgotten and abandoned. These heritage structures are severely dilapidated with structural distress and vandalized due to encroachments. This research paper emphasizes the elapsed and neglected heritage building of the Sikh clan; the founders of the city, located in Gujranwala, to document the significance of the structure, its causes of decay and neglect, and the importance of its conservation and revival. To give it life to be explored and appreciated by the public. The qualitative research methodology was adopted for this paper to document the heritage structure, using both primary and secondary resources including photographic surveys, interviews, detailed site inspection, and literature review. The objective of the paper is to document this haveli, explore causes of neglect and deterioration and how to address it, in the later stage, how to enhance its value to open it for both national and international tourism.

https://journals.umt.edu.pk/index.php/JAABE/article/view/3188

11. **Ahmad, I., Ahmed, Z., & Al-Rashid, M. A.** (2023). Improved stability through self-localisation scheme in heterogeneous vehicular clustering. *International Journal of Vehicle Information and Communication Systems,* 8(3), 252-265. doi: 10.1504/IJVICS.2023.132928. **Muhammad Ahmad Al-Rashid (SAP) Date of Publication: August 2023 HJRS: Y (Null)**

Intelligent local data processing within vehicular ad hoc networks (VANET) may increase the capabilities of the internet of vehicles (IoVs). To share data effectively, vehicular clusters should be synchronised and stable. Vehicle needs uninterrupted global positioning system (GPS) signal for synchronisation purposes, especially in the urbane environment. GPS interruption leads to an unstable connection that is a big hurdle in developing cost-effective solutions for navigation and route planning applications. To solve this problem a self-location calculation scheme within the vehicular clustering process is proposed. The proposed self-location calculation algorithm enables vehicles to calculate their coordinates in the absence of GPS signals. A clustering mechanism is developed for sharing traffic information system (TIS) data among multiple vehicles over a particular road segment. Sharing of vehicular data in real-time helps vehicles to synchronise well. The developed scheme is simulated and compared with existing known approaches. The results show the better stability of our proposed mechanism over others.

https://www.inderscienceonline.com/doi/abs/10.1504/IJVICS.2023.132928?journalCode=ijvics

12. **Shaikh, S., Talpur, M. A. H., Baig, F., Tariq, F., & Khahro, S. H. (2023). Adoption of Electric Motorcycles in Pakistan: A Technology Acceptance Model Perspective. *World Electric Vehicle Journal,* 14(10). doi: 10.3390/wevj14100278. Farrukh Baig, Fariha Tariq (SAP) Date of Publication: October 2023 HJRS: X (Clay)**
Electric motorcycles (EMs) are gaining popularity in densely populated Asian countries, offering environmentally friendly solutions to combat traffic-related pollution. Governments and authorities are eager to promote EMs to reduce reliance on traditional fuel-based motorcycles. While prior research has explored the potential impacts of EMs, limited attention has been given to the adoption intentions of the Pakistani public. This study investigates the factors influencing the behavioral intentions of adopting EMs in Pakistan, employing an extended technology acceptance model (TAM) framework. The extended model incorporates perceived values and environmental concerns, along with perceived usefulness and perceived ease of use, to assess their impact on EM adoption intentions. Based on data collected from 228 respondents in Karachi, Pakistan, structural equation models were estimated to identify significant factors affecting EM adoption. Findings highlight the substantial influence of perceived value and environmental concern on behavioral intentions, with perceived ease of use playing a mediated role through perceived usefulness. Results suggest that effective marketing and user-friendly EM designs, coupled with well-crafted policies and education, can substantially boost EM adoption by the public, facilitating a shift toward sustainable transportation alternatives.
https://www.mdpi.com/2032-6653/14/10/278

School of Professional Advancement (SPA)

1. **Alanazi, S. A., Shabbir, M., Alshammari, N., Alruwaili, M., Hussain, I., & Ahmad, F. (2023). Prediction of Emotional Empathy in Intelligent Agents to Facilitate Precise Social Interaction. *Applied Sciences*, 13(2), 1163.doi: 10.3390/app13021163. Maryam Shabbir (SPA) Date of Publication: January 2023 HJRS: W (Bronze)**
The research area falls under the umbrella of affective computing and seeks to introduce intelligent agents by simulating emotions artificially and encouraging empathetic behavior in them, to foster emotional empathy in intelligent agents with the overarching objective of improving their autonomy. Raising the emotional empathy of intelligent agents to boost their autonomic behavior can increase their independence and adaptability in a socially dynamic context. As emotional intelligence is a subset of social intelligence, it is essential for successful social interaction and relationships. The purpose of this research is to develop an embedded method for analyzing empathic behavior in a socially dynamic situation. A model is proposed for inducing emotional intelligence through a deep learning technique, employing multimodal emotional cues, and triggering appropriate empathetic responses as output. There are 18 categories of emotional behavior, and each one is strongly influenced by multimodal cues such as voice, facial, and other sensory inputs. Due to the changing social context, it is difficult to classify emotional behavior and make predictions based on modest changes in multimodal cues. Robust approaches must be used to be sensitive to these minor changes. Because a one-dimensional convolutional neural network takes advantage of feature localization to minimize the parameters, it is more efficient in this exploration. The study's findings indicate that the proposed method outperforms other popular ML approaches with a maximum accuracy level of 98.98 percent when compared to currently used methods.
https://www.mdpi.com/2076-3417/13/2/1163

2. **Nabila, Ahmad, M., Althobaiti, A. T., Ali, W., Masood, K., Ramadan, M. F., . . . Asif, S. (2023). Membrane-processed honey samples for pollen characterization with health benefits. *Chemosphere, 319*. doi: 10.1016/j.chemosphere.2023.137994. Khansa Masood (SPA) Date of Publication: April 2023 HJRS: W (Gold)**
Better processing techniques must be utilized widely due to the rising demand for honey. The most common honey processing techniques are applied to melissopalynomorphs to check the quality and quantity of valuable honey using microporous ultrafiltration membranes. It is essential to have the ability to selectively filter out sugars from honey using ultrafiltration. This study authenticated 24 honey samples using membrane reactors ultrafiltration protocol to describe the pollen spectrum of dominant vegetation. The purpose of this study was also to explore nutritional benefits as well as the active phytochemical constituents of honey samples. Honey samples were collected and labeled Acacia, Eucalyptus, and Ziziphus species based on plant resources provided by local beekeepers. A variety of honeybee flora was collected around the apiaries between 2020 and 2021. Honey analysis revealed that the pollen extraction of 24 bee foraging species belonging to 14 families. The honey membrane technology verified the identities of honey and nectar sources. Also, pollen identified using honey ultrafiltration membranes revealed dominant resources: Acacia spp. (69%), Eucalyptus spp. (52%) and Ziziphus spp. Honey filtration using a membrane technology classified 14 samples as unifloral, represented by six dominant pollen types. The absolute pollen count in the honey sample revealed that 58.33% (n = 14) belong to Maurizio's class I. Scanning ultrasculpturing showed diverse exine patterns: reticulate, psilate, scabrate-verrucate, scabrate-gemmate, granulate, perforate, microechinate, microreticulate, and regulate to fossulate for correct identification of honey pollen types. Honey ultrafiltration should be utilized to validate the

botanical sources of honey and trace their biogeographic authenticity. Thus, it is imperative to look at the alternative useful method to identify the botanical origin of filtered honey. It is critical to separate honey from adulteration by a standardized protocol. Membrane technology has yielded significant outcomes in the purification of honey.

https://www.sciencedirect.com/science/article/pii/S0045653523002618

3. **Sadiq, I., & Waheed, A.** (2023). Resource value co-creation in retail: integrating service dominant logic of marketing and consumer culture theory. *Russian Law Journal, 11*(2). https://doi.org/10.52783/rlj.v11i2.2200. Imran Sadiq (SPA) Abdul Waheed (Management\HSM) Date of Publication: February 2023 HJRS: X (Clay)

To establish the framework for the research of the value co-creation process in the retail sector, the study merges the Service Dominant Logic of Marketing (S-DL) and Consumer Culture Theory (CCT). S-DL is widely adopted, criticized, developed, and coupled with many disciplines on a global scale. This logic heavily relies on the concept of value co-creation (VCoC), which outlines the overarching objective of marketing interactions and partnerships. S-DL offers a framework for actors' actions and reactions when they collaborate to integrate resources with the intention of creating experiences. Further, thirty-eight interviews were conducted to find out the type of resources that are part of cocreated retail process. The study found out two main resources hard skills and soft skills. The largest frequencies scored was by soft skills. Further, hard skills got four sub themes. They are availability of the stock and on logging it on e-live, smooth operations, marketing research, evaluation and comparison with other brands, and good understanding and knowledge about the products they are selling. However, soft skills depicted thirteen sub themes. They are selling, vision, see the picture in long term, innovative people, adaptable, fresh ideas and new way of doing things, communication, build relation, judge the psychology of customer, creating value, experience to co-create value, try to build a good relationship, and honesty and integrity.

https://russianlawjournal.org/index.php/journal/article/view/2200

4. **Ahmad, S., Gul, W., Sadiq, I., & Rehman, S. U.** (2023). Impact of Using AI to manage project risks including change in scope and lack of required skills: moderating effect of team expertise in it industry of pakistan. *Russian Law Journal, 11*(12s). Sana Ahmad, Warda Gul, Imran Sadiq, Saeed Ur Rehman (SPA) Date of Publication: April 2023 HJRS: X (Clay)

The aim of this paper is to study the impact of using Artificial Intelligence to manage project risks within IT industry by IT project managers. By implementing the socio technical system theory the model was derived to implement technology i.e. Artificial Intelligence to enable project managers assess risks beforehand and reduce the risk of project failure rate, The study was quantitative in nature and survey was conducted to collect data from 249 respondents which include project managers, functional managers and project team members of different software houses present in Lahore which included NETSOL, Systems, Tkxel, InvoZone. The results of this study clearly showed positive relationship between the variables, showing the use of artificial intelligence can create a significant impact on managing project risks and gaining expertise in AI can contribute towards managing project risks more effectively.

https://www.russianlawjournal.org/index.php/journal/article/view/2338

5. **Rehman, S. U.,** Shahzad, M., Ding, X., & Razzaq, A. (2023). Impact of corporate motives for sustainable sourcing: key moderating role of regulatory pressure. *Environmental Science and Pollution Research, 30*(27), 71382-71395. https://doi.org/10.1007/s11356-023-27463-7. Saif Ur Rehman (SPA) Date of Publication: May 2023 HJRS: W (Silver)

Organizational decisions and their motivations are crucial for successfully implementing sustainable sourcing practices (SSP). Still, there is scant research on how SSPs are impacted by corporate motives (CM). To fill this research gap, we formed a three-tiered stakeholder theory (ST) based paradigm that accounts for the moderating impact of regulatory pressure (RP) while examining the relationship between different types of corporate motives (instrumental, relational, and moral) and SSP. Partial least squares structural equation modeling (PLS-SEM) was used to examine data collected from 248 respondents in the Pakistani manufacturing industry. The outputs of SEM disclosed that all CMs affect SSP. RP also confoundedly moderated these targeted relationships. Importance performance map analysis (IPMA) showed that regulatory pressure (0.319) and relational motives (67.38) are more important and perform better than all other exogenous variables. This study sheds light on corporate strategies and decision-making in multi ways. All dimensions of CM greatly enhance SSP directly and through RP, as RP firmly moderates these associations, indicating the relevance of ST. Finally, this empirical investigation ends with a framework of testable assertions and many future research endeavors on environmental sustainability.

https://link.springer.com/article/10.1007/s11356-023-27463-7

6. **Shahzad, M., Qu, Y.,** Rehman, S. U., & Zafar, A. U. (2022). Adoption of green innovation technology to accelerate sustainable development among manufacturing industry. *Journal of Innovation & Knowledge,*

7(4), 100231. https://doi.org/10.1016/j.jik.2022.100231. **Saif Ur Rehman (SPA) Date of Publication: October 2023** HJRS: W (Silver)

Recent advancements in green and innovative technologies have resulted in a number of innovations in manufacturing operations to accelerate sustainable development (SD). Despite several benefits of green innovation adoption (GIA), the adoption rate of these initiatives is still abysmal in manufacturing organisations. To fill this gap, we have developed and validated the GIA model grounded on the unified theory of acceptance and use of technology (UTAUT), which compels organisations to implement these novel technologies. Data was collected through a survey of 516 respondents from Pakistani manufacturing industries and analysed using structural equation modelling (SEM) and the artificial neural network (ANN) approach. The deliverables of SEM and ANN approaches demonstrated that all green integrated constructs of the research model, such as performance expectancy, effort expectancy, hedonic motivation, social influence, facilitating conditions, and innovation cost, predict green behavioural intention (GBI). Besides, GBI was found to have a strong direct and mediating effect among integrated constructs towards GIA. In addition, the moderation of organisational size highlighted the differentiation among small, medium and large size enterprises. Additionally, ANN specifies the robustness and relative importance of all integrated constructs, whereas green facilitating conditions have the highest relative importance value for GIA. The proposed integrated model offers novel insights for decision-makers and suggests various implications for adopting and implementing innovative green technologies to achieve SD objectives.

https://www.sciencedirect.com/science/article/pii/S2444569X22000671

7. **Shahzad, M., Qu, Y., Ur Rehman, S., Ding, X., & Razzaq, A. (2023). Impact of stakeholders' pressure on green management practices of manufacturing organizations under the mediation of organizational motives.** *Journal of Environmental Planning and Management,* 66(10), 2171-2194. doi: 10.1080/09640568.2022.2062567. **Saif Ur Rehman (SPA) Date of Publication: August 2023** HJRS: W (Gold)

Due to growing consciousness and pressure from concerned stakeholders, organizations have started to prioritize green management practices (GMP); however, little is known about the critical role of organizational motives (OM) for achieving GMP. Following the stakeholder theory, this study intends to examine the relationship between stakeholders' pressure (STP), organizational motives (OM), and GMP in an encompassing model. Three hundred and eight responses were collected from the Pakistani manufacturing industry, and hypotheses were confirmed employing structural equation modeling (SEM). Empirical results indicate that primary and secondary stakeholders' pressure has a substantial effect on OM. Further, each motive, such as instrumental, relational, and moral, substantially impacts GMP. Besides, OM has been found to partially mediate the relationship. Importance-performance analysis specified that the importance and performance values of STP are higher than OM for GMP. The conclusion emphasizes the essential role that STP can play in realizing GMP in manufacturing industries through OM. These novel findings suggest worthy insights for managerial staff and policymakers on enhancing GMP adoption through OM in emerging economies.

https://www.tandfonline.com/doi/full/10.1080/09640568.2022.2062567

8. **Shahzad, M., Rehman, S. U., Zafar, A. U., & Masood, K. (2024). Sustainable sourcing for a sustainable future: the role of organizational motives and stakeholder pressure.** *Operations Management Research*, *17*(1), 75-90. **Saif Ur Rehman, Khansa Masood (SPA) Date of Publication: August 2023** HJRS: W (Bronze)

Implementing sustainable sourcing practices (SSP) relies strongly on organizational decisions and the motives behind these decisions. However, little is known about how SSP are influenced by organizational motives (OM). To address this gap, we developed a multifaceted framework based on stakeholder theory (ST) that enables enhanced knowledge of OM, such as instrumental motives (IM), relational motives (RM), moral motives (MM), and their influence on SSP by incorporating the moderating role of stakeholder pressure (STP). Data were compiled from 308 Pakistani manufacturing organizational respondents and assayed by partial least squares structural equation modeling (PLS-SEM). The deliverables of SEM validated that all OM directly impact SSP. Further, STP expressively moderated the targeted relations in confounding ways and organizational size moderately distinguished small and larger organizations. Importance-performance map analysis also revealed that RM have a greater importance value (0.201) and MM have a greater performance value (71.833) than all exogenous variables. This research offers several key contributions. First, all three OM (IM, RM, and MM) significantly improve SSP directly, and with the moderation of STP and organizational size, which signifies the salience of ST and provide diverse conclusions. Second, OM operationalize SSP and suggest ways to execute them to meet the organizational environmental goals. Third, this study examines how SSP implementation requires the source function to reconsider its key motives for sustainability endeavors.

https://link.springer.com/article/10.1007/s12063-023-00409-5

Conference Proceeding

1. **Ali, L., Taleb, N., Ali, A., Abu-Alsondos, I. A., Naseem, H., Yousaf, F., & Abdelhakim, M. (2023).** *Post-Covid-19 Pandemic IT Project Management Skills and Challenges.* **Paper presented at the 2nd International Conference on Business Analytics for Technology and Security, ICBATS 2023. Farhan Yousaf (SPA) Date of Publication: 07-08 March 2023.**

   Since December 2019, the COVID-19 pandemic has harmed social, financial, and work life. The novel coronavirus has caused problems in all business sectors, including Information Technology(IT). Many Projects have been stopped or delayed due to the impact of this pandemic. Most of the companies recognized the importance of IT to achieve competitive advantage and to survive. Companies are investing a lot of money in IT projects. More than 60% of IT project fail. Lack of professional IT project management is one of the main reasons for that fail. Managing IT projects is a complex problem. Crises such as COVID 19 and uncertainty are increasing the complexity and challenges in IT projects management. This paper investigates what are the IT project management Key success factors required during and after the Pandemic. Secondary data were collected from literature review in the field of IT project management. an online questionnaire was used to collect the primary data from 107 IT firms. 323 respondents were participated. It is concluded that the following Key success factors are required: e-communication, centralization of data, online project monitoring, designing new policies and guidelines for incorporating new work culture, gaining and establishing project risk management exercises, especially cybersecurity and data protection by gaining access to the latest tools, establishing a culture for strict usage of Personal Protective Equipment (PPEs) to help project managers complete projects safely, and top management support.

   https://ieeexplore.ieee.org/abstract/document/10111320/authors

School of Commerce and Accountancy (SCA)

1. **Rasheed, B., Malik, Z. F., Haider, S. T. F., & Shakeel, A. (2023). Corporate Social Responsibility Disclosure and Firm's Operational, Financial and Market Performance: A Study of Content Analysis of Firms Listed at Pakistan Stock Exchange.** *IRASD Journal of Economics,* **5(1), 658–670. https://doi.org/10.52131/joe.2023.0501.0106. Burhan Rasheed, Zohair Farooq Malik, Syed Taha Fraz Haider, Amer Shakeel (SCA) Date of Publication: March 2023 HJRS: Y (Null)**

   Developing economies like Pakistan, still struggling to promote the emerging concept of Corporate Social Responsibility (CSR), so this research aims to investigate the impact of CSR Disclosure (CSRD) on a Firm's Performance (FP). This study is based on conceptual aspects of CSRD and is different because FP is measured with three different types of proxies, i.e. operational, financial and market performance. The empirical results of this research show the positive and significant impact of CSRD on a firm's operational and financial performance but insignificant in the case of market performance. It is further concluded that firms disclosing CSR have better operational and financial performance. This study is a pioneer to uplift the importance of CSRD in Pakistan and therefore an addition to existing literature, this paper also provides different new ways to assess the link between CSRD and FP.

   https://journals.internationalrasd.org/index.php/joe/article/view/1045

2. **Ali, H. S., Jia, F., Lou, Z., & Xie, J. (2023). Effect of blockchain technology initiatives on firms' market value.** *Financial Innovation,* **9(1), 48. doi: 10.1186/s40854-023-00456-8. Haji Suleman Ali (SCA) Date of Publication: February 2023 HJRS: W (Bronze)**

   Despite blockchain's potential to transform corporations by providing new ways of organizing business processes and handling information, extant research pays inadequate attention to how and under what conditions blockchain technology provides additional fnancial value for shareholders. Drawing on the efcient market hypothesis and signaling theory, we examined the relationship between frms' blockchain use, development announcements, and stock market reactions. We used the event study methodology to analyze a sample of blockchain projects initiated by US frms between 2016 and 2019. The sample contains 114 frm-event observations. The fndings show that the average abnormal return over a 2 days event period (including the day of the announcement and the day after the announcement) was positive. This positive stock market reaction is even more substantial when frms announce blockchain projects that focus on saving cost or time. Our fndings also indicate that blockchain announcements tend to elicit more positive market reactions from smaller frms. We analyzed 249 frm-event observations containing frms from around the world and conclude that blockchain technology has a non-signifcant long-term impact on operating performance. The contingency approach adopted in our research provides advice for selecting the right mix of blockchain investment initiatives that is most suitable for a given organizational context.

   https://link.springer.com/article/10.1186/s40854-023-00456-8

3. Alrwashdeh, N. N. F., Ahmed, R., **Danish, M. H.,** & Shah, Q. (2023). Assessing the factors affecting the liquidity risk in Jordanian commercial banks: a panel data analysis. *International Journal of Business Continuity and Risk Management, 13*(1), 84-99. doi: 10.1504/ijbcrm.2023.130304. **Muhammad Hassan Danish (SCA) Date of Publication: March 2023** HJRS: Y (Null)

This research explores factors affecting liquidity risk of commercial banks operating in Jordan, spanning from 2003 through 2017. The sample of the study includes all commercial banks by employing pooled OLS and panel 2SLS econometric techniques. Findings of the study show that bank size, return on assets (ROA), capital adequacy ratio (CAR), risk, non-performing loans (NPL), T-equality and T-liability have a positive impact on liquidity risk. While return on equity (ROE) shows the negative and significant impact on the liquidity risk. This study suggests that authorities should trace and monitor the determined internal factors that have a negative impact on the liquidity of banks to minimise bank run chances.

https://www.inderscienceonline.com/doi/abs/10.1504/IJBCRM.2023.130304

4. Ilyas, U., Butt, M. U., **Gulzar, M.,** & Quddoos, M. U. (2023). A new dimension in exploring stock price movement. *International Journal of Economics and Business Research, 25*(3), 414-430. doi: 10.1504/IJEBR.2023.129989. **Muhammad Gulzar (SCA) Date of Publication: January 2023** HJRS: Y (Null)

This study unfolds the deficiencies of traditional index base studies and explores the macroeconomic determinants of stock price movement in Pakistan with the aid of panel ARDL model with co-integration and with the objective to provide knowledge platform applicable beyond the geographical boundaries by overcoming the deficiencies of traditional index base studies. Monthly data for the period of 2005 to 2020 were collected for exchange rate, foreign direct investment, interest rate, foreign exchange reserve and exports along with month end share price for analysis. This study captures the impact of these variables first on overall sector and then on each individual firm within same sector to analyse is there any difference in response for both. The results of the study rejected the conventional methods of adopting stock index for decision making as for most cases the overall sector response found different as compared to firms within same sector.

https://www.inderscienceonline.com/doi/abs/10.1504/IJEBR.2023.129989

5. **Naqvi, G., & Sultan, H.** (2023). Ethical Hacking and its Necessity in the Society. *Resmilitaris, 12*(6), 1634-1638. **Gulfraz Naqvi, Hamdan Sultan (SCA) Date of Publication: January 2023** HJRS: Y (Null)

Hacking mostly known as a way to steal one's privacy and confidential information for some benefit, a breach in the system causes this type of immense damage. But hacking with good intentions and benefits to someone is known as ethical hacking. Ethical hacking is a method to find vulnerabilities in one's system or network. Ethical hackers are individuals who use proper standards to find these vulnerabilities in a legit way. Most people considered hacking as a bad, unethical practice and refer to most as criminals, because most individuals have disrupted organizations and stole confidential information, money and other important files concerning that organization. Due to this reason many organizations and even the government decide to recruit the ethical hackers to discover the vulnerabilities in their system and network. There is one another face of the coin which tells that without hackers the vulnerabilities and holes of software would remain undiscovered. In this research paper I have tried to explain the benefits of this type of hacking, how it has impacted our today's society and what can be considered an ethical and unethical hacker. In this research paper I have attempted to find the problem that currently affect this field where security and vulnerability are most concerned. And how this form is hacking is affecting our modern-day society.

https://resmilitaris.net/menu-script/index.php/resmilitaris/article/view/2674

6. Nadeem, M. U., Kulich, S. J., & **Bokhari, I. H.** (2023). The assessment and validation of the depression, anxiety, and stress scale (DASS-21) among frontline doctors in Pakistan during fifth wave of COVID-19. *Frontiers in Public Health, 11*, https://doi.org/10.3389/fpubh.2023.1192733. **Ijaz Hussain Bokhari (SCA) Date of Publication: June 2023** HJRS: W (Gold)

Objective: The study aims to document sociodemographic features, address the symptoms and levels of depression, anxiety, and stress among frontline doctors in Pakistan, and validate the depression, anxiety, stress scale (DASS-21) on the context of Pakistan. **Method:** A cross-sectional survey was conducted throughout the regions of Pakistan on frontline doctors to document their sociodemographic patterns and the levels of depression, anxiety, and stress while dealing with the fifth wave (Omicron-variant) of the coronavirus (SARS-CoV-2) pandemic in Pakistan (December 2021–April 2022). Respondents (N = 319) were recruited through a snowball sampling process. **Results:** Though previous literature reported declines in psychological symptoms after earlier waves of COVID-19, these DASS-21 findings show that as the pandemic has worn on, frontline doctors in Pakistan are having considerable personal symptoms of depression (72.7%), anxiety (70.2%), and stress (58.3%). Though specifically related to the COVID-19 pandemic, they rated only moderate levels of depression and stress, however they reported severe levels of anxiety. The results also revealed a positive correlation between depression and anxiety (r = 0.696, p < 0.001), depression and stress (r = 0.761, p < 0.001), and anxiety and stress (r = 0.720, p < 0.001).**Conclusion:** Through the application of all required statistical procedures, DASS-21 is validated in the cultural context of Pakistan among this group of frontline doctors. The

findings of this study can provide new directions for the policy makers (government and hospitals' administration) of Pakistan to focus on the mental wellbeing of the doctors under similar enduring public health crises and to protect them from short- or long-term disorders.
https://www.frontiersin.org/articles/10.3389/fpubh.2023.1192733/full

7. **Bashir, A., Javed, M. M., & Gulzar, M. (2023). Examining the Impact of Corruption on Financial Sector Development in Arab League Countries.** *Empirical Economic Review, 6*(1), 75-92. https://doi.org/10.29145/10.29145/eer.61.04.** Muhammad Gulzar (SCA) Date of Publication: June 2023 HJRS: Y (Null)**

Arab League Countries have seen major regulatory and financial reforms in the last two decades and during this period these counties have been marred by corruption. In this background, this study explores the impact of corruption on financial sector development in Arab League countries from 2001 to 2020. By using the dynamic panel data estimation technique of the Generalized Method of Moments on a sample of 20 Arab League countries, the study reports its findings. The finding shows that there is a significant negative effect of corruption on financial sector development. These results favor the notion of the "sand the wheels" hypothesis. The findings of this study highlight the insensitiveness of financial development to corruption during Global Financial Crisis (2008). The results also indicate that there is an adverse effect of corruption on financial development after Arab Spring. The study acknowledges the moderation role of rule of law in the relationship between corruption and financial development.
https://ojs.umt.edu.pk/index.php/eer/article/view/1333

8. **Naqvi, M. H. A., Naqvi, M., & Bokhari, I. (2023). Does the cause related market really predict the consumer purchase intention?** *UW Journal of Management Sciences, 7*(1), 1-22. **Muhammad Hasnain Abbas Naqvi, Ijaz Hussain Bokhari (SCA) Mishal Naqvi (SPA) Date of Publication: June 2023 HJRS: Y (Null)**

Purpose: The current study intents to evaluate how to cause promotion strategy shapes customer viewpoint, perception, and purchasing behavior. To achieve the research objectives of the present study considered the integrated model based on the theory of planned behavior. The integrated model evaluates the role of causal marketing towards the consumer purchase intention. In addition to that the present study proposed that the consumer perception and attitude, and brand loyalty significantly mediate the association between causal marketing and consumer purchase intention. Design and Methodology: The present study used the non-probability sampling technique. The association among the latent constructs was evaluated using the structural equation modeling technique. The findings of the current study revealed a link between causal marketing and purchasing behavior and attitude. Consumers are more inclined to support corporations that participate in cause campaigns and acquire a favorable view of the firm and its products. The study's main result is that while consumers may be more favorable to causal Marketing, the trademark must be regarded to have a usual link with the cause. Furthermore, causal marketing has the potential to elicit a more favorable shift in brand attitude than sales promotion. This shift in attitude is influenced by the consumer's perception of the approach itself. Findings: Finding of present study affirms that brand loyalty and consumer perception, and attitude significantly and positively linked with the consumer purchase intentions. Furthermore, the findings affirm that brand loyalty and consumer perception, and attitude significantly and positively mediate the association between the causal marketing and consumer purchase intention. Implications: Causal Marketing may also elicit a favorable shift in brand attitude more successfully than a promotional strategy. This shift in mindset is dependent on the consumer's reaction to the approach itself.
https://www.uwjms.org.pk/index.php/uwjms/article/view/120

9. **Nadeem, M. U., Bokhari, I. H., Zabrodskaja, A., Koschmann, M. A., & Kulich, S. J. (2023). Assessment of university students' energy saving behavior by integrating stimulus-organism-response (SOR) and the theory of planned behavior (TPB).** *Environment and Social Psychology, 8*(3). doi: 10.54517/esp.v8i3.2071. **Ijaz Hussain Bokhari (SCA) Date of Publication: October 2023 HJRS: Y (Null)**

Concerned about balancing issues of global warming and economic growth, the growing needs of energy consumption in contexts with limited production and resources have created a serious challenge for developing countries like Pakistan. Research approaches that focus mainly on the production or purchase of environmentally friendly products or assessment of the stance of employees and households are not seen assufficient to present the full picture of any society regarding energy saving behaviors (ESB). The attitudes and behaviors of the student population have generally not been sufficiently presented in energy saving studies to reflect current or emerging realities. Two leading behavioral theories, stimulus-organism-response theory (SOR) and the theory of planned behavior (TPB), and their relevant variables are integrated in this study to unpack the ESB of university-going students in Pakistan. Through an online survey, 410 university students from the four main urban cities of Pakistan participated in the study. The findings revealed that media and organizational climate have significantly created both a sense of social pressure and responsibility among students to cultivate stronger intentions and actions toward saving energy. The results further indicated that these behavioral intentions do indeed have a strong impact on students reported ESB. Overall, the students

appeared to have been effectively influenced to be more active in saving energy for their society and country. The findings also validate the selected energy-related constructs and predictive paths in the proposed integrated SOR and TPB model. This study shows the potential for the further testing and application of the variables and this model in other contexts with other populations as the world grapples with energy shortages and global climate change issues.

https://esp.apacsci.com/index.php/esp/article/view/2071

10. **Nadeem, M. U., Kulich, S. J., Zabrodskaja, A., & Bokhari, I. H. (2023). The impact of empathy, sensation seeking, anxiety, uncertainty, and mindfulness on the intercultural communication in China during the COVID-19.** *Frontiers in Public Health,* **11. doi: 10.3389/fpubh.2023.1223215. Ijaz Hussain Bokhari (SCA) Date of Publication: July 2023 HJRS: W (Gold)**

Objective: This study seeks to explore factors that have shaped the intercultural communication effectiveness (ICE) of international students (IS) during the COVID-19 pandemic. Theoretical predictions of anxiety uncertainty management (AUM) are considered to assess the ICE of IS who stayed in China throughout the COVID-19 pandemic. The prime causal factors of AUM theory (anxiety, uncertainty, and mindfulness) are included with empathy and sensation, seeking to examine their impact on ICE among IS in China. Methods: A quantitative research design was designed to survey IS via convenience samples from across China with a total of 261 IS from 42 different cultural backgrounds responding to invitations to participate in a Chinese– English survey. Well-established measurement tools were adopted to measure empathy (Cultural Empathy scale), sensation seeking (Brief Sensation Seeking Scale), anxiety (Intercultural Anxiety scale), uncertainty (Intercultural Uncertainty scale), mindfulness (Cognitive and Affective Mindfulness Scale-Revised), and ICE (Perceived Effectiveness of Communication scale). Findings: The findings revealed that anxiety (t = −3.61, p

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10372221/

11. **Naqvi, M. H. A., Hongyu, Z., Naqvi, M. H., & Kun, L. (2023). Impact of service agents on customer satisfaction and loyalty: mediating role of Chatbots.** *Journal of Modelling in Management.* **doi: 10.1108/JM2-01-2023-0004. Muhammad Hasnain Abbas Naqvi, Mishal Hasnain Naqvi (SCA) Date of Publication: August 2023 HJRS: X (Honorable Mention)**

Purpose – This study aims to determine whether or not fashion retail brands can maintain their essence by providing personalized care through conventional face-to-face interactions or the use of e-services. Design/methodology/approach – An exploratory investigation is being conducted to attain this goal. According to the findings of this research, Chatbots have an impact on consumer loyalty. The quality of a Chatbot's system, service and information are all critical to providing a positive consumer experience. Findings – The study concluded that Chatbot e-services might potentially enable dynamic and fascinating interactions between firms and their consumers. To personalize a Chatbot, firms might change the tone of the language used. Customers are more likely to use a Chatbot if it resembles a real person, which increases their pleasure and confidence in the product. Originality/value – More precisely, the emphasis of the inquiry was on Chatbot, a relatively new digital tool that offers user-friendly, personalized and one-of-a-kind support to customers. Using information.

https://www.emerald.com/insight/content/doi/10.1108/JM2-01-2023-0004/full/html

UMOs

Office of Research Innovation and Commercialization (ORIC)

1. **Agwu, I. K., Ishtiaq, U., Saleem, N., Igbokwe, D. I., & Jarad, F. (2023). Equivalence of novel IH-implicit fixed point algorithms for a general class of contractive maps.** *AIMS Mathematics,* **8(1), 841-872. doi: 10.3934/math.2023041. Umar Ishtiaq (ORIC) Naeem Saleem (Mathematics\SSC) Date of Publications: January 2023 HJRS: W (Honorable Mention)**

In this paper, a novel implicit IH-multistep fixed point algorithm and convergence result for a general class of contractive maps is introduced without any imposition of the "sum conditions" on the countably finite family of the iteration parameters. Furthermore, it is shown that the convergence of the proposed iteration scheme is equivalent to some other implicit IH-type iterative schemes (e.g., implicit IH-Noor, implicit IH-Ishikawa and implicit IH-Mann) for the same class of maps. Also, some numerical examples are given to illustrate that the equivalence is true. Our results complement, improve and unify several equivalent results recently announced in literature.

http://www.aimspress.com/article/doi/10.3934/math.2023041

2. **Ishtiaq, U., Khaleel Ahmad, Asjad, M. I., Ali, F., & Jarad, F. (2023). Common fixed point, Baire's and Cantor's theorems in neutrosophic 2-metric spaces.** *AIMS Mathematics,* **8(2), 2532-2555.doi:**

10.3934/math.2023131.doi: 10.3934/math.2023131. **Umar Ishtiaq (ORIC) Muhammad Imran Asjad (Mathematics/SSC) Date of Publication: February 2023** **HJRS: W (Honorable Mention)**

These fundamental Theorems of classical analysis, namely Baire's Theorem and Cantor's Intersection Theorem in the context of Neutrosophic 2-metric spaces, are demonstrated in this article. Naschie discussed high energy physics in relation to the Baire's Theorem and the Cantor space in descriptive set theory. We describe, how to demonstrate the validity and uniqueness of the common fixed-point theorem for four mappings in Neutrosophic 2-metric spaces.

http://www.aimspress.com/article/doi/10.3934/math.2023131

3. **Ishtiaq, U., Asif, M., Hussain, A., Ahmad, K., Saleem, I., & Al Sulami, H. (2023). Extension of a Unique Solution in Generalized Neutrosophic Cone Metric Spaces.** *Symmetry*, *15*(1), 94.doi: 10.3390/sym15010094. **Umar Ishtiaq (ORIC) Date of Publications: January 2023** **HJRS: W (Bronze)**

In order to solve issues that arise in various branches of mathematical analysis, such as split feasibility problems, variational inequality problems, nonlinear optimization issues, equilibrium problems, complementarity issues, selection and matching problems, and issues proving the existence of solutions to integral and differential equations, fixed point theory provides vital tools. In this study, we discuss topological structure and several fixed-point theorems in the context of generalized neutrosophic cone metric spaces. In these spaces, the symmetric properties play an important role. We examine the existence and a uniqueness of a solution by utilizing new types of contraction mappings under some circumstances. We provide an example in which we show the existence and a uniqueness of a solution by utilizing our main result. These results are more generalized in the existing literature.

https://www.mdpi.com/2073-8994/15/1/94

4. **Naveed, M. A., Iqbal, J., Asghar, M. Z., Shaukat, R., & Seitamaa-Hakkarainen, P. (2023). Information Literacy as a Predictor of Work Performance: The Mediating Role of Lifelong Learning and Creativity.** *Behavioral Sciences*, *13*(1), 24.doi: 10.3390/bs13010024. **Muhammad Zaheer Asghar, Rozeen Shaukat (ORIC) Date of Publications: January 2023** **HJRS: W Gold)**

This study examined the effect of information literacy (IL) on work performance with mediating role of lifelong learning and creativity among journalists in Pakistan. A cross-sectional survey using an online questionnaire was conducted in the press clubs of four provinces (e.g., Punjab, Sindh, Khyber Pakhtunkhwa, and Baluchistan) and the federal capital Islamabad for data collection. The received 1084 responses were analyzed using the partial least squares structural equation modelling. The results indicated that IL of journalists had a direct and indirect but positive influence on their work performance. The lifelong learning and creativity skills also mediated the relationship between IL and work performance. This study provided empirical evidence for how IL directly influence work performance and indirectly with the mediated role of lifelong learning and creativity. These pragmatic insights may inform academicians and enterprises about the IL importance at workplace for enhancement of organizational performance and achieving a competitive advantage. Such results may also initiate an instruction program for existing as well as for prospective journalists to impart IL education. This study could be a worthy contribution to the existing IL research in the workplace context in general and of journalists' workplace in particular as no such study has appeared so far.

https://www.mdpi.com/2076-328X/13/1/24

5. **Din, F. U., Din, M., Ishtiaq, U., & Sessa, S. (2023). Perov Fixed-Point Results on F-Contraction Mappings Equipped with Binary Relation.** *Mathematics*, *11*(1), 238.doi: 10.3390/math11010238. **Umar Ishtiaq (ORIC) Date of Publications: January 2023** **HJRS: W (Bronze)**

The purpose of this article is to discuss some new aspects of the vector-valued metric space. The idea of an arbitrary binary relation along with the well-known F contraction is used to demonstrate the existence of fixed points in the context of a complete vector-valued metric space for both single- and multi-valued mappings. Utilizing the idea of binary relation, and with the help of F contraction, this work extends and complements some of the very recently established Perov-type fixed-point results in the literature. Furthermore, this work includes examples to justify the validity of the given results. During the discussion, it was found that some of the renowned metrical results proven by several authors using different binary relations, such as partial order, pre-order, transitive relation, tolerance, strict order and symmetric closure, can be weakened by using an arbitrary binary relation.

https://www.mdpi.com/2227-7390/11/1/238

6. **Naveed, M. A., Iqbal, J., Asghar, M. Z., Shaukat, R., & Kishwer, R. (2023). How information literacy influences creative skills among medical students? The mediating role of lifelong learning.** *Medical Education Online,* *28*(1). doi: 10.1080/10872981.2023.2176734. **Rozeen Shaukat (ORIC) Date of Publications: March 2023** **HJRS: W (Gold)**

This research investigated the influence of information literacy on the creative skills of medical students through the mediation of lifelong learning. A cross-sectional survey was conducted for data collection among

medical students, recruited through a stratified convenient sampling procedure, of Khyber Pakhtunkhwa, Pakistan. The questionnaire was personally administered by visiting each college with written permission. A total of 473 survey responses were collected and analysed using the partial least squares structural equation modelling. The results revealed that the information literacy of medical students had a direct and indirect but positive influence on their creative skills. Lifelong learning not had a direct but positive effect on creative skills but also mediated the relationship between information literacy and creative skills. The empirical evidence for how information literacy influences creative skills through the mediated role of lifelong learning may inform policy and practice for information literacy instructions. These results may help academicians and information specialists to initiate a credited or integrated course on information literacy in the curriculum of medical students not only in Pakistan but also in other developing countries. This research would be a worthwhile contribution to the existing research on information literacy as the mediated role of lifelong learning between information literacy and creative skills has never been examined so far.
https://www.tandfonline.com/doi/full/10.1080/10872981.2023.2176734

7. **Naveed, M. A., Shaukat, R., Asghar, A., & Rafique, G. M. (2023). How Covid-19 literacy influences fear, protective behaviour, and conspiracy beliefs among university students in Pakistan?** *Journal of Academic Librarianship, 49*(3). doi: 10.1016/j.acalib.2023.102699. **Rozeen Shaukat (ORIC) Ali Asghar (Management/HSM) Date of Publications: May 2023 HJRS: W (Silver)**
Background: Covid-19 literacy, a social vaccine, is crucial to cope pandemic situations as it helps individuals to manage panic situations, adopt health preventive behaviours and adapting to the new normal. Objectives: This research examined the effects of Covid-19 literacy on fear, protective behaviour, and conspiracy beliefs of university students using an online questionnaire. Methods: A cross-sectional survey was conducted at two universities from Lahore with permission from concerned authorities. A total of 301 received responses were analyzed by applying descriptive as well as inferential statistics in SPSS. Results: The results indicated that Covid-19 literacy appeared to predict negatively fear of Covid-19 and conspiracy beliefs and positively health-protective behaviours. In other words, the university students with better Covid-19 literacy appeared to have less fear of Covid-19, more likely to adopt health-protective behaviours and believe less in conspirative information. Conclusions: These results demonstrated the potential benefits of Covid-19 literacy to respond proactively to the fear caused by the Covid-19 pandemic, managing infodemic and adoption of health-protective behaviours. These results would be useful for policymakers, NGOs, health professionals, and university librarians in planning health education and promotion for not only university students but also for general public. This research contributed to the existing research on health literacy related to the Covid-19 pandemic in general and Covid-19 literacy in particular as limited studies have been published so far.
https://www.sciencedirect.com/science/article/pii/S0099133323000381

8. **Shaukat, R., Ahmad, S., Naveed, M. A., & Ur Rehman, S. (2023). Impact of Personality Traits on Knowledge Sharing Behavior of Academicians: A Case of University of Sargodha, Punjab, Pakistan.** *SAGE Open, 13*(1). doi: 10.1177/21582440231160984. **Rozeen Shaukat (ORIC) Date of Publications: March 2023 HJRS: W (Gold)**
This study examined the impact of personality traits on the knowledge sharing behavior of academicians in the public sector. The data were collected from 237 respondents using a questionnaire. The results showed that the personality trait openness to experience had a significant and positive impact on the knowledge sharing behavior and its sub-dimensions such as written contributions, organizational communication, personal interactions, and communities of practice. Furthermore, the personality traits extraversion and agreeableness positively predicted the knowledge sharing behavior for the dimensions of communities of practice and organizational communication, respectively. The results of this study would be helpful for the administrative staff of universities to develop programs to promote a knowledge sharing culture in universities and improve collaborative learning, research, organizational effectiveness, and performance. It would also be a worthy contribution to the existing literature as only a limited number of studies have addressed the role of personality traits in the knowledge sharing behaviors in the academic environment of a non-western country.
https://journals.sagepub.com/doi/full/10.1177/21582440231160984

9. **Amjad, Z., Salahuddin, A., & Shaukat, R. (2023). Nexus of Gender and Disability: An Intersectional Study on Shaping Lives of University Students.** *UMT Education Review, 6*(1), 1-24. doi: https://doi.org/10.32350/uer.61.01. **Rozeen Shaukat (ORIC) Date of Publications: June 2023 HJRS: Y (Null)**
The current study attempted to explore the intersection of gender and disability in university students. It was observed that how the nexus of gender and disability shapes lives. Disability poses many problems for each individual. However, in the context of Pakistani society, the intersection of disability with gender is not explored much. The purpose of this research was to understand the differences between girls and boys as they face disability. This was a qualitative study. The students of public and private sector universities of Lahore were interviewed in this phenomenological study. A total number of eight (8) students including 4 male and 4 female students with physical and visual disability were interviewed. The gender differences were examined through qualitative thematic content analysis. The findings showed that disability tends to effect

the social inclusion of the people with special needs. The nexus of disability and gender marginalize women more as compared to men. Women lose confidence which, in turn, impacts their emotional and psychological well-being. The current study is one of the very few researches which explored the intersection of gender and disability among the university students of Lahore, Pakistan. On the basis of the findings, future research could be conducted on a bigger population and with different research designs. Additionally, this study is a step in the direction of raising awareness regarding the added issues faced by girls and women with disabilities.

https://journals.umt.edu.pk/index.php/uer/article/view/2861

10. Saeed, M. I., Ali, F. & Ali, F. (2023). Nexus between Old Age Demographic Ratio and Economic Growth: An Empirical Analysis of Selected Developing Countries. *Global Economics Review,8*(2), 22-31. 10.31703/ger.2023(VIII-II).03. Muhammad Ibrahim Saeed (ORIC) Faran Ali (OCE/UMT) Date of Publications: June 2023 HJRS: Y (Null)

The global population is ageing in all areas of the globe. First, ageing was an issue in developed countries but nowadays it is a burning research topic for developing countries. So, this study has taken selected ASIAN developing countries for investigation. This study probes the relationship between the old age demographic ratio on economic growth. Panel data has been taken for seven developing countries (India,Pakistan, China, Nepal, Bangladesh, Malaysia, and Sri Lanka) for the period 1990 to 2019 from World Development Indicators. The study uses the panel fixed effect technique for the analysis. The results of the study reveal that the old-age demographic ratio is statistically significant and has a negative impact on the economic growth of developing countries. The control variable inflation and life expectancy are statistically significant and carry a positive sign while carbon emission and remittance have a negative sign and are statistically insignificant.

https://www.gerjournal.com/article/nexus-between-old-age-demographic-ratio-and-economic-growth-an-empirical-analysis-of-selected-developing-countries#

11. Arshed, N., Saeed, M. I., Abdulghafor, S. C., & Hassan, M. S. (2023). Promoting Education Quality in Curbing Business Crime Costs: A Quantile Analysis. *Journal of Social Sciences Review, 3*(1), 138-148. https://doi.org/10.54183/jssr.v3i1.133 . Muhammad Ibrahim Saeed (ORIC) Muhammad Shahid Hassan (Economics & Statistics/HSM) Date of Publications: March 2023 HJRS: Y (Null)

Studies have concentrated on numerous strategies and measures to curb the crime rate. Out of these, interventions via education are most promising as teaching children has a multiplier effect on crime reduction. Empirically there is a debate on the effect of education on the incidence of crime, and it is reasoned that education with opportunities, relevance, and ethics plays a decisive role in reducing crime. This study has used more comprehensive indicators and a robust distribution-free approach to estimate the effect of education on the crime rate. The contour plot of Quantile on Quantile regression helps assess each level of education quality on each level of the business cost of crime. This model does not require the assumption of normality and linearity of variables. This study points out that primary and science education reduces crime rates at low levels, while management studies and research help reduce crime at high levels. This study provides a robust assessment of how education may influence the cost of crime at their different corresponding levels. These estimates can help determine how the marginal effects will affect and change in response to the change in the cost of crime. This study is an instrument in for assessing the role of education on crime at each quantile data position.

http://ojs.jssr.org.pk/index.php/jssr/article/view/133

12. Khan, M. T., & Nawaz, F. (2023). Analysis of the effect of Financial Distress on Tax avoidance during the COVID-19 Financial Crisis: Evidence from Pakistan. *Review of Applied Management and Social Sciences, 6*(1), 45-62. https://doi.org/10.47067/ramss.v6i1.257. Muhammad Tasnim Khan (ORIC) Fatima Nawaz Khan (Management/HSM) Date of Publications: March 2023 HJRS: Y (Null)

For the purposes to finance their business operations, firms have incentives to engage in corporate tax avoidance activities when managerial incentives increase as compared to managerial costs. These activities are significantly high when firms are inthe financial distress zone. The Covid-19 financial crisis (CFC) provides significant findings on whether corporate tax avoidance hasa significant difference from the pre-Covid-19 tothe post-Covid-19 financial crisis, whether a firm's management is obligated to engage aggressively with corporate tax avoidance. This research aims to investigate the impact of financial distress on corporate tax avoidance during the Covid-19 financial crisis. Based on a sample of 175 firms listed on PSX covering the period of 2010-2021. The study applies GMM dynamic approach with (static) fixed and random effect models to check the robustness of results. The finding of the GMM approach demonstrates that financial distress has a statistically significant and positive impact on corporate tax avoidance. Consistent with the cost-benefits analysis and risk-shifting behavior theories, firms engage more in tax avoidance, especially during financial distress. Moreover, CFC magnified the relationship between these variables, and firms investigated in the study face development suffer mostly in this globally and economically distressing period.

https://ramss.spcrd.org/index.php/ramss/article/view/257

13. **Rafiq, S., & Khan, M. T. (2023). Charismatic Leadership and Job Performance: Mediation of Interpersonal Communication and Moderation of Leader Vision .** *Pakistan Journal of Humanities and Social Sciences,* *11*(2), 2056–2067. https://doi.org/10.52131/pjhss.2023.1102.0501. **Muhammad Tasnim Khan (ORIC) Date of Publications: June 2023 HJRS: Y (Null)**

The study investigates the association between charismatic leadership and job performance using interpersonal communication as a mediator and leader vision as moderator variables. The social cognitive theory uses as a theoretical lens to understand this conceptual framework. The sample of the study is those organizations that have undergone a central level of change. The study used a cross-sectional research design and data was collected from 350 participants through paper–and–pencil questionnaires to 30 different organizations. This exploratory study uses structural equation modeling (SEM) with common method bias (CMB), discriminant, and convergent validity tests to analyze the data. The results of this study explain how charismatic leadership impacted job performance with moderated (leader vision) mediation (interpersonal communication) analysis. These significant insights delineated practical as well as theoretical implications for both researchers and policymakers. This study significantly contributes to the body of knowledge on human resource literature. According to researchers' knowledge, this study is one of the pioneer studies to investigate leader vision as a moderator variable between stated associations in the Pakistani context. https://journals.internationalrasd.org/index.php/pjhss/article/view/1476

14. **Sohail, H., Tariq, S., & Tariq, A. (2023). Evaluating Antecedents of Online Customer Retention.** *Pakistan Journal of Humanities and Social Sciences,* *11*(2), 1337–1351. https://doi.org/10.52131/pjhss.2023.1102.0438. **Saroosh Tariq (ORIC) Date of Publications: June 2023 HJRS: Y (Null)**

This study analyses and examines the impact of performance expectancy on online customer retention with the mediating role of customer satisfaction and experience. In this economic era, the mainstream trend is additionally making progress towards the organization by keeping up its positions. Consequently, it becomes necessary for organizations to give their first preferences to customers' tastes for the profitability of their organization. The study aims to unleash future research directions and recommendations to overcome the under-study problem. The target population of this study includes customers who shop online. The sample included 308 respondents who have experience in online purchasing. Sample selection was supported through non-probability sampling. Moreover, inferential statistics, i.e., correlation and regression analysis, were used to test the significance of the hypothesis statements. The findings of this research indicate that online customer retention has a significant positive relationship with the mediating role of experience and customer satisfaction. Furthermore, it will improve business, increase customer flow, and positively impact the company's profitability. https://journals.internationalrasd.org/index.php/pjhss/article/view/1388

15. **Tariq, S ., Hashmi, S., & Tariq, A. (2023). Factors Affecting Employee Performance: A Mediation Analysis.** *Review of Applied Management and Social Sciences,* *6*(2), 177-188. https://doi.org/10.47067/ramss.v6i2.310. **Saroosh Tariq (ORIC) Date of Publications: May 2023 HJRS: Y (Null)**

The research reported in this article was on "Factors affecting employee performance: A mediation analysis". The study aims to examine the mediating role of job crafting in the Public universities. This research sheds light on the significance of job crafting with reference to negative emotions and diverse workforce and psychological aspects in regard to employee performance. The study aims to explore the determinants of employee performance of the workers in Public universities. Secondary data was collected with the help of prior research and literature from internet and libraries. This primary data was accumulated by distributing questionnaires and to analyzed data SPSS was used. This data was accumulated from 200 faculty members working in public universities of Lahore. In This current research it uses an empirical approach to test the hypotheses model and this research is quantitative and descriptive in nature. Data was collected thorough cross-sectional design and questionnaire on variables. The SPSS 21 and Process Hayes is used for examine the data. https://ramss.spcrd.org/index.php/ramss/article/view/310

16. **Tariq, S., Zahra, R., & Tariq, A. (2023). Impact of Brand Personality on Brand Loyalty: The Mediating Role of Self-Congruence and Brand Trust.** *Review of Education, Administration & Law,* *6*(2), 139-150. https://doi.org/10.47067/real.v6i2.317. **Saroosh Tariq (ORIC) Date of Publications: June2023 HJRS: Y (Null)**

The study examines the impact of brand personality on brand loyalty. It also explores the mediating role of self-congruence and brand trust on the relationship between brand personality and brand loyalty. With today's competitive environment, it has become increasingly challenging and important for companies to increase the customer retention. To trespass and achieve the highest point in the competition, companies have been rigorously looking for customs to make powerful brand relations with the customers. This study

concludes that due to brand personality the consumer become loyal towards brand and purchase products from the specific brand. The act of self-congruence on brand personality increases the brand loyalty, when the personality of the brand matches the personality of the consumer, this enhances self-congruence and trust of the consumers on trust which will lead to increase in the loyalty of consumers towards brand. On the basis of results implications, limitations and future directions of the study were conferred.
https://real.spcrd.org/index.php/real/article/view/317

17. **Umar, M., Mansoor, S., Javed, M., Hussain, N., Bajaber, M. A., Iqbal, S., ... & Elkaeed, E. B. (2023). Fabrication of novel oxochalcogens halides of manganese and tin nanocomposites as highly efficient photocatalysts for dye degradation and excellent antimicrobial activity.** *Frontiers in Materials, 10*. | https://doi.org/10.3389/fmats.2023.1125869. **Sana Mansoor (ORIC) Mohsin Javed (Chemistry\SSC) Date of Publications: February 2023 HJRS: W (Honorable Mention)**

The dark brown and white crystals of manganese and tin ($Mn_2Se_3Cl_2O_7$ and $SnSe_3O_4Cl$) have been synthesized by solid-state reaction at 450 C. The morphology and the elemental analysis of newly synthesized compounds were studied by SEM and EDX Analysis. SEM analysis reveals that the particle size for $Mn_2Se_3Cl_2O_7$ was found to be 0.2–2.5 µm and for $SnSe_3O_4Cl$ 2.0–6.0 µm. The EDX studies showed the presence of Mn, Se, O, Cl, and Sn elements. Powdered XRD confirmed the presence of a new phase present in these compounds. Under UV-vis irradiation, the kinetics of methylene blue (MB) degradation catalyzed by produced nanoparticles were monitored. The dye degradation efficiency was estimated, and results reveals that after 150 min of irradiation, almost 75% of the dye was degraded in the presence of Mn compound while 71% degradation was shown by Sn compound. Both composites display antimicrobial activity against *Staphylococcus aureus* and *Escherichia coli* with a maximum value of 34.5 mm. The maximum antimicrobial activity shown by Mn-incorporated nanocomposites estimated at 32.5 mm was against Gram-positive bacteria and 26.4 mm against Gram-negative bacteria. Similarly, the maximum antifungal activity shown by Sn incorporated estimated at 33.9 mm was compared to Gram-positive bacteria and 27.8 mm against Gram-negative bacteria.
https://www.frontiersin.org/articles/10.3389/fmats.2023.1125869/full

18. **Haq, N. U. (2023). Impact of FDI and Its Absorption Capacity on the National Innovation Ecosystems: Evidence from the Largest FDI Recipient Countries of the World.** *Foreign Trade Review,* **58(2), 259-288. doi: 10.1177/00157325221077007. Naveed Ul Haq (ORIC) Date of Publications: May 2023 HJRS: X (Null)**

Foreign direct investment (FDI) improves economic growth by stimulating native investment, facilitating technology transfers in the recipient country and increasing human capital development, thus playing a vital role in economic development. On the other hand, innovation is also considered one of the major drivers for the economic growth of a country. This study empirically investigates the impact of FDI and its absorption capacity on the national innovation system of the world's top five largest FDI recipient countries for the period of 1990–2016. Using two-stage analysis (DEA and Tobit regression), we found that research and development expenditures, researchers in the host country and the number of patents, trademark and industrial design applications are positive drivers of the national innovation systems. Moreover, the FDI inflows positively impact the innovation efficiency in the host countries. However, the strength of this relationship depends on the availability of the absorption capacity of FDI in the host country. The result shows that the global financial crisis and inflation negatively impact the FDI inflows and innovation efficiency in the sample countries. It concludes that FDI inflows and the country's strength of domestic absorption capacity are essential drivers for developing national innovation ecosystems.
https://journals.sagepub.com/doi/10.1177/00157325221077007

19. **Hussain, A., Ishtiaq, U., & Al Sulami, H. (2023). Fixed Point Results in Fuzzy Strong Controlled Metric Spaces with an Application to the Domain Words.** *Advances in Mathematical Physics,* **2023. doi: 10.1155/2023/4350504. Umar Ishtiaq (ORIC) Date of Publications: Aug 2023 HJRS: X (Null)**

In this manuscript, we introduce the notions of fuzzy strong controlled metric spaces, fuzzy strong controlled quasi-metric spaces, and non-Archimedean fuzzy strong controlled quasi-metric spaces and generalize the famous Banach contraction principle. We prove several fixed point results in the context of non-Archimedean fuzzy strong controlled quasi-metric space. Furthermore, we use our main result to obtain the existence of a solution for a recurrence problem linked with the study of Quicksort algorithms.
https://www.hindawi.com/journals/amp/2023/4350504/

20. **Inthavong, P., Rehman, K. U., Masood, K., Shaukat, Z., Hnydiuk-Stefan, A., & Ray, S. (2023). Impact of organizational learning on sustainable firm performance: Intervening effect of organizational networking and innovation.** *Heliyon,* **9(5). doi: 10.1016/j.heliyon.2023.e16177. Khaliq Ur Rehman (ORIC) Khansa Masood (SPA) Zeeshan Shaukat (Management/HSM) Date of Publications: May 2023 HJRS: W (Silver)**

This research has analyzed the role of learning in an organization while measuring and managing sustainable organizational performance. Furthermore, our research has also included the intervening role of organizational networking and organizational innovation while analyzing the relationship between

organizational learning and sustainable organizational performance. Our research has adopted a quantitative approach while using the survey method to collect data from 710 owners of the manufacturing sector belonging to the Small and Medium Enterprises SMEs operating in Laos. Informed consent was obtained from all participants for your research. Structure equation modeling SEM was used through partial least square PLS software to test the collected data's reliability and validity and test the hypothesis to meet the research objectives. The study's findings reveal that organizational learning is vital to organizational performance and success. Information sources (networks) moderate the relationship between innovation and organizational performance. Our findings confirm that innovation is disruptive if it is not well-informed and well-processed. The research concludes that organizational learning is very vital for sustainable organizational performance. The current research contributes to the body of knowledge by examining sustainable organizational performance from an entirely different perspective.
https://pubmed.ncbi.nlm.nih.gov/37251908/

21. **Ishtiaq, U., Jahangeer, F., Kattan, D. A., & Argyros, I. K. (2023). Generalized Common Best Proximity Point Results in Fuzzy Metric Spaces with Application. Symmetry, 15(8). doi: 10.3390/sym15081501.** Umar Ishtiaq (ORIC) Date of Publications: August 2023 HJRS: W (Honorable Mention)

The symmetry of fuzzy metric spaces has benefits for flexibility, ambiguity tolerance, resilience, compatibility, and applicability. They provide a more comprehensive description of similarity and offer a solid framework for working with ambiguous and imprecise data. We give fuzzy versions of some celebrated iterative mappings. Further, we provide different concrete conditions on the real valued functions (Formula presented.) for the existence of the best proximity point of generalized fuzzy (Formula presented.) -iterative mappings in the setting of fuzzy metric space. Furthermore, we utilize fuzzy versions of (Formula presented.) -proximal contraction, (Formula presented.) -interpolative Reich–Rus–Ciric-type proximal contractions, (Formula presented.) -Kannan type proximal contraction and (Formula presented.) -interpolative Hardy Roger's type proximal contraction to examine the common best proximity points in fuzzy metric space. Also, we establish several non-trivial examples and an application to support our results.
https://www.mdpi.com/2073-8994/15/8/1501

22. **Ishtiaq, U., Jahangeer, F., Kattan, D. A., Argyros, I. K., & Regmi, S. (2023). On Orthogonal Fuzzy Interpolative Contractions with Applications to Volterra Type Integral Equations and Fractional Differential Equations. Axioms, 12(8). doi: 10.3390/axioms12080725.** Umar Ishtiaq (ORIC) Date of Publications: August 2023 HJRS: X (Clay)

In this paper, orthogonal fuzzy versions are reported for some celebrated iterative mappings. We provide various concrete conditions on the real valued functions (Formula presented.) for the existence of fixed-points of (Formula presented.) -fuzzy interpolative contractions. This way, many fixed point theorems are developed in orthogonal fuzzy metric spaces. We apply the (Formula presented.) -fuzzy version of Banach fixed point theorem to demonstrate the existence and uniqueness of the solution. These results are supported with several non-trivial examples and applications to Volterra-type integral equations and fractional differential equations.
https://www.preprints.org/manuscript/202306.0749/v1

23. **Ishtiaq, U., Jahangeer, F., Kattan, D. A., & de la Sen, M. (2023). Generalized common best proximity point results in fuzzy multiplicative metric spaces. AIMS Mathematics, 8(11), 25454-25476. doi: 10.3934/math.20231299.** Umar Ishtiaq (ORIC) Date of Publications: November 2023 HJRS: X (Honorable Mention)

In this manuscript, we prove the existence and uniqueness of a common best proximity point for a pair of non-self mappings satisfying the iterative mappings in a complete fuzzy multiplicative metric space. We consider the pair of non-self mappings X : P [right arrow] G and Z : P [right arrow] G and the mappings do not necessarily have a common fixed-point. In a complete fuzzy multiplicative metric space, if [phi] satisfy the condition [phi](b, Zb, [??]) = [phi](P, G, [??]) = [phi](b, Xb, [??]), then b is a common best proximity point. Further, we obtain the common best proximity point for the real valued functions L, M : (0,1] [right arrow] R by using a generalized fuzzy multiplicative metric space in the setting of (L, M)- iterative mappings. Furthermore, we utilize fuzzy multiplicative versions of the (L, M)-proximal contraction, (L, M)-interpolative Reich-Rus-Ciric type proximal contractions, (L, M)-Kannan type proximal contraction and (L, M)-interpolative Hardy-Rogers type proximal contraction to examine the common best proximity points in fuzzy multiplicative metric space. Moreover, we provide differential non-trivial examples to support our results. Keywords: fuzzy multiplicative metric space; fixed-point; best proximity point theorems; contraction mappings; uniqueness Mathematics Subject Classification: 26E05, 26E25, 47H10.
https://go.gale.com/ps/i.do?id=GALE%7CA764790559&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=24736988&p=AONE&sw=w&userGroupName=anon%7E4c20b292&aty=open-web-entry

24. **Ishtiaq, U., Kattan, D. A., Ahmad, K., Lazăr, T. A., Lazăr, V. L., & Guran, L. (2023). On Intuitionistic Fuzzy Nb**

Metric Space and Related Fixed Point Results with Application to Nonlinear Fractional Differential Equations. *Fractal and Fractional,* **7(7). doi: 10.3390/fractalfract7070529. Umar Ishtiaq (ORIC) Date of Publications: July 2023 HJRS: W (Bronze)**

This manuscript contains several new notions including intuitionistic fuzzy (Formula presented.) metric space, intuitionistic fuzzy quasi- (Formula presented.) -metric space, intuitionistic fuzzy pseudo- (Formula presented.) -metric space, intuitionistic fuzzy quasi- (Formula presented.) -metric space and intuitionistic fuzzy pseudo (Formula presented.) fuzzy metric space. We prove decomposition theorem and fixed-point results in the setting of intuitionistic fuzzy pseudo (Formula presented.) fuzzy metric space. Further, we provide several non-trivial examples to show the validity of introduced notions and results. At the end, we solve an integral equation, system of linear equations and nonlinear fractional differential equations as applications.

https://www.mdpi.com/2504-3110/7/7/529

25. **Ishtiaq, U., Kattan, D. A., Ahmad, K., Sessa, S., & Ali, F. (2023). Fixed Point Results in Controlled Fuzzy Metric Spaces with an Application to the Transformation of Solar Energy to Electric Power. Mathematics, 11(15). doi: 10.3390/math11153435. Umar Ishtiaq (ORIC) Date of Publications: August 2023 HJRS: W (Honorable Mention)**

In this manuscript, we give sufficient conditions for a sequence to be Cauchy in the context of controlled fuzzy metric space. Furthermore, we generalize the concept of Banach's contraction principle by utilizing several new contraction conditions and prove several fixed point results. Furthermore, we provide a number of non-trivial examples to validate the superiority of main results in the existing literature. At the end, we discuss an important application to the transformation of solar energy to electric power by utilizing differential equations.

https://www.mdpi.com/2227-7390/11/15/3435

26. **Ishtiaq, U., Saeed, M., Ahmad, K., Shokat, I., & Sen, M. D. L. (2023). Certain Fixed-Point Results via DS-Weak Commutativity Condition in Neutrosophic Metric Spaces with Application to Non-linear Fractional Differential Equations.** *International Journal of Analysis and Applications,* **21. doi: 10.28924/2291-8639-21-2023-74. Umar Ishtiaq (ORIC) Date of Publications: July 2023 HJRS: Y (Null)**

This study demonstrates that, for the non-linear contractive conditions in Neutrosophic metric spaces, a common fixed-point theorem may be proved without requiring the continuity of any mappings. A novel commutativity requirement for mappings weaker than the compatibility of mappings is used to demonstrate the conclusion. We provide several examples to illustrate our major idea. Also, we provide an application to the non-linear fractional differential equation to show the validity of our main result.

https://etamaths.com/index.php/ijaa/article/view/2838

27. **Jahangeer, F., Alshaikey, S., Ishtiaq, U., Lazăr, T. A., Lazăr, V. L., & Guran, L. (2023). Certain Interpolative Proximal Contractions, Best Proximity Point Theorems in Bipolar Metric Spaces with Applications.** *Fractal and Fractional,* **7(10). doi: 10.3390/fractalfract7100766. Umar Ishtiaq (ORIC) Date of Publications: October 2023 HJRS: W (Bronze)**

In this manuscript, we present several types of interpolative proximal contraction mappings including Reich–Rus–Ciric-type interpolative-type contractions and Kannan-type interpolative-type contractions in the setting of bipolar metric spaces. Further, taking into account the aforementioned mappings, we prove best proximity point results. These results are an extension and generalization of existing ones in the literature. Furthermore, we provide several nontrivial examples, an application to find the solution of an integral equation, and a nonlinear fractional differential equation to show the validity of the main results

https://www.mdpi.com/2504-3110/7/10/766

28. **Arshed, N., Saeed, M. I., Salem, S., Hanif, U., & Abbas, M. (2023). National strategy for climate change adaptability: a case study of extreme climate-vulnerable countries.** *Environment, Development and Sustainability.* **doi: 10.1007/s10668-023-04122-y. Muhammad Ibrahim Saeed (ORIC) Date of Publications: November 2023 HJRS: W (Gold)**

Countries face extreme climate-related adaptation challenges, but some countries are more vulnerable due to their geographic location and socioeconomic conditions. These differences in vulnerabilities between countries motivated us to examine the socioeconomic factors and climate change adaptation relationship. The objective is to capture the impact of the socioeconomic factors on the climate change adaptation index for selected developing countries that influence vulnerability or adaptation. Dynamic panel data from 1995 to 2019 are used for four developing countries. The results reveal that fossil fuel increases vulnerability in the long run. However, education, patents, and domestic credit to the private sector positively influence adaptation. Hence, the selected countries' governments must encourage renewable energy consumption with a special focus on municipal solid waste, which is abundant in selected developing countries.

https://link.springer.com/article/10.1007/s10668-023-04122-y#Abs1

29. **Sessa, S., Jahangeer, F., Kattan, D. A., & Ishtiaq, U. (2023). Development of Fixed Point Results for αΓ-F-Fuzzy Contraction Mappings with Applications. Symmetry, 15(7). doi: 10.3390/sym15071300. Umar Ishtiaq (ORIC) Date of Publications: June 2023 HJRS: W (Bronze)**

This manuscript contains several fixed point results for αΓ�Γ-*F*-fuzzy contractive mappings in the framework of orthogonal fuzzy metric spaces. The symmetric property guarantees that the distance function is consistent and does not favour any one direction in orthogonal fuzzy metric spaces. No matter how the points are arranged, it enables a fair assessment of the separations between all of them. In fixed point results, the symmetry condition is preserved for several types of contractive self-mappings. Moreover, we provide several non-trivial examples to show the validity of our main results. Furthermore, we solve non-linear fractional differential equations, the Atangana–Baleanu fractional integral operator and Fredholm integral equations by utilizing our main results.

https://www.mdpi.com/2073-8994/15/7/1300

30. **Siddiqi, A. F. I., & Khan, M. T. (2023). Impact of Organizational Justice on Employee Satisfaction Among Punjab Police: An Empirical Investigation in the Post Model Town Incident Time.** *Journal of Police and Criminal Psychology.* **doi: 10.1007/s11896-023-09580-8. Muhammad Tasnim Khan (ORIC) Date of Publications: March 2023 HJRS: X (Honorable Mention)**

The purpose of the study is to investigate the impact of organizational justice, in Punjab Police, with reference to its subtypes on job satisfaction in the aftermath of the Model Town incident which severely damage their organizational fabric. This is a study adopting a quantitative research design, data collected from Punjab Police by the SRS sampling approach. The conventional relationship between justice and satisfaction is proved with significant deviations in granular dependencies. For Police, the procedural justice is insignificantly correlated with distributive and interactional justices which results in statistical insignificant dependence of job satisfaction on these two components of the organizational justice. The study is limited only to the Punjab Police as they are affected the most from the Model Town incident. The study is based upon the organizational justice theory and focuses on the impact of a high valued incident on the organizational fabric of the Police in special, and the security agencies in general.

https://link.springer.com/article/10.1007/s11896-023-09580-8

31. **Uddin, F., Ishtiaq, U., Aydi, H., Javed, K., & Arshad, M. (2023). On orthogonal fuzzy b-metric-like spaces and their fixed point application.** *Sigma Journal of Engineering and Natural Sciences,* **41(5), 916-925. doi: 10.14744/sigma.2023.00111. Umar Ishtiaq (ORIC) Date of Publications: October 2023 HJRS: Y (Null)**

This manuscript aims to introduce the concept of orthogonal fuzzy b-metric-like spaces and discuss some fixed point results. A non-trivial example is imparted to illustrate the feasibility of the proposed methods. Finally, to validate the superiority of the obtained results, we provide an application to fractional differential equations.

https://purerims.smu.ac.za/en/publications/on-orthogonal-fuzzy-b-metric-like-spaces-and-their-fixed-point-ap

Knowledge and Research Support Services (KRSS)

1. **Khan, M. A. B., BaHammam, A. S., Amanatullah, A., Obaideen, K., Arora, T., Ali, H., . . . Faris, M. E. (2023). Examination of sleep in relation to dietary and lifestyle behaviors during Ramadan: A multi-national study using structural equation modeling among 24,500 adults amid COVID-19.** *Frontiers in Nutrition, 10.* **doi: 10.3389/fnut.2023.1040355. Asma Amanatullah (KRSS) Date of Publications: March 2023 HJRS: W (Gold)**

Background: Of around 2 billion Muslims worldwide, approximately 1.5 billion observe Ramadan fasting (RF) month. Those that observe RF have diverse cultural, ethnic, social, and economic backgrounds and are distributed over a wide geographical area. Sleep is known to be significantly altered during the month of Ramadan, which has a profound impact on human health. Moreover, sleep is closely connected to dietary and lifestyle behaviors. Methods: This cross-sectional study collected data using a structured, self-administered electronic questionnaire that was translated into 13 languages and disseminated to Muslim populations across 27 countries. The questionnaire assessed dietary and lifestyle factors as independent variables, and three sleep parameters (quality, duration, and disturbance) as dependent variables. We performed structural equation modeling (SEM) to examine how dietary and lifestyle factors affected these sleep parameters .Results: In total, 24,541 adults were enrolled in this study. SEM analysis revealed that during RF, optimum sleep duration (7–9 h) was significantly associated with sufficient physical activity (PA) and consuming plant-based proteins. In addition, smoking was significantly associated with greater sleep disturbance and lower sleep quality. Participants that consumed vegetables, fruits, dates, and plant-based proteins reported better sleep quality. Infrequent consumption of delivered food and infrequent screen time were also associated with better sleep quality. Conflicting results were found regarding the impact of dining at home versus dining out on the three

sleep parameters. Conclusion: Increasing the intake of fruits, vegetables, and plant-based proteins are important factors that could help improve healthy sleep for those observing RF. In addition, regular PA and avoiding smoking may contribute to improving sleep during RF.
https://www.frontiersin.org/articles/10.3389/fnut.2023.1040355/full

2. **Asif, S., & Shahid, S.** (2023). Emerging Trends in Nano-Theranostics: Platinum-based Drug Delivery. *Global Drug Design and Development Review 8*(2),15-28. http://dx.doi.org/10.31703/gdddr.2023(VIII-II).03. **Samia Asif (KRSS/ORIC) Sammia Shahid (Chemistry/SSC) Date of Publication: June 2023** HJRS: Y (Null)

Nanotechnology is the most common and frequently used technology that aims to improve the efficacy of medical procedures, sometimes known as Nanomedicine. With their impressive pharmacological efficacy as nanomedicines and delivery systems, nano materials have been recognized as attractive diagnostic and chemotherapeutic tools to treat diseases. To treat a wide range of solid malignant tumors, Drugs built on platinum complexes are now the foundation for many other therapies. They are often used to treat a varietym of solid tumors in the clinic, including head and neck, colorectal, lung and other malignancies. Cell-specific targeting with nano-carriers is possible using both active and passive techniques. This paper provides a thorough overview of platinum-based drug delivery system with the help of nanotechnology. Their mechanisms of action used in the treatment of cancer and potential for further development are all anticipated.
https://gdddrjournal.com/current-issue/8/2/2023

3. **Sultana, K., Kitchlew, N., & Ali, S. A.** (2023). Perceived Ethical Leadership and Moral Voice: Mediating Role of Moral Courage. *International Journal of Business and Economic Affairs, 8*(1), 26-42. https://doi.org/10.24088/IJBEA-2023-81004 . **Khawar Sultana (KRSS) Naveda Kitchlew, Syed Ahmad Ali Management/HSM) Date of Publication: April 2023** HJRS: Y (Null)

This paper uses a mediation model to examine moral courage as an employee's self-regulatory mechanism for promoting a moral voice. Following the social cognitive theory, we hypothesized that moral courage was the underlying mechanism in the relationship between ethical leadership and moral voice. The analysis was based on the time-lagged data collected from 347 faculty members of private universities in Pakistan using convenience sampling. We found that perceived ethical leadership is not directly associated with employees' moral voice. We further found that respondents' moral courage fully mediates the effect of perceived ethical leadership on their moral voice behavior. This study contributes to the literature pertinent to the behavioral ethics, ethical leadership and moral courage. Theoretical and practical implications and directions for future research are given in the light of these findings.
http://ijbea.com/ojs/index.php/ijbea/article/view/298

Learning Resource Center (LRC)

1. **Ahmad, Z., Soroya, S. H., & Mahmood, K. (2023). Bridging social capital through the use of social networking sites: A systematic literature review. Journal of Human Behavior in the Social Environment, 33(4), 473-489. doi: 10.1080/10911359.2022.2064025. Zaheer Ahmad (LRC) Date of Publication: 2023** HJRS: W (Bronze)

The purpose of this study is to find out the impact of the use of social networking sites (SNS) use on bridging social capital (BRS). This paper also aimed to identify the popular medium used for developing BRS. A systematic literature review (SLR) was performed by following the preferred reporting items for systematic reviews and meta-analyses (PRISMA). This SLR was conducted based on Scopus, Web of Science and Google Scholar to collate and synthesize the findings of published studies by 2021. During the reported period, 29 quantitative studies fall under the inclusion criterion. The generalized findings indicated that SNS use has a significant and positive impact on bridging social capital (BRS). The relationship between SNS use and bridging capital is stronger in Western countries as compared to Eastern countries. Facebook is the mostly used medium for developing bridging social capital. Social networking sites (SNSs) offer a platform to develop new relations and strengthen weak ties. It also prioritized SNS-based social interaction for developing weak bonds, which further help to form bridging social capital within online communities. These findings support media designers in highlighting cultural differences while designing SNSs based applications. This is one of the first attempts to accumulate systematically published literature in the area of study during the reported period. The study's outcomes are result-oriented contributions for marketers in developing marketing agendas and strategies compatible with consumer preferences while designing and improving SNS based information systems.
https://www.tandfonline.com/doi/full/10.1080/10911359.2022.2064025

UMT Sialkot Campus

Knowledge Unit of Systems and Technology

Department of Computer Sciences

1. **Cheema, S. M., Tariq, S., & Pires, I. M. (2023). A natural language interface for automatic generation of data flow diagram using web extraction techniques.** *Journal of King Saud University - Computer and Information Sciences,* 35(2), 626-640. doi: https://doi.org/10.1016/j.jksuci.2023.01.006. **Sehrish Munawar Cheema, Saman Tariq (Computer Science/KUST) Date of Publication: February 2023 HJRS: W (Silver)**

   To model the data and functions in various computer science applications, the researcher uses a Data Flow Diagram (DFD). DFD has been constructed using [open-source software tools that provide users with different shapes and environments. However, the existing approaches require substantial human effort, the validity of the generated output is still a loophole, and they have never gained traction in practice. Our research objective is to develop a semi-automated tool for drawing complex Data Flow Diagrams in the shortest time according to the specified features of the intended system. We developed a Natural Language Interface (NLI) that allows the user to compose a query and identify the system functionality and constraints for the composition of DFD. Natural Language Processing (NLP) techniques are applied to scrapped data to extract the keywords and develop a data repository. Also, we developed rule-based algorithms to map user queries onto respective token shapes to draw the required functionality into appropriate levels of DFD. For verification, output DFDs were converted into conceptual digraphs using adjacency and permutation matrices to evaluate isomorphism. The empirical results reflect that the DFDs generated by the system are correct, complete, and significant. https://www.sciencedirect.com/science/article/pii/S131915782300006X

2. **Ullah, F., Ullah, S., Srivastava, G., & Lin, E. C. W. (2023). Droid-MCFG: Android malware detection system using manifest and control flow traces with multi-head temporal convolutional network.** *Physical Communication, 57.* doi: 10.1016/j.phycom.2022.101975. **Shamsher Ullah (Computer Science/KUST) Date of Publication: April 2023 HJRS: X (Honorable Mention)**

   Android is the most popular mobile operating system, making it the main target of malware attacks. Machine learning-based attack detection techniques have recently emerged as promising methods that relies heavily on particular features to classify malware. Despite machine learning-based malware detectors having hundreds of features, attackers can use feature-related expertise to generate malware variants to avoid detection. Therefore, the Android security team must constantly develop novel features to detect suspicious attacks. This paper proposes a novel malware detection method called Droid-MCFG that combines the Android features of manifest and Control Flow Graph (CFG). First, reverse engineering tools are used to mine manifest files and Java source codes from Android Package Kit (APK). Second, to represent Android apps with elevated features, we develop a features selection method that retrieves API calls and API sequences from CFGs. The API calls and manifest information are then combined to produce digital fingerprints of Android app actions. Third, a transfer learning approach based on word2vec is developed to extract trained features from digital fingerprints. To thoroughly analyze the novel features, the word2vec is fine-tuned with random, static, and dynamic strategies. Finally, the multi-head Temporal Convolutional Network (TCN) is designed to identify malware based on fine-tuned features. The TCN employs casual convolutions and dilations due to its temporality and broad receptive fields, making it very responsive to API-call sequences and malware activities in the manifest file. The proposed method achieves a classification accuracy of 96.24% using the CICInvesAndMal2019 dataset. https://www.sciencedirect.com/science/article/pii/S187449072200252X

3. **Ullah, S., Zheng, J., Din, N., Hussain, M. T., Ullah, F., & Yousaf, M. (2023). Elliptic Curve Cryptography; Applications, challenges, recent advances, and future trends: A comprehensive survey.** *Computer Science Review,* 47. doi: 10.1016/j.cosrev.2022.100530. **Shamsher Ullah (Computer Science/KUST) Muhammad Tanveer Hussain (Mathematics/SSC) Date of Publication: February 2023 HJRS: W (Gold)**

   Elliptic Curve (EC) is the most recent and advanced technique of Elliptic Curve Cryptography (ECC). EC is often used to improve the security of open communication networks and to let specific persons with confirmed identities into the Modern Digital Era (MDE). Users of MDE make use of many technologies, such as social media, the cloud, and the IoT industry, among others. No matter what tool the users are using, the whole environment has to be able to keep their security and privacy preserved. The study of cryptography is required because unsecure networks make data transmission and the transfer of information susceptible to data theft and attack via an open channel. This makes it necessary to learn cryptography. The art of encrypting documents and communications using keys in such a way that only the individuals who are intended to receive them are able to decode and process them is referred to as cryptography. A digital signature, cryptographic data integrity, and authentication method all rely on the address of the receiver and the sender in addition to mathematical operations to find the signature. During the process of signature and verification, the solution that was

presented is compared with the technique that is currently being used by ECDSA in order to illustrate the differences that exist between the two processes. This comprehensive survey of EC seeks to thoroughly investigate many scientific concepts, state-ofthe-art, and innovative methodologies and implementations. This work will be useful for academics, who are interested in further analysis. Use and development of EC based schemes for cloud computing, e-health, and e-voting, is more secure as compared to RSA, and Diffie–Hellman schemes. In this comprehensive study, we claim that the adoption of EC methods in distributed computing and asynchronous networking provides significant benefits in distributed computing and interdependent networking.

https://www.sciencedirect.com/science/article/pii/S1574013722000648

4. **Ullah, S.,** Jiangbin, Z., **Hussain, M. T.,** Sardar, M. W., Farooq, M. U., & Khan, S. (2023). An investigating study of blind and ID-based signcryption schemes for misuse risk protection and high-performance computing. *Cluster Computing*, 1-15. https://doi.org/10.1007/s10586-023-03969-0. **Shamsher Ullah** (Computer Science/KUST) **Muhammad Tanveer Hussain** (Mathematics/SSC) **Date of Publication: February 2023** **HJRS: W (Honorable Mentioned)**

The risks of misusing new and developing technology are increasing on a daily basis. In these technologies, electronic communication (e-communication) anonymously delivers sensitive information. It is a challenging task in e-communication to conceal the identity of the original users and preserve misuse risk protection (i.e., security and privacy) with low computations. On the other hand, anonymous communication may be detrimental. For security and privacy maintenance, we use the concept of Misuse Risk Protection (MRP) for low computations and High-Performance Computing (HPC). To overcome these challenges, the researchers use the concept of blind signature, blind singcryption and ID-based signcryption for e-communication environments. We analyzed blind and ID-based signcryption schemes and their security hardness, which is based on different Discrete Logarithm Problems (DLP) such as Elliptic Curve DLP (ECDLP), Hyperelliptic Curve DLP (HECDLP), and bilinear pairing etc. In this paper, we also investigated that the proposed schemes attain the desired MRP features, HPC (e.g., low computation and communication overheads) than the existing schemes, which makes the newly proposed scheme more suitable for low-power environments. Finally, all schemes with small key sizes provide low computation and communication overhead. Due to low computation and communication overheads, it is considered efficient.

https://link.springer.com/article/10.1007/s10586-023-03969-0#citeas

5. **Din, N., Waheed, A., Ullah, S., Amin, N. U., Srivastava, G., Ullah, F., & Lin, J. C. W. (2023). A typology of secure multicast communication over 5 G/6 G networks.** *International Journal of Information Security,* **22(4), 1055-1073. doi: 10.1007/s10207-023-00678-y. Shamsher Ullah (Computer Science/KUST) Date of Publication: August 2023 HJRS: W (Bronze)**

The growth of media services, multimedia conferencing, interactive distance learning, and distributed interactive simulations is becoming more dependent on the security of multicast communication over 5 G and 6 G networks. In order to ensure the security and efficacy of multicast communication, our research came up with the idea of combining multicast public-key encryption with digital signatures known as "Multi-Receiver Signcryption (MRSC)." As compared to multicast encryption and signature primitives, MRSC significantly improves the effectiveness of secure information delivery through multicast communication over 5 G and 6 G networks. In this paper, we first provide the formal model of MRSC schemes used in Public Key Infrastructure, Identity-based Cryptography, and Certificateless Cryptography. Secondly, we present a typology of MRSC, as well as a summary of an in-depth investigation of the qualities of security, the cost of computing, and the overhead of communication over the networks.

https://link.springer.com/article/10.1007/s10207-023-00678-y#Abs1

6. **Farooq, M., Noor, A., & Naeem, M. (2023). Does family ownership moderate the relationship between board characteristics and corporate social responsibility? Evidence from an emerging market.** *Asian Journal of Business Ethics,* **12(1), 71-99. doi: 10.1007/s13520-022-00164-z. Muhammad Naeem (Computer Science/KUST) Date of Publication: June 2023 HJRS: Y (Null)**

To model the data and functions in various computer science applications, the researcher uses a Data Flow Diagram (DFD). DFD has been constructed using [open-source software tools that provide users with different shapes and environments. However, the existing approaches require substantial human effort, the validity of the generated output is still a loophole, and they have never gained traction in practice. Our research objective is to develop a semi-automated tool for drawing complex Data Flow Diagrams in the shortest time according to the specified features of the intended system. We developed a Natural Language Interface (NLI) that allows the user to compose a query and identify the system functionality and constraints for the composition of DFD. Natural Language Processing (NLP) techniques are applied to scrapped data to extract the keywords and develop a data repository. Also, we developed rule-based algorithms to map user queries onto respective token shapes to draw the required functionality into appropriate levels of DFD. For verification, output DFDs were converted into conceptual digraphs using adjacency and permutation matrices to evaluate isomorphism. The empirical

results reflect that the DFDs generated by the system are correct, complete, and significant. https://www.sciencedirect.com/science/article/pii/S131915782300006X

7. **Mateen, A., Wasim, M., Ahad, A., Ashfaq, T., Iqbal, M., & Ali, A. (2023). Smart energy management system for minimizing electricity cost and peak to average ratio in residential areas with hybrid genetic flower pollination algorithm.** *Alexandria Engineering Journal,* **77, 593-611. doi: 10.1016/j.aej.2023.06.053. Abdul Mateen (Computer Science/KUST) Date of Publication: February 2023 HJRS: W (Silver)**
Demand Side Management (DSM) plays a significant role in the smart grid to minimize Electricity Cost (EC). Home Energy Management Systems (HEMSs) have recently been studied and proposed explicitly for HEM. In this paper, we propose a novel nature-inspired hybrid Genetic Flower Pollination Algorithm (GFPA) to minimize cost with an affordable delay in appliance scheduling. Our proposed GFPA algorithm combines elements of the Genetic Algorithm (GA) and Flower Pollination Algorithm (FPA) to create a hybrid approach. To assess the effectiveness of the proposed algorithm, we consider a scalable town consisting of 1, 10, 30, and 50 homes, respectively. The proposed solution finds an optimal scheduling pattern that simultaneously minimizes EC and Peak to Average Ratio (PAR) while maximizing User Comfort (UC). We assume that all homes are homogeneous in terms of appliances and power consumption patterns. Simulation results show that our proposed scheme GFPA performs better when applying Critical Peak Pricing (CPP) signal using different Operational Time Intervals (OTIs) and compared with unscheduled, GA, and FPA-based solutions in terms of reducing cost since they achieve on average 98%, 36%, 23%, and 22%, respectively. Similarly, PAR averages 98%, 36%, 59%, and 55%, respectively. While, UC comparing to GA and FPA, are around 88%, 48%, and 63%, respectively. Our proposed scheme achieves better results by applying Real Time Pricing (RTP) signals and different OTIs. As these schemes, i.e., unscheduled, GA, FPA, and GFPA, achieve cost on average 92%, 50%, 29%, and 28%, respectively. While PAR on average 94%, 39%, 62%, and 56%, and UC for GA, FPA, and GFPA on average 98%, 52%, and 49%, respectively. Overall, our proposed GFPA algorithm offers a more effective solution for minimizing EC with an affordable delay in appliance scheduling while considering PAR and UC.
https://www.sciencedirect.com/science/article/pii/S1110016823005288

8. **ul Huda, N., Amin, R., Gillani, S. I., Hussain, M., Ahmed, A., & Aldabbas, H. (2023). Skin Cancer Malignancy Classification and Segmentation Using Machine Learning Algorithms.** *JOM,* **75(8), 3121-3135. doi: 10.1007/s11837-023-05856-w. Mudassar Hussain (Computer Science/KUST) Date of Publication: May 2023 HJRS: W (Bronze)**
Malignant melanoma is the deadliest form of skin cancer. Once it metastasizes from its origin into other tissues, there is no surgical removal option as a treatment. The only way to improve the cure rate is through early diagnosis. Many machine learning (ML) algorithms have been proposed for early skin cancer classification and segmentation. Each algorithm performs well in certain situations; therefore, the selection of ML algorithm is the key to better accuracy. This article surveys many research studies that used ML algorithms (i.e., supervised and unsupervised skin cancer malignancy classification and segmentation). We present some objectives and limitations of the surveyed papers. We also provide future directions for better skin cancer malignancy detection with high accuracy.
https://link.springer.com/article/10.1007/s11837-023-05856-w#Abs1

9. **Wasim, M., Cheema, S. M., & Pires, I. M. (2023). Normalized effect size (NES): a novel feature selection model for Urdu fake news classification.** *PeerJ Computer Science***, 9, 1-23. doi: 10.7717/peerj-cs.1612. Muhammad Wasim (Computer Science/KUST) Sehrish Munawar Cheema (Computer Science/SST) Date of Publication: October 2023 HJRS: W (Bronze)**
Social media has become an essential source of news for everyday users. However, the rise of fake news on social media has made it more difficult for users to trust the information on these platforms. Most research studies focus on fake news detection in the English language, and only a limited number of studies deal with fake news in resource-poor languages such as Urdu. This article proposes a globally weighted term selection approach named normalized effect size (NES) to select highly discriminative features for Urdu fake news classification. The proposed model is based on the traditional inverse document frequency (TF-IDF) weighting measure. TF-IDF transforms the textual data into a weighted term-document matrix and is usually prone to the curse of dimensionality. Our novel statistical model filters the most discriminative terms to reduce the data's dimensionality and improve classification accuracy. We compare the proposed approach with the seven well-known feature selection and ranking techniques, namely normalized difference measure (NDM), binormal separation (BNS), odds ratio (OR), GINI, distinguished feature selector (DFS), information gain (IG), and Chi square (Chi). Our ensemble-based approach achieves high performance on two benchmark datasets, BET and UFN, achieving an accuracy of 88% and 90%, respectively.
https://peerj.com/articles/cs-1612/

Book Chapter

1. **Jafri, N., Tahir, M., & Ahad, A. (2023). The role of artificial intelligence in solar harvesting, storage, and conversion Solar Energy Harvesting, Conversion, and Storage: Materials, Technologies, and Applications (pp. 293-318). Abdul Ahad (Computer Science/KUST) Date of Publication: 2023**
   With the United Nations (UN) push for sustainable development goals (SDGs), research on renewable energy resources has received significant renewed interest. Furthermore, major economies worldwide have committed to reducing carbon emissions significantly and eventually achieving the goal of carbon-neutral economies to tackle climate change. To meet the growing need for energy consumption, among several renewable options, the development of solar energy (SE) systems is an attractive solution. However, SE systems have several challenges, such as high installation and maintenance costs, conversion efficiency, and storage issues. With recent advances in material science focusing on discovering new material, storage and conversion aided by artificial intelligence (AI) have the potential to improve the efficiency of solar power systems significantly. AI approaches will greatly help model, analyze, and predict renewable energy performance and determine optimal operating conditions. This chapter provides an overview of recent advances in applying AI techniques to solar harvesting, storage, and conversion, along with challenges and potential future research directions.
   https://www.sciencedirect.com/science/article/abs/pii/B9780323906012000106

Conference Proceeding

1. **Mateen, A., Ahad, A., Zia, S., Shayea, I., & Ali, S. (2023).** *Energy-efficient routing to prevent void holes in heterogeneous 5G wireless sensor network using game theory.* **Paper presented at the International Conference on Smart Computing and Application, ICSCA 2023. Abdul Mateen, Abdul Ahad, Salam Zia (Computer Science/KUST) Date of Publication: April 2023**
   Heterogenous 5G wireless Sensor Networks face several constraints throughout the routing process. Reduced costs, minimal energy use, and reliable data transmission between nodes are the primary problems of a heterogenous 5G wireless sensors network. During the transmission process of nodes, vacant holes use the most energy. The two most problematic aspects of heterogenous 5G WSNs are the location mentioned above mistake and the battery drain on individual nodes. However, the network's performance suffers significantly due to data packet loss and excessive energy consumption. Thus, many routing protocols incorporate various energy-saving techniques. In contrast, a routing strategy is suggested in this research to prevent void holes and maximize network stability. In addition, the scalability and efficacy of the proposed protocol are demonstrated by comparing it with state-of-the-art protocols. This study also introduces the idea of location error to increase the network's efficiency. In addition, a scalability study of the suggested systems has been conducted. Extensive simulations were also conducted to evaluate the effectiveness of the proposed technique. The findings confirm that the recommended routing strategy outperforms the competing schemes.
   https://ieeexplore.ieee.org/abstract/document/10087702

2. **Ali, M., Cheema, S. M., Aslam, Z., Naz, A., & Ayub, N. (2023).** *CBAI: Cloud-Based Agile Infrastructure for Enhancing Distributed Agile Development.* **Paper presented at the 4th International Conference on Computing, Mathematics and Engineering Technologies, iCoMET 2023. Sehrish Munawar Cheema (Computer Science/KUST) Date of Publication: 17-18 March 2023**
   Distributed agile development comes with a lot of challenges in particular as it has to do with agile teams working together from different geological locations on the same project. Most probably it happens due to a lack of visibility in the complex development and deployment process, poor communication, and unavailability of the development team and corresponding customer in the same place. These factors affect the performance of the team and increase the overall cost of development. To mitigate all these aspects, we proposed a cloud computing-based Infrastructure which is a combination of both agile as well as cloud computing technology named 'CBAI'. The proposed Infrastructure assists the team members to work efficiently even if they are different geo-locations without burdening the cost. It provides the basic structure for global agile development and is also efficient in reducing the technical liability, and the need for project backlog.
   https://ieeexplore.ieee.org/abstract/document/10099284/authors#authors

3. **Yousaf, M., Khan, M. S. S., Ullah, S., Wang, S., & Jing, L. (2023).** *NR-Isomap: An Incremental Approach with Gaussian Process Kernels for Denoising.* **Paper presented at the 6th International Conference on Big Data and Artificial Intelligence, BDAI 2023. Shamsher Ullah (Computer Science/KUST) Date of Publication: 07-09 July 2023**
   The Isomap is a popular nonlinear dimensionality reduction method often used for low-dimensional embedding space. When the big data is noisy, Isomap often fails because of the graph structure' Short-Circuit Edges (SCE) problem. In this paper, an incremental Noise-Reduction Isomap (NR-Isomap) approach is to address the SCE problem in a graph structure. The GP kernels are combined with the manifold learning approach and provide

significant results. NR-Isomap is based on the Hessian Locally Linear Embedding (HLLE) algorithm with Gaussian Process (GP) kernels. The HLLE algorithm provides the optimal solution to the SCE problem caused by an overly noisy dataset. NR-Isomap provides an answer to the Isomap SCE problem in noisy big data problems that cannot be handled using existing methods. Therefore, the GP kernel significantly improves and measures the performance of the NRI-somap accuracy. Our NR-Isomap method outperforms experiments on SK-Learn datasets and shows efficient results compared to Isomap. Our NR Isomap is much more efficient and faster compared to Isomap. The efficiency and accuracy of the NR-Isomap method are demonstrated theoretically and compared with other manifold learning methods.
https://ieeexplore.ieee.org/abstract/document/10256697

Knowledge Unit of Science

Department of Biotechnology

1. **Irshad, A., Tahir, A., Sharif, S., Khalid, A., Ali, S., Naz, A., Amin, A., ... & Ameen, A. (2023). Determination of Nutritional and Biochemical Composition of Selected Pleurotus spps. *BioMed Research International*, *2023*. 815090. doi: 10.1155/2023/8150909. Sajed Ali (Biotechnology/KUSC) Alisha Naz (Life Sciences/SSC) Ayesha Amin (ORIC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**
The global demand for good quality food is going to be increased gradually. Mushrooms are broadly used as healthy nutritious meals. The nutritional values of extracts from four distinct Pleurotus species - Pleurotus ostreatus, Pleurotus sajor-caju, Pleurotus sapidus, and Pleurotus columbinus - were determined in the current study. Firstly, proximate analysis of selected Pleurotus species was performed followed by the Bradford assay to analyze the protein spectrophotometrically; high-performance liquid chromatography (HPLC) was performed for sugar determination while GC-MS was done to determine fatty acids on organic extracts of selected mushrooms. Descriptive statistics were used to calculate the percentages while significance was determined by SPSS statistics. The results depicted that fat, protein, ash, fiber, energy contents, and total carbohydrate were in the range of 0.64-2.02%, 16.07-25.15%, 2.1-9.14%, 6.21-54.12%, 342.20-394.30 kcal/100 g, and 65.66-82.47%, respectively. The protein's maximum concentration was observed in P. ostreatus followed by P. columbinus>P. sajor-caju>P. sapidus, sequentially. Various sugars may or may not be present in selected Pleurotus spps. Among the fatty acids, the prevalence of UFA was more than that of saturated fatty acids among all selected mushrooms. From this study, it is concluded that all four Pleurotus spps. have excellent nutritional composition and can be used as valuable food and a great source of biochemical compounds.
https://www.hindawi.com/journals/bmri/2023/8150909/

2. **Jehangir, N., & Ali, S. (2023). The insecticidal efficacy and performance of Bt Cotton under variable abiotic stresses – A review on recent findings. *Plant Stress, 8*. doi: 10.1016/j.stress.2023.100151. Nahal Jehangir, Sajed Ali (Biotechnology/KUSC) Date of Publication: June 2023 HJRS: Y (Null)**
Bt cotton is a genetically modified crop that combats cotton pests (bollworm) by its insecticidal properties induced by insertion of endotoxin *Cry1Ac* gene from soil dwelling bacterium *Bacillus thuringiensis.* Bt cotton has been a big agricultural hit product of biotechnology for past 2 decades. Many countries have been successfully cultivating Bt crops on commercial scales. Transgenic Bt crops have favorably increased crop yields and solved global crisis of food shortage. Bt cotton crop shows variable insect resistance levels under the influence of multiple environmental abiotic stresses like high temperature, soil salinity, water logging and water deficiency, nitrogen deficiency, and humidity. These factors have been observed to degrade endotoxin protein content of transgenic crop and ultimately reduce its insecticidal efficacy. Under harsh environmental conditions, plant undergoes disturbed nitrogen metabolism and physiological mechanism distress. This review has discussed some of the major stress factors of Bt cotton and the underlying mechanisms of its unstable insecticidal efficacy under individual and combined stresses. Gene silencing, post transcriptional changes, protein degradation are some crucial reasons discussed in this review, but nitrogen metabolism is the most important research needed area of this domain. A detailed meta-analysis table has been drawn as a summary of various vital researches done in order to investigate the stress impacts. A deep research approach is needed to further elaborate the metabolic and physiological changes that take place in transgenic cotton crop under harsh stress states. Due to insufficient evidences and lack of solution strategies against this problem, there is a need of further research data to address this unstable protection of Bt crops against insects in order to enhance the ability and performance of the cotton crop worldwide.
https://www.sciencedirect.com/science/article/pii/S2667064X23000209

3. **Awan, M. F., Ali, S., Ullah, I., Ullah, A., Tariq, M., Iqbal, M. S., ... & Farid, A. (2023). Expression Studies of Synthetic Sucrose Isomerase Gene 1 (SySIG1) in Saccharum officinarum L. *Plant Molecular Biology Reporter*,**

1-13. https://doi.org/10.1007/s11105-023-01385-7. **Mudassar Fareed Awan, Sajed Ali** **(Biotechnology/KUSC) Date of Publication: May 2023 HJRS: X (Clay)**

Extracted cane juice from *Saccharum officinarum* L. was employed as a major source of sugar acting as major input in various food industries. Current genotypes are yielding lower quantities of sugar posing a major challenge for sugarcane producers and plant biotechnologists. Discovery of novel sucrose isomerases (SI) derived from multiple microbial sources enlightened a great hope for molecular food scientists to introduce slowly digestible sucrose isomers not only to make up deficiencies of reduced sugar recovery but also produce healthful sugars. Modified *Synthetic Sucrose Isomerase Gene 1* (*SySIG1*) cloned in plant expression vector *pCAMBIA1301* under the combined influence of two promoters (*CmYMV* and *Zm-Ubi*) to produce high sugar yielding sugarcane genotypes. The expression of the transgene was terminated finally by *nopaline synthase gene* (*Nos*). The genetic construct pCEMBIA1301-1 was archestrated with transgene *SySIGI* having size 2180 bp integrated to plant expression vector. The vacoule targeted sequence (VTS) as signal peptide was also added in the vector so that the product could be directed and stored in the vacuolar region. Transgene expression regulation was increased with enhancers to clone highly expressed gene construct. Transgene incorporation into genome was confirmed by PCR amplifications and dot blot analysis. Stem expression profile via qPCR indicated multiple fold magnification in transgene expression which was translated gorgeously into increased sugar recovery percentages in various tested transgenic lines comparative to control counterparts. Further quantifications by HPLC showed much high isomaltulose production in transgenic sugarcane lines as compared to control non-transgenic sugarcane lines. Different categories of sugarcane lines on the basis of sugar yields were developed and classified as super sugar lines (SSLs), elite sugar lines (ESLs), and good sugar lines (GSLs). Stem-based transgene expression and leaf-based expression quantifications were originated from real-time PCR.

https://link.springer.com/article/10.1007/s11105-023-01385-7#citeas

4. **Jamil, M., Ali, S., Gul, J., Kashif, M., Ullah, N., Ali, M., ... & Qazi, I. (2023). 45. Taxonomical and epidemiological study of tick species on domesticated animals.** *Pure and Applied Biology (PAB), 12*(1), 523-530. **http://dx.doi.org/10.19045/bspab.2023.120054. Sajed Ali (Biotechnology/KUSC) Date of Publication: March 2023 HJRS: X (Clay)**

JGlobal environmental changes have led to an increase in the spread of ticks and tick-borne diseases (TBDs) affecting humans, domestic, and wild animals. Ticks are obligate ectoparasites that transmit a wide range of pathogens that cause a wide range of diseases in livestock, resulting in skin damage, weight loss, anemia, mortality, morbidity, reduced meat and milk production. The taxonomic and epidemiological study was conducted in District Muzaffargarh during 2020-2022. Ten species such as Amblyomma variegatum, Haemaphysalis punctata, Haemaphysalis sulcate, Hyalomma anatolicum, Hyalomma marginatum, Hyalomma detritum, Rhipicephalus decoloratus, Rhipicephalus turanicus, Rhipicephalus sanguineus, and Rhipicephalus microplus belonged to four genera were identified. Prevalence percentage of A. variegatum, Hae. punctata, Hae. sulcate, Hy. anatolicum, Hy. marginatum, Hy. detritum, Rh. decoloratus, Rh. turanicus, Rh. sanguineus, and Rh. microplus was 3.74, 8.42, 9.19, 20.93, 3.70, 8.80, 11.14, 5.82, 15.78, and 12.42%, respectively on examined animals. Hyalomma anatolicum was recorded abundant species in the current study area. Area-wise data showed that Hy. marginatum was only collected from Chowk Sarwar Shaheed while Rh. turanicus and Rh. decoloratus from Muzaffargarh. Among areas, animals in tehsil Muzaffargarh were extremely infested with tick species while lightly in Chowk Sarwar Shaheed. Host-wise data showed that Rh. microplus, Rh. turanicus, and Hy. marginatum was not found on sheep, goats, and buffaloes, respectively. The prevalence of ticks on buffaloes, cows, goats and sheep was 32.51, 26.85, 21.87, and 18.76%, respectively. Maximum tick infestation was recorded on buffaloes while minimum on sheep. Summer (months of June and July) season was provided with the most suitable environment for tick migration and reproduction. Tick diversity, infestation rate, and numerous factors (area of collection, age, season, and sex of host) influencing tick infestation rate in different breeds of sheep, goats, cows, and buffalo in three tehsils of district Muzaffargarh were studied. Due to excessive feeding of tick species, production of the animals can reduce with the increase of tick and tick-borne diseases. The proper identification and epidemiology of tick species will prove fruitful in managing by adopting effective control measures against ticks and tick-borne diseases.

https://mail.thepab.org/index.php/journal/article/view/2529

5. **Iqbal, Z., Shafiq, M., Ali, S., Mahmood, M. A., Siddiqui, H. A., Amin, I., & Briddon, R. W. (2023). qPCR Assay as a Tool for Examining Cotton Resistance to the Virus Complex Causing CLCuD: Yield Loss Inversely Correlates with Betasatellite, Not Virus, DNA Titer.** *Plants*, 12(14). doi: 10.3390/plants12142645. **Muhammad Shafiq (Biotechnology/KUSC) Date of Publication: July 2023 HJRS: W (Silver)**

Cotton leaf curl disease (CLCuD) is a significant constraint to the economies of Pakistan and India. The disease is caused by different begomoviruses (genus Begomovirus, family Geminiviridae) in association with a disease-specific betasatellite. However, another satellite-like molecule, alphasatellite, is occasionally found associated with this disease complex. A quantitative real-time PCR assay for the virus/satellite components causing CLCuD was used to investigate the performance of selected cotton varieties in the 2014–2015 National Coordinated

Varietal Trials (NCVT) in Pakistan. The DNA levels of virus and satellites in cotton plants were determined for five cotton varieties across three geographic locations and compared with seed cotton yield (SCY) as a measure of the plant performance. The highest virus titer was detected in B-10 (0.972 ng·µg−1) from Vehari and the lowest in B-3 (0.006 ng·µg−1) from Faisalabad. Likewise, the highest alphasatellite titer was found in B-1 (0.055 ng·µg−1) from Vehari and the lowest in B-1 and B-2 (0.001 ng·µg−1) from Faisalabad. The highest betasatellite titer was found in B-23 (1.156 ng·µg−1) from Faisalabad and the lowest in B-12 (0.072 ng·µg−1) from Multan. Virus/satellite DNA levels, symptoms, and SCY were found to be highly variable between the varieties and between the locations. Nevertheless, statistical analysis of the results suggested that betasatellite DNA levels, rather than virus or alphasatellite DNA levels, were the important variable in plant performance, having an inverse relationship with SCY (−0.447). This quantitative assay will be useful in breeding programs for development of virus resistant plants and varietal trials, such as the NCVT, to select suitable varieties of cotton with mild (preferably no) symptoms and low (preferably no) virus/satellite. At present, no such molecular techniques are used in resistance breeding programs or varietal trials in Pakistan.
https://www.mdpi.com/2223-7747/12/14/2645

6. **Zahid, E., & Farhan Sarwar, M. (2023). Multiple Structural and Functional Annotations Based In-silico Characterization of Q9BRX8 Protein.** *Karbala International Journal of Modern Science,* **9(3), 553-563. doi: 10.33640/2405-609X.3320.** Eiman Zahid, Muhammad Farhan Sarwar **(Biotechnology/KUSC) Date of Publication: 2023** HJRS: Y (Null)

Numerous proteins found in humans are poorly understood because there is a dearth of experimental evidence. Hypothetical proteins (HPs) or uncharacterized proteins are the terms used to describe these proteins. In this work, one of these proteins, Q9BRX8, is investigated using in-silico or bioinformatics tools to reveal its significant properties. In this regard, NCBI for the sequence retrieval, ProtParam tool for analysis of physiochemical properties, SOPMA for secondary structure prediction, SWISS-Model for homology modelling, STRING for protein-protein interaction and HDOCK for protein-protein docking analysis among other tools, were incorporated. The physiochemical characteristics indicated that Q9BRX8, which has an instability score of 32.57, is a stable protein. It was identified in other cellular compartments, such as the cytosol, mitochondria, etc., where it may be betrothed in a variety of cellular functions, according to the sub-cellular localization studies. In addition, its secondary structure consists of high percentage of alpha helices (44.10%), among other components. Additionally, it was discovered through protein-protein interactions that this protein belongs to FAM213A family suggesting that it may function as antioxidant and affect bone resorption among other crucial functions. While, molecular docking analysis indicated that Q9BRX8 had a larger degree of similarity with the HLA-G protein, scoring -332.53kcal/mol. It can be hypothesized that the functions of Q9BRX8 and the HLA-G may be associated as a result of this similarity.
https://kijoms.uokerbala.edu.iq/home/vol9/iss3/18/

Department of Mathematics

1. **Saleem, M., & Hussain, M. (2023). Impression of nonlinear radiation and Stefan blowing on the magneto cross nano-Williamson fluid above exponentially stretching sheet.** *Results in Engineering*, **17**, **100864. doi: 10.1016/j.rineng.2022.100864.** Musharafa Saleem **(Mathematics/KUSC) Date of Publications: March 2023** HJRS: X (Clay)

In order to investigate the impacts of mixed convection, electromagnetic force, and nonlinear thermal radiation on the nano-Williamson fluid (NWF) (Williamson fluid as a base fluid with nanoparticles) on an exponential stretched surface placed in a porous medium, this work considers the effects of both heat absorption-generation and Joule heating. However, consideration is also given to Stefan blowing in combination with Brownian motion and thermophoresis factors. By using similarity transformations and non-dimensional variables, the set of non-linear partial differential equations (PDEs) leading the study of fluid flow is converted into a system of ordinary differential equations (ODEs), which then numerically solved by the bvp4c built in MATLAB package. Additionally, the effects of the acquired relevant factors on the distributions of velocity, nanoparticles-concentration, and temperature have been investigated through graphical arrangements in order to give each parameter a physical meaning. The comparative values of skin friction and Nusselt number for dissimilar values of and (Stefan blowing cases) are tabulated in Table 1, Table 2, Table 3, Table 4 respectively.
https://www.sciencedirect.com/science/article/pii/S2590123022005345

2. **Liu, J. B., Ali, H., Shafiq, M. K., Dustigeer, G., & Ali, P. (2021). On topological properties of planar octahedron networks.** *Polycyclic Aromatic Compounds,* **43(1), 755-771.doi: 10.1080/10406638.2021.2022726.** Muhammad Kashif Shafiq **(Mathematics/KUSC) Date of Publication: January 2023** HJRS: X (Null)

In the research of QSAR and QSPR correlations, topological indices such as the Randi'c index, Zagreb index, ABC index, and geometric-arithmetic index have been proposed to analyze bio-compatibility of chemical compounds. Chemical graph theory is the combination of Chemistry and Graph theory, and this theory deals

with the topology such as the mathematical study of isomerism and the development of topological indices which has applications in QSAR and QSPR. In this article, we consider the Octahedron networks and find out the above mentioned degree based topological indices.
https://www.tandfonline.com/doi/full/10.1080/10406638.2021.2022726

3. **Hussain, S., Asif, M., Shah, T., Mahboob, A., & Eldin, S. M. (2023). Redesigning the Serpent Algorithm by PA-Loop and Its Image Encryption Application.** *IEEE Access, 11*, 29698-29710. **doi: 10.1109/ACCESS.2023.3261568. Muhammad Asif (Mathematics/KUSC) Date of Publication: March 2023 HJRS: W (Silver)**

This article presents a cryptographic encryption standard whose model is based on Serpent presented by Eli Biham, Ross Anderson, and Lars Knudsen. The modification lies in the design of the Cipher, we have used power associative (PA) loop and group of permutations. The proposed mathematical structure is superior to Galois Field (GF) in terms of complexity and has the ability to create arbitrary randomness due to a larger key space. The proposed method is simple and speedy in terms of computations, meanwhile it affirms higher security and sensitivity. In contrast to GF, PA-loop are non-isomorphic and have several Cayley table representations. This validates the resistance to cryptanalytic attacks, particularly those targeting mathematical structures. This cryptographic scheme's full description of encryption and decryption is measured and rigorously assessed to support its multimedia applications. The observed speed of this technique, which uses a key of 256 bits and a block size of 128 bits, is comparable to three-key triple-DES.
https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10080958

4. **Malik, A., Yousaf, Z., Jan, M., Shahzad, M. R., & Akram, Z. (2023). Analysis of charged compact stars in f (R, T) gravity using Bardeen geometry.** *International Journal of Geometric Methods in Modern Physics, 20*(4). **doi: 10.1142/S0219887823500615. Adnan Malik, Zaiba Akram (Mathematics/KUSC) Date of Publication: April 2023 HJRS: X (Clay)**

The purpose of this paper is to examine the anisotropic matter distribution concerning one of the well-known f(R,T)�(�,�) theories of gravity, where R� and T� represent the Ricci scalar and trace of the energy–momentum tensor, respectively. We consider anisotropic matter distribution in spherically symmetric spacetime for our desired work. We investigate the physical behavior of pressure components, energy density, anisotropic function, equation of state parameters, and energy conditions. Furthermore, we analyze the stability of compact stars by investigating the causality condition, adiabatic index, and generalized Tolman–Oppenheimer–Volkoff equation. Some fundamental features of compact stars have been investigated, like compactness factor, mass function, and surface redshift. Our calculated solutions for Bardeen stellar structures are consistent and stable in the background of the f(R,T)�(�,�) theory of gravity.
https://www.worldscientific.com/doi/abs/10.1142/S0219887823500615

5. **Mahboob, A., Siddique, I., Asif, M., Nadeem, M., & Saleem, A. (2023). Construction of highly nonlinear component of block cipher based on mclaurin series and mellin transformation with application in image encryption.** *Multimedia Tools and Applications,* **1-19. https://doi.org/10.1007/s11042-023-15965-y. Imran Saddique, Muhammad Asif (Mathematics/KUSC) Date of Publication: June 2023 HJRS: W (Bronze)**

A substitution box (S-box) in data encryption is a non-linear tool that conducts substitution to assure the overall security of the system. S-box is the most important part of the block cipher. The non-linearity trait is critical for the construction of more reliable substitution boxes in data encryption. As a result, new approaches for generating high no n-linear S-boxes are required. Using the Mellin transformation and the McLaurin series, this work suggests an approach for creating Substitution boxes with a high non-linearity value of 112.5. S-box construction consists of three phases. In step 1, we build a sequence from a function's McLaurin series and then apply Mellin transformation to the sequence's terms without substituting limits. In the second phase, we solved all of the coefficients under mod 257, and in the third step, we improved the unpredictability of the initial S-box by using a particular permutation of Symmetric group . Furthermore, the algebraic characteristics of S-box are evaluated using various tests, including non-linearity (NL), Bit Independent Criterion (BIC), Strict Avalanche Criterion (SAC), Linear Approximation Probability (LAP), and Differential Uniformity (DU), all of which certify the algebraic properties of the S-box.
https://link.springer.com/article/10.1007/s11042-023-15965-y#citeas

6. **Zaman, S., Salman, M., Ullah, A., Ahmad, S., & Abdelgader Abas, M. S. (2023). Three-Dimensional Structural Modelling and Characterization of Sodalite Material Network concerning the Irregularity Topological Indices.** *Journal of Mathematics, 2023*. **https://doi.org/10.1155/2023/5441426. Shahzad Ahmad (Mathematics/KUSC) Date of Publication: May 2023 HJRS: X (Null)**

Topological characterization of 3D molecular structures is an emerging study area in theoretical and computational chemistry. These structural descriptors are used in a variety of domains, including chemical graph theory, drug delivery, and nanomaterial characterization. Quantitative structural descriptors can be used to characterize the chemical and physical properties of a given compound. Topological indices of

molecular graphs are numerical quantities that allow us to collect information about the chemical structure and reveal its hidden qualities without performing experiments. Due to the low cost of implementation, zeolite networks are considered popular chemical networks. Zeolites are widely used networks with applications in chemistry, medicine, and commercial production owing to their excellent chemical features. The sodalite network is composed of a very unique type of zeolite framework called sodalite. It is a three-dimensional network of interconnected cages and tunnels that provide an ideal environment for a wide range of chemical and physical processes. This paper deals with the sodalite material network's degree-based and reverse degree-based irregularity indices. These indices provide a quantitative measure of the irregular behaviour of the sodalite material network. It can be used to identify areas of the network where irregular behaviour is occurring and to compare different networks to determine which is more irregular. Additionally, these indices can be used to monitor changes in irregularity over time, allowing us to measure the impact of any interventions that are implemented.
https://www.hindawi.com/journals/jmath/2023/5441426/

7. **Luqman, A., & Shahzadi, G.** **(2023). Multi-attribute decision-making for electronic waste recycling using interval-valued Fermatean fuzzy Hamacher aggregation operators. Granular Computing, 1-22.** https://doi.org/10.1007/s41066-023-00363-4. **Anum Luqman, Gulfam Shahzadi (Mathematics/KUSC) Date of Publication: February 2023 HJRS: X (Honorable Mention)**
The utilization of electrical and electronics equipments in waste recycling has become a paramount for various countries. The waste electrical and electronics equipment (WEEE) recyclers own a crucial position in the environmental growth of a country as they help to minimize the carbon emissions during the recycling of WEEE in the most eco-friendly way. Therefore, the selection and assessment of an appropriate WEEE recycling partner has become a most important part of DM (decision-making) applications. The collusion of numerous quantitative and qualitative factors makes the recycling partner selection problem, a multifaced and significant decision for the managerial experts. The main objective of this work is to propose MADM (multi-attribute decision-making) techniques to evaluate the WEEE recycling partners under interval-valued Fermatean fuzzy (IVFF) information. In this regard, certain Hamacher AOs (aggregation operators) are proposed to develop the required DM method. These AOs include Hamacher weighted averaging, ordered weighted averaging, weighted geometric, ordered weighted geometric, generalized Einstein weighted averaging, generalized Einstein ordered weighted averaging, generalized Einstein weighted geometric, etc. Then, these averaging operators are utilized to come up with a MADM techniques under IVFF environment. Furthermore, the constructed technique is applied to a case study in China to incorporate with the e-waste recycling partner selection problem. Moreover, a brief comparison of the proposed with is presented with various existing techniques to manifest the productivity and coherence of the proposed model. Finally, the accuracy and consistency of results shows that the proposed technique is fully compatible and applicable to handle any MADM problem.
https://link.springer.com/article/10.1007/s41066-023-00363-4#citeas

8. **Shahzadi, G., Luqman, A., & Karaaslan, F. (2023). A decision-making technique under interval-valued Fermatean fuzzy Hamacher interactive aggregation operators.** *Soft Computing,* **1-28.** https://doi.org/10.1007/s00500-023-08479-0 . **Gulfam Shahzadi, Anum Luqman (Mathematics/KUSC) Date of Publication: June 2023 HJRS: W (Silver)**
The evolution of a novel technique to handle multi-attribute decision-making (MADM) problems under interval-valued Fermatean fuzzy numbers is the main motivation of this paper. We aim to introduce several initiative aggregation operators (AOs), including Hamacher interactive weighted averaging, Hamacher interactive ordered weighted averaging, Hamacher interactive hybrid weighted averaging operations, etc., to acquire our desired outcomes. Then, the distinguished characteristics of these AOs are investigated. Furthermore, the suggested AOs are carried out to build a technique to MADM issues using interval-valued Fermatean fuzzy information. A case study of mine emergency plan selection is then narrated to elaborate the practicality and effectiveness of the developed method. The influence of parametric values on decision-making outcomes is investigated considering the distinct values of parameter. After discussing the developed work and seeing its applications, we come across with the conclusion that the dominant privilege of adaptation of the above-mentioned AOs is situated in the fact that these operators allow a progressively complete approach on the matters to decision-makers. Hence, the method recommended in this study offers progressively wide, enhanced accuracy and actual outcomes when compared with the prevailing associated strategies. Therefore, this technique plays a vital role in actual-life MADM problems.
https://link.springer.com/article/10.1007/s00500-023-08479-0

9. **Malik, A., Tariq, A., Mardan, S. A., & Noureen, I. (2023). Singularity-free anisotropic strange quintessence stars in f (R, φ, X) theory of gravity.** *The European Physical Journal Plus, 138*(5), 418. **https://doi.org/10.1140/epjp/s13360-023-03995-2. Adnan Malik, Ayesha Tariq (Mathematics/KUSC) Syed Ali Mardan (Mathematics/SSC) Date of Publication: May 2023 HJRS: W (Bronze)**

In this article, we present a detailed model of anisotropic quintessence stars in the hypothesis of $f(R,\phi,X)$ gravity, where R is the Ricci scalar, ϕ represents the potential scalar and a kinetic term of ϕ is X. The Karori–Barua technique was used to solve the dynamical calculations in the $f(R,\phi,X)$ hypothesis using an anisotropic fluid and quintessence field. We observed that all of the answers we found are independent of focal peculiarity and possibly steady. The masses and radii of compact stars like Her X-1, SAX J1808.4-3658, and 4U 1820-30 were utilized to compute the value of obscure constants in the Krori and Barua metric. Graphical plots have been created for the fluid parameters density, radial, transverse, and anisotropy factors. To talk about the model's regularity, the first and second derivatives of density and radial pressure have been assessed. The stability of the developed model is determined utilizing radial sound speed velocity and tangential sound speed velocity. The true bounds of the stars such as anisotropy, intensity, and redshift have been thoroughly investigated.

https://link.springer.com/article/10.1140/epjp/s13360-023-03995-2#citeas

10. **Bhar, P., Pradhan, S., Malik, A., & Sahoo, P. K. (2023). Physical characteristics and maximum allowable mass of hybrid star in the context of f(Q) gravity.** *European Physical Journal C,* **83(7). doi: 10.1140/epjc/s10052-023-11745-y. Adnan Malik (Mathematics/KUSC) Date of Publication: July 2023 HJRS: W (Platinum)**
In this study, we explore several new characteristics of a static anisotropic hybrid star with strange quark matter (SQM) and ordinary baryonic matter (OBM) distribution. Here, we use the MIT bag model equation of state to connect the density and pressure of SQM inside stars, whereas the linear equation of state $pr= \alpha\rho- \beta$ connects the radial pressure and matter density caused by baryonic matter. The stellar model was developed under a background of f(Q) gravity using the quadratic form of f(Q). We utilized the Tolman–Kuchowicz ansatz (Tolman in Phys. Rev. 55:364–373, 1939; Kuchowicz in Acta Phys Pol 33: 541, 1968) to find the solutions to the field equations under modified gravity. We have matched the interior solution to the external Schwarzschild spacetime in order to acquire the numerical values of the model parameters. We have selected the star Her X-1 to develop various profiles of the model parameters. Several significant physical characteristics have been examined analytically and graphically, including matter densities, tangential and radial pressures, energy conditions, anisotropy factor, redshirt, compactness, etc. The main finding is that there is no core singularity present in the formations of the star under investigation. The nature of mass and the bag constant Bg have been studied in details through equi-mass and equi- Bg contour. The maximum allowable mass and the corresponding radius have been obtained via M- R plots.

https://link.springer.com/article/10.1140/epjc/s10052-023-11745-y#article-info

11. **Gurmani, S. H., Garg, H., Zulqarnain, R. M., & Siddique, I. (2023). Selection of Unmanned Aerial Vehicles for Precision Agriculture Using Interval-Valued q-Rung Orthopair Fuzzy Information based TOPSIS Method.** *International Journal of Fuzzy Systems.* **doi: 10.1007/s40815-023-01568-0. Rana Muhammad Zulqarnain (Mathematics/KUSC) Imran Siddique (Mathematics/SSC) Date of Publication: August 2023 HJRS: W (Bronze)**
Precision agriculture refers to the use of advanced technologies and data analytics to optimize farming practices, maximize crop yields, and reduce resource wastage. In precision agriculture monitoring, unmanned aerial vehicles (UAVs) have emerged as a valuable tool for large-scale implementation. The selection of suitable UAVs is a critical aspect of precision agriculture and is deliberated as significant multi-attribute group decision-making (MAGDM) problem. In decision issues, the evaluation of experts about any available options plays an important role. In this context, interval-valued q-rung orthopair fuzzy set (IVq-ROFS) is a useful tool allowing experts to provide their evaluations in a wider space and better deal with incomplete information. This paper aims to develop a new approach to determining expert weights using distance and similarity measures for interval-valued q-rung orthopair fuzzy numbers (IVq-ROFNs). To achieve this, an average group assessment based on individual assessments is constructed. The experts' weights were then established by computing similarity measures between the individual evaluations and the average group assessment. Moreover, the technique for order of preference by similarity to the ideal solution (TOPSIS) method is extended to address the MAGDM problem under IVq-ROF information. An example involving UAV selection for precision agriculture is provided to demonstrate the validity of the suggested method, and the impact of parameters on decision results is discussed. Finally, a comparative analysis with existing approaches demonstrates the superiority and advantages of the proposed technique.

https://link.springer.com/article/10.1007/s40815-023-01568-0

12. **Gurmani, S. H., Zhang, Z., & Zulqarnain, R. M. (2023). An integrated group decision-making technique under interval-valued probabilistic linguistic T-spherical fuzzy information and its application to the selection of cloud storage provider.** *AIMS Mathematics,* **8(9), 20223-20253. doi: 10.3934/math.20231031. Rana Muhammad Zulqarnain (Mathematics/KUSC) Date of Publication: June 2023 HJRS: X (Honorable Mention)**
Cloud storage is crucial in today's digital era due to its accessibility, scalability, cost savings, collaboration and enhanced security features. The selection of a reliable cloud storage provider is a significant multi-attribute group decision-making (MAGDM) problem that involves intrinsic relationships among the various alternatives, attributes and decision DMs. Due to the uncertain and incomplete nature of the evaluation data for cloud

storage providers, i.e., quality of service and user feedback, the identification of appropriate cloud storage providers with accurate service ranking remains an open research challenge. To address the above-mentioned challenge, this work proposes the concept of interval-valued probabilistic linguistic T-spherical fuzzy set (IVPLt-SFS). Then, some basic operations and a score function are defined to compare two or more IVPLt-SF numbers (IVPLt-SFNs). For information fusion, two aggregation operators for IVPLt-SFN are also developed. Next, an extended TOPSIS method-based group decision-making technique under interval-valued probabilistic linguistic T-spherical fuzzy information is established to solve the MAGDM problem. Finally, a numerical example is given to illustrate the practicability and usefulness of the designed approach and its suitability as a decision-making tool for selecting a cloud storage provider. Comparative and sensitivity analysis confirmed that this paper enriches the theory and methodology of the selection problem of cloud storage provider and MAGDM analysis. © 2023, American Institute of Mathematical Sciences. All rights reserved.
https://www.aimspress.com/aimspress-data/math/2023/9/PDF/math-08-09-1031.pdf

13. **Gurmani, S. H., Zhang, Z., Zulqarnain, R. M., & Askar, S. (2023). An interaction and feedback mechanism-based group decision-making for emergency medical supplies supplier selection using T-spherical fuzzy information.** *Scientific Reports,* **13(1). doi: 10.1038/s41598-023-35909-8. Rana Muhammad Zulqarnain (Mathematics/KUSC) Date of Publication: May 2023 HJRS: W (Bronze)**
Selecting a supplier for emergency medical supplies during disasters can be considered a typical multiple attribute group decision-making (MAGDM) problem. MAGDM is an intriguing common problem that is rife with ambiguity and uncertainty. It becomes much more challenging when governments and medical care enterprises adjust their priorities in response to the escalating problems and the effectiveness of the actions taken in different countries. As decision-making problems become increasingly complicated nowadays, a growing number of experts are likely to use T-spherical fuzzy sets (T-SFSs) rather than exact numbers. T-SFS is a novel extension of fuzzy sets that can fully convey ambiguous and complicated information in MAGDM. The objective of this paper is to propose a MAGDM methodology based on interaction and feedback mechanism (IFM) and T-SFS theory. In it, we first introduce T-SF partitioned Bonferroni mean (T-SFPBM) and T-SF weighted partitioned Bonferroni mean (T-SFWPBM) operators to fuse the evaluation information provided by experts. Then, an IFM is designed to achieve a consensus between multiple experts. In the meantime, we also find the weights of experts by using T-SF information. Furthermore, in light of the combination of IFM and T-SFWPBM operator, an MAGDM algorithm is designed. Finally, an example of supplier selection for emergency medical supplies is provided to demonstrate the viability of the suggested approach. The influence of parameters on decision results and comparative analysis with the existing methods confirmed the reliability and accuracy of the suggested approach.
https://www.nature.com/articles/s41598-023-35909-8

14. **Ali, A., Balachandran, S., Elumalai, S., & Mansour, T. (2023). On n-vertex chemical graphs with a fixed cyclomatic number and minimum general randić index.** *Mathematical Reports,* **25-75(1), 113-122. doi: 10.59277/MRAR.2023.25.75.1.113. Akbar Ali (Mathematics/KUSC) Date of Publication: 2023 HJRS: Y (Null)**
The general Randić index of a graph G is defined as $R\alpha(G) = \Sigma uv \in E(G)(dudv)\alpha$, where du and dv denote the degrees of the vertices u and v, respectively, α is a real number, and $E(G)$ is the edge set of G. The minimum number of edges of a graph G whose removal makes G as acyclic is known as the cyclomatic number and it is usually denoted by v. A graph with the maximum degree at most 4 is known as a chemical graph. For $v = 0, 1, 2$ and $\alpha > 1$, the problem of finding graph(s) with the minimum general Randić index $R\alpha$ among all n-vertex chemical graphs with the cyclomatic number v has already been solved. In this paper, this problem is solved for the case when $v \geq 3$, $n \geq 5(v - 1)$, and $1 < \alpha < \alpha 0$, where $\alpha 0 \approx 11.4496$ is the unique positive root of the equation $4(8\alpha - 6\alpha) + 4\alpha - 9\alpha = 0$. © 2023 Editura Academiei Romane. All rights reserved.
http://imar.ro/journals/Mathematical_Reports/Pdfs/2023/1/8.pdf

15. **Asghar, Z., Malik, A., Shamir, M. F., & Mofarreh, F. (2023). Comprehensive analysis of relativistic embedded class-I exponential compact spheres in f(R, φ) gravity via Karmarkar condition.** *Communications in Theoretical Physics,* **75(10). doi: 10.1088/1572-9494/acf123. Adnan Malik (Mathematics/KUSC) Date of Publication: October 2023 HJRS: X (Honorable Mention)**
In this article, we use the prominent Karmarkar condition to investigate some novel features of astronomical objects in the f(R, φ) gravity; R and φ represent the Ricci curvature and the scalar field, respectively. It is worth noting that we classify the exclusive set of modified field equations using the exponential type model of the f(R, φ) theory of gravity $f(R, \varphi) = \varphi(R + \alpha(e^{\beta R} - 1))$. We show the embedded class-I approach via a static, spherically symmetric spacetime with an anisotropic distribution. To accomplish our objective, we use a particular interpretation of metric potential (grr) that has already been given in the literature and then presume the Karmarkar condition to derive the second metric potential. We employ distinct compact stars to determine the values of unknown parameters emerging in metric potentials. To ensure the viability and consistency of our exponential model, we execute distinct physical evolutions, i.e. the graphical structure of energy density and pressure evolution, mass function, adiabatic index, stability, equilibrium, and energy

conditions. Our investigation reveals that the observed anisotropic findings are physically appropriate and have the highest level of precision.
https://iopscience.iop.org/article/10.1088/1572-9494/acf123/meta

16. **Asghar, Z., Shamir, M. F., Usman, A., & Malik, A. (2023). Study of embedded class-I fluid spheres in f(R,T) gravity with Karmarkar condition.** *Chinese Journal of Physics,* **83, 427-437. doi: 10.1016/j.cjph.2023.04.009. Adnan Malik (Mathematics/KUSC) Date of Publication: June 2023 HJRS: W (Bronze)**
In this article, we explore some emerging properties of the stellar objects in the frame of the f(R,T) gravity by employing the well-known Karmarkar condition, where R and T represent Ricci scalar and trace of energy momentum tensor respectively. It is worthy to highlight here that we assume the exponential type model of f(R,T) theory of gravity $f(R,T)=R+\alpha(e^{-\beta R}-1)+\gamma T$ along with the matter Lagrangian $L_m=-$[Formula presented](p_r+2p_t) to classify the complete set of modified field equations. We demonstrate the embedded class-I technique by using the static spherically symmetric line element along with anisotropic fluid matter distribution. Further, to achieve our goal, we consider a specific expression of metric potential g_{rr}, already presented in literature, and proceed by using the Karmarkar condition to obtain the second metric potential. In particular, we use four different compact stars, namely LMCX−4, EXO1785−248, CenX−3 and 4U1820−30 and compute the corresponding values of the unknown parameters appearing in metric potentials. Moreover, we conduct various physical evolutions such as graphical nature of energy density and pressure progression, energy constraints, mass function, adiabatic index, stability and equilibrium conditions to ensure the viability and consistency of our proposed model. Our analysis indicates that the obtained anisotropic outcomes are physically acceptable with the finest degree of accuracy.
https://www.sciencedirect.com/science/article/abs/pii/S0577907323000576

17. **Luqman, A., & Shahzadi, G. (2023). Multi-criteria group decision-making based on the interval-valued q-rung orthopair fuzzy SIR approach for green supply chain evaluation and selection.** *Granular Computing,* **8(6), 1937-1954. doi: 10.1007/s41066-023-00411-z. Gulfam Shahzadi (Mathematics/KUSC) Date of Publication: August 2023 HJRS: W (Bronze)**
The interval-valued q-rung orthopair fuzzy sets (IVq-ROFSs), considered as a new useful decision tool, possess a great ability to handle uncertain or vague knowledge in practical decision-making (DM). This paper introduces a novel IVq-ROF superiority and inferiority (IVq-ROF-SIR) technique combining with sine-trigonometric operational laws (STOLs). The proposed SIR method utilizes two kinds of information, the superiority and the inferiority information, to obtain two types of flows, including the superiority and the inferiority flows. Then, these flows are utilized to rank the set of alternatives partially or completely. Using sine-trigonometric functions and the flexibility of IVq-ROFSs, novel STOLs have been created. Further, we conduct a case study of green supplier selection (GSS) to demonstrate the feasibility and applicability of the developed technique. The main contributions of this article are as follows: (1) The aggregation operators for interval-valued q-rung orthopair fuzzy numbers and their characteristics have been studied under sine-trigonometric functions. (2) The SIR approach has been developed under IVq-ROFSs. The proposed technique is explained through an Algorithm as well as a flowchart. (3) Then, a case study of GSS is considered to apply the developed technique. (4) The results obtained have been compared with the ranking obtained through various existing techniques, including IVq-ROF TOPSIS method.
https://link.springer.com/article/10.1007/s41066-023-00411-z#article-info

18. **Mahboob, A., Asif, M., Zulqarnain, R. M., Siddique, I., Ahmad, H., Askar, S., & Pau, G. (2023). An Innovative Technique for Constructing Highly Non-Linear Components of Block Cipher for Data Security against Cyber Attacks.** *Computer Systems Science and Engineering,* **47(2), 2547-2562. doi: 10.32604/csse.2023.040855. Muhammad Asif (Mathematics/KUSC) Imran Siddique (Mathematics/SSC) Date of Publication: July 2023 HJRS: X (Clay)**
The rapid advancement of data in web-based communication has created one of the biggest issues concerning the security of data carried over the internet from unauthorized access. To improve data security, modern cryptosystems use substitution-boxes. Nowadays, data privacy has become a key concern for consumers who transfer sensitive data from one place to another. To address these problems, many companies rely on cryptographic techniques to secure data from illegal activities and assaults. Among these cryptographic approaches, AES is a well-known algorithm that transforms plain text into cipher text by employing substitution box (S-box). The S-box disguises the relationship between cipher text and the key to guard against cipher attacks. The security of a cipher using an S-box depends on the cryptographic strength of the respective S-box. Therefore, various researchers have employed different techniques to construct high order non-linear S-box. This paper provides a novel approach for evolving S-boxes using coset graphs for the action of the alternating group A_5 over the finite field and the symmetric group S_{256}. The motivation for this work is to study the symmetric group and coset graphs. The authors have performed various analyses against conventional security criteria such as nonlinearity, differential uniformity, linear probability, the bit independence criterion, and the strict avalanche criterion to determine its high cryptographic strength. To evaluate its image application

performance, the proposed S-box is also used to encrypt digital images. The performance and comparison analyses show that the suggested S-box can secure data against cyber-attacks.
https://www.techscience.com/csse/v47n2/53673

19. **Malik, A. (2023). Comprehensive study of cylindrical Levi-Civita and cosmic string solutions in Rastall theory of gravity.** *Chinese Journal of Physics,* **84, 357-370. doi: 10.1016/j.cjph.2023.05.020.** Adnan Malik (Mathematics/KUSC) Date of Publication: August 2023 HJRS: W (Bronze)

In this manuscript, the main aim is to investigate the cylindrically symmetric solutions in a well known Rastall theory of gravity. For this purpose, we consider the cylindrically symmetric space–time to discuss the cylindrical solutions in some realistic regions. First, we investigate four distinct cases of exact solutions using the field equations of Rastall theory of gravity. Furthermore, we set some suitable values of the Rastall coupling constant (λ) for the investigation of well-known Levi-Civita and cosmic string solutions. The Energy conditions are also investigated for all different cases and observed that null energy conditions are violated, which is the indication of the existence of cylindrical wormholes.
https://www.sciencedirect.com/science/article/abs/pii/S0577907323000862

20. **Malik, A. , Arif, A., & Shamir, M. F. (2023). Anisotropic compact stars in f(R , A) gravity including charge with exterior Reissner-Nordstrom spacetime.** *International Journal of Theoretical Physics,* **62(11). doi: 10.1007/s10773-023-05499-2.** Adnan Malik (Mathematics/KUSC) Date of Publication: November 2023 HJRS: X (Clay)

The aim of this manuscript is to investigate the charged anisotropic compact stars in f(R, A) theory of gravity, namely Ricci-Inverse gravity. By employing the Karmarkar condition, we construct relativistic anisotropic static spherically symmetric solutions using a particular Adler model for the gtt metric potential (1974). The exterior geometry is derived following the Reissner-Nordstrom spacetime. A series of physical analysis, including energy density, pressure elements, and energy conditions, anisotropy, as well as mass-radius relation, compactness and redshift activity, are conducted to assess the viability of the Ricci-Inverse gravity model. Our paper discuss the effectiveness of the f(R, A) gravity model in describing charged anisotropic compact stars provides significant support for massive stars and proves to be suitable for our chosen model.
https://link.springer.com/article/10.1007/s10773-023-05499-2

21. **Malik, A., Asghar, Z., & Shamir, M. F. (2023). Krori–Barua Bardeen compact stars in f(R,T) gravity.** *New Astronomy,* **104. doi: 10.1016/j.newast.2023.102071.** Adnan Malik (Mathematics/KUSC) Date of Publication: November 2023 HJRS: X (Clay)

The current study emphasizes the impact of electric charge for static spherically symmetric stellar structures using isotropic distribution in f(R,T) theory of gravity. For this purpose, we assume the Krori–Barua metric potential, $v(r)=Br^2+C$ and $\lambda(r)=Ar^2$, where A,B and C are the unknowns constants. The simplified phenomenological MIT bag equation of state, [Formula presented], and a precise form of electrical charge distribution [Formula presented] to be evaluated for the solution of Einstein–Maxwell field equations. To get the value of unknown parameters of the compact structures, we compare the Krori–Barua spacetime to external Bardeen geometry. Moreover, we examine the physical attributes of compact objects by presuming three viable f(R,T) models. We analyze the graphical behavior of density and pressure, the Tolman–Oppenheimer–Volkov equation, energy conditions, mass function, surface redshift, and adiabatic index. It is recognized that all the obtained results deliver emphatic evidence for the stability of our considered realistic stars.
https://www.sciencedirect.com/science/article/abs/pii/S1384107623000726

22. **Malik, A., Ashraf, A., Mofarreh, F., Ali, A., & Shoaib, M. (2023). Embedding procedure and wormhole solutions in Rastall gravity utilizing the class I approach.** *International Journal of Geometric Methods in Modern Physics,* **20(9). doi: 10.1142/S0219887823501451.** Adnan Malik (Mathematics/KUSC) Date of Publication: August 2023 HJRS: X (Clay)

This paper investigates the wormhole solutions in Rastall theory of gravity using the Karmarkar conditions. For this purpose, we choose a shape function (SF) that connects two asymptotically flat regions. We also discuss the wormhole configuration by plotting three-dimensional (3D) analysis of the embedding diagram in Euclidean space. Furthermore, we also observe the detailed graphical representation of energy conditions using the considered SF. The violation of energy conditions, especially null energy conditions (NEC), indicates the existence of exotic matter and wormholes. Hence, it can be concluded that our calculated results in the background of Rastall theory of gravity are viable and stable. The exciting feature of this work is the 3D analysis to discuss the viability of wormhole geometry.
https://www.worldscientific.com/doi/abs/10.1142/S0219887823501451

23. **Malik, A., Meer, E., Asghar, Z., & Ali, A. (2023). Stellar structure modeling in Ricci-inverse gravity with Tolman–Kuchowicz spacetime.** *Chinese Journal of Physics,* **86, 391-401. doi: 10.1016/j.cjph.2023.10.025. Adnan Malik (Mathematics/KUSC) Date of Publication: December 2023** HJRS: W (Bronze)

The primary objective of this research is to conduct an extensive investigation of stellar compact structures within the frame of the newly proposed Ricci-Inverse theory of gravity. The study utilizes the Tolman–Kuchowicz spacetime to explore these relativistic stars. In this work, we derive the modified field equations for a spherically symmetric line element with an isotropic matter distribution. To ensure physical validity, we consider appropriate expressions for the metric potentials i.e., $\varepsilon = Br^2 + 2\ln(X)$ and $\vartheta = \ln(1 + ar^2 + br^4)$. In order to determine the unknown parameters, we employ observational evidence from star models such as 4U1538−52, LMCX−4, EXO1785−248, 4U1820−30, and VelaX−1. Next, we examine and discuss the graphical behavior of several key parameters, including energy density and pressure, adiabatic index, equation of state, redshift function, and stability analysis. The observed behavior of these attributes aligns with accepted physical properties, and the emerging outcomes fall within the observed range. This demonstrates the viability of our proposed Ricci-Inverse gravity model.

https://www.sciencedirect.com/science/article/abs/pii/S057790732300206X

24. **Malik, A., Naz, T., Qadeer, A., Shamir, M. F., & Yousaf, Z. (2023). Investigation of traversable wormhole solutions in modified f(R) gravity with scalar potential.** *European Physical Journal C,* **83(6). doi: 10.1140/epjc/s10052-023-11704-7. Adnan Malik (Mathematics/KUSC) Date of Publication: June 2023** HJRS: W (Platinum)

The objective of this manuscript is to investigate the traversable wormhole solutions in the background of the $f(R, \varphi)$ theory of gravity, where R is the Ricci scalar and φ is the scalar potential respectively. For this reason, we use the Karmarkar criterion for traversable static wormhole geometry to create a wormhole shape function. The suggested shape function creates wormhole geometry that links two asymptotically flat spacetime regions and meets the necessary requirements. The embedding diagram in three-dimensional Euclidean space is also discussed in order to demonstrate the wormhole configurations. For our current analysis, we choose the suitable values of free parameters for $f(R, \varphi)$ gravity models to discuss the wormhole geometry. It can be observed that our proposed shape function provides the wormhole solutions with less amount of exotic matter. It can be noticed that energy conditions especially null energy conditions are violated for all considered models. The violation of energy conditions indicates the existence of exotic matter and wormhole geometry. It is concluded that the shape function acquired through the Karmarkar technique yields validated wormhole configurations with even less exotic matter correlating to the chosen $f(R, \varphi)$ gravity models.

https://link.springer.com/article/10.1140/epjc/s10052-023-11704-7

25. **Malik, A., Naz, T., Tariq, A., Yousaf, Z., Alkhaldi, A. H., & Shahzad, M. U. (2023). Anisotropic strange quintessence stars in modified f (R, φ) theory of gravity.** *International Journal of Geometric Methods in Modern Physics.* **doi: 10.1142/S0219887824400036. Adnan Malik (Mathematics/KUSC) Date of Publication: November 2023** HJRS: X (Clay)

This paper investigated the anisotropic quintessence stars in the $f(R, \phi)$ theory of gravity, where R is the Ricci scalar and ϕ is the scalar potential. We investigated the field equations of the $f(R, \phi)$ theory of gravity by using the Krori-Barua technique. We have determined that all the obtained solutions are free from central singularity and potentially stable. The observed values of mass and radius of the different strange stars Her X1, SAXJ1808.4-3658, and 4U1820-30 have been used to calculate the values of unknown constants in the Krori and Barua metric. The physical phenomena of stars, such as energy density, pressure components, anisotropy, sound speeds, equation of state parameters, energy conditions and redshift have been investigated in detail.

https://www.worldscientific.com/doi/abs/10.1142/S0219887824400036

26. **Malik, A., Naz, T., Yousaf, Z., Almas, A., & Saleem, K. (2023). Singularity-free anisotropic compact star in f (R, φ) gravity via Karmarkar condition.** *International Journal of Geometric Methods in Modern Physics.* **doi: 10.1142/S021988782450018X. Adnan Malik (Mathematics/KUSC) Date of Publication: September 2023** HJRS: X (Clay)

In this paper, we explore some emerging properties of the stellar objects in the frame of the $f(R, \phi)$ gravity by employing the well-known Karmarkar condition, where R and ϕ represent the Ricci scalar and scalar potential, respctively. We demonstrate the embedded class-I technique by using the static spherically symmetric line element along with anisotropic fluid matter distribution. Furthermore, to achieve our goal, we take a specific expression of metric potential grr, already presented in the literature, and proceed by using the Karmarkar condition to obtain the second metric potential. To get the value of unknown parameters of the compact structures, we compare the Krori-Barua spacetime with spherically symmetric spacetime. Moreover, we examine the physical attributes of compact objects by presuming three viable $f(R, \phi)$ models. We analyze the graphical behavior of density and pressure, the Tolman-Oppenheimer-Volkoff equation, energy conditions,

mass function, surface redshift, and adiabatic index. It is recognized that all the obtained results deliver emphatic evidence for the stability of our considered realistic stars.
https://www.worldscientific.com/doi/abs/10.1142/S021988782450018X

27. **Malik, A.,** Shafaq, A., Koussour, M., & Yousaf, Z. (2023). Development of local density perturbation technique to identify cracking points in f(R, T) gravity. *European Physical Journal C,* 83(9). doi: 10.1140/epjc/s10052-023-11996-9. Adnan Malik (Mathematics/KUSC) Date of Publication: September 2023 HJRS: W (Platinum)
This paper investigate the impacts of local density perturbations on the stability of self-gravitating compact objects by utilizing cracking technique within the context of f(R, T) gravity, where R and T represent the Ricci scalar, and the trace of energy–momentum, respectively. To achieve this, we developed the hydrostatic equilibrium equation for spherically symmetric spacetime with anisotropic matter configuration and subsequently applied the Krori–Barua spacetime coefficient. Subsequently, the hydrostatic equilibrium equation of the configuration is perturbed by employing the local density perturbations to the system, while considering a barotropic equation of state. To ascertain the validity of the proposed technique, we applied it to several compact stars, including, Her X-1, SAX J1808.4-3658, 4U 1820-30, PSR J1614-2230, Vela X-1, Cen X-3, and RXJ1856-37 and found that all the considered stars exhibit cracking or overturning. This study conclusively highlights the significance of the cracking technique in providing valuable insights into the stability analysis of self-gravitating compact objects.
https://link.springer.com/article/10.1140/epjc/s10052-023-11996-9?utm_medium=cpc&utm_source=trendmd&utm_content=paid&utm_term=null&utm_campaign=MPSR_OAJRN_AWA1_GL_MPAS_01WN0_CONTI-TMD_Springer

28. **Malik, A.,** Shafaq, A., Naz, T., & Al-khaldi, A. H. (2023). A comprehensive discussion for the identification of cracking points in f(R) theories of gravity. *European Physical Journal C,* 83(8). doi: 10.1140/epjc/s10052-023-11940-x. Adnan Malik (Mathematics/KUSC) Date of Publication: August 2023 HJRS: W (Platinum)
This paper investigates the concept of cracking and overturning to analyze the impact of local density perturbations on the stability of self-gravitating compact objects in the framework of f(R, φ, X) theory of gravity, where R, φ , and X denote the Ricci scalar, scalar potential, and kinetic term, respectively. In this context, we developed the hydrostatic equilibrium equation for spherically symmetric spacetime with anisotropic matter configuration and subsequently employed the Krori Barua technique. We then perturb the hydrostatic equilibrium state of the configuration by employing the local density perturbation technique, while taking into account the barotropic equation of state. To validate this technique, we employed it on different compact stars namely, Her X-1, SAX J1808.4-3658, 4U 1820-30, PSR J1614-2230, Vela X-1, and Cen X-3, and found that all stars exhibit cracking or overturning for a specific range of model parameters. Conclusively, this study emphasizes that the proposed cracking technique provides significant insights into the stability analysis of self-gravitating compact objects.
https://link.springer.com/article/10.1140/epjc/s10052-023-11940-x

29. **Malik, A**., Shahzad, M. U., Naz, T., Zulqarnain, R. M., & Sultana, A. (2023). Relativistic tolman stellar spheres in f (R, φ) theory of gravity. *International Journal of Geometric Methods in Modern Physics.* doi: 10.1142/S0219887824500555. Adnan Malik (Mathematics/KUSC) Date of Publication: October 2023 HJRS: X (Clay)
In this study, we investigate the literature on anisotropic stellar spheres in f(R,φ) gravity utilizing Tolman-Kuchowicz (TK) spacetime. Due to the existence of anisotropic matter distribution, we derive the equations of motion for spherically symmetric spacetime by taking into account physically accurate formulations of the metric potentials. For this purpose, we develop the matching conditions by comparing them with the exterior solution to determine the TK constants. We have also discussed the graphical analysis of energy density, pressure components, equation of state components, equilibrium condition, and stability analysis. Moreover, other properties of a compact star, like the mass-radius function, compactness, and redshift function, have also been investigated. It is also noticed that energy conditions are satisfied, which justifies that our considered stars are viable. The validity of our proposed model has been proven by studying the development of various physical characteristics, and it is determined that our system is physically stable and free of any singularities.
https://www.worldscientific.com/doi/abs/10.1142/S0219887824500555

30. **Malik, A**., W., Zahid, A. H., Bhatti, D. S., Kim, H. J., & Kim, K. I. (2023). Designing S-Box Using Tent-Sine Chaotic System while Combining the Traits of Tent and Sine Map. *IEEE Access,* 11, 79265-79274. doi: 10.1109/ACCESS.2023.3298111. Adnan Malik (Mathematics/KUSC) Date of Publication: July 2023 HJRS: W (Silver)
Secure exchange of sensitive information between different entities is a serious challenge in today's environment. Therefore, various cryptosystems have been created specifically for this purpose. Various operations are used in these cryptosystems. The most common operations used are substitution and permutation. The substitution-box (S-box), a look-up table that takes x bits as input and replaces them with y

bits, is responsible for the substitution operation. The construction of an S-box with strong cryptographic attributes is an essential part of building a robust and secure cryptosystem.Numerous researchers have dedicated their efforts to devising intricate techniques for constructing S-boxes. In this study, a novel approach is proposed to design a robust and dynamic S-box based on a compound-chaotic map. The suggested method for constructing the S-box is characterized by its simplicity and resilience. Notably, the Tent-Sine chaotic system significantly expands the chaotic range, setting it apart from other chaotic systems and rendering it more suitable for cryptographic applications. This research introduces a promising avenue for enhancing the security and effectiveness of S-boxes, contributing to the advancement of cryptographic systems. A number of widely accepted metrics, such as Non-Linearity (NL), Strict Avalanche Criterion (SAC), Bit Independence Criterion (BIC), Linear Probability (LP), and Differential Probability (DP), are extensively exercised for the analysis and evaluation of the proposed S-Box's cryptographic strength. The results of the proposed of S-box are compared with the S-boxes of other researchers, and it is observed that it is cryptographically sound and worthy of inclusion in modern cryptosystems.

https://ieeexplore.ieee.org/abstract/document/10190570

31. **Naz, T., Malik, A., Asif, M. K., & Fayyaz, I. (2023). Evolving embedded traversable wormholes in f(R,G) gravity: A comparative study.** *Physics of the Dark Universe,* **42. doi: 10.1016/j.dark.2023.101301. Adnan Malik (Mathematics/KUSC) Date of Publication: July 2023 HJRS: W (Silver)**

The objective of this paper is to unveil the evolving traversable wormhole solutions within the perspective of modified �(�,�) gravity, where � is Ricci scalar and � is Gauss Bonnet term. In order to accomplish this, we develop a wormhole shape function using the Karmarkar condition for traversable static wormhole geometry, that links two asymptotically flat spacetime regions and meets the necessary requirements. The embedding diagram in two and three-dimensional Euclidean space is also discussed in order to demonstrate the wormhole configurations. For our current study, we choose two realistic and viable �(�,�) gravity models to discuss the wormhole geometry. For the traversable wormhole configurations the energy conditions must be satisfied at the throat. For this purpose, we check the energy conditions and observed that these conditions are satisfied near the throat of the wormhole space in modified �(�,�) gravity. Further, the intriguing part of this research is to perform a comparative analysis of the evolving wormhole geometries of our considered models with the help of three-dimensional graphical representation along with their regions. Moreover, we also describe the stability of obtained wormholes solutions by employing the equilibrium condition. It can be observed that our shape function acquired through the Karmarkar technique yields validated wormhole configurations with even less exotic matter correlating to the proper choice of �(�,�) gravity models. As a nutshell, we can infer that our findings fulfill all of the criterion for the presence of traversable wormhole, ensuring that our study is viable and consistent.

https://www.sciencedirect.com/science/article/abs/pii/S2212686423001358?via%3Dihub

32. **Naz, T., Malik, A., Gillani, D., & Mofarreh, F. (2023). Relativistic configurations of Tolman stellar spheres in f(G,T) gravity.** *International Journal of Geometric Methods in Modern Physics,* **20(13). doi: 10.1142/S0219887823502225. Adnan Malik (Mathematics/KUSC) Date of Publication: 2023 HJRS: X (Clay)**

This study is devoted to investigate the formation of compact stars using Tolman-Kuchowicz space-time in $f(\mathcal{G},\mathcal{T})$ gravity. By taking into account the physically reliable formulations of metric potentials, ξ = Br2 + 2lnC and η = ln(1 + ar2 + br4), we investigate the equation of motion for spherically symmetric space-time in the presence of an anisotropic matter distribution. Furthermore, matching conditions are employed to compute the unknown constants. By making use of dynamical equations, the pivotal relevant aspects, including energy density, radial and tangential pressures, dynamical equilibrium, anisotropy effect, energy conditions and stability, are physically tested in order to determine the physical acceptability of yielding celestial model, which are thoroughly compared with experimental facts and figures of ten different compact stars. Finally, we observe that obtained anisotropic outcomes are physically viable, free from geometrical and physical singularities. Moreover, these outcomes also provide circumstantial evidence for the existence of super-massive compact stars.

https://ui.adsabs.harvard.edu/abs/2023IJGMM..2050222N/abstract

33. **Rashid, A., Malik, A., & Shamir, M. F. (2023). A comprehensive study of Bardeen stars with conformal motion in f(G) gravity.** *European Physical Journal C,* **83(11). doi: 10.1140/epjc/s10052-023-12141-2. Adnan Malik (Mathematics/KUSC) Date of Publication: November 2023 HJRS: W (Gold)**

In this manuscript, we use the conformal killing vectors to solve the Einstein–Maxwell field equations in the background of modified gravity. We consider the observational data for four different stars namely, and respectively. By using the data, we derive the physical parameters from the matching criteria using conformal killing vectors and the exterior Bardeen geometry. Furthermore, several physical properties of compact stellar structures are examined in order to achieve the physical validity and stability for considered models. The graphical analysis including energy density, pressure components, equation of state parameters, and energy conditions are examined. Moreover, the equilibrium conditions through Tolman–Oppenheimer–Volkoff

equation and stability criteria through adiabatic index for the charged stellar structure study are investigated. It is worth noting that all of these compact objects are physically viable and stable under conformal motion in context of Bardeen geometry for two different models of theory of gravity. Conclusively, the results show that f(G) gravity with Bardeen model may provide more massive stellar objects as compared to general relativity.
https://link.springer.com/article/10.1140/epjc/s10052-023-12141-2#Abs1

34. **Saleem, M., & Hussain, M. (2023). Dual solutions of Williamson-Casson fluid over a heated exponentially shrinking surface with stability analysis: A novel Catteneo-Christov heat flux model combination.** *Numerical Heat Transfer; Part A: Applications.* **doi: 10.1080/10407782.2023.2252583. Musharafa Saleem (Mathematics/KUSC) Date of Publication: September 2023** HJRS: X (Honorable Mention)
Background: In this study, the effects of mixed convective, thermally radi-ating, magnetized flow of a Williamson-Casson fluid (WCF) over an expo-nentially shrinking surface in a porous material are investigated. The influences of heat generation-absorption, Joule heating, and a unique Catteneo-Christov (CC) heat flux model are examined, deviating from trad-itional research approaches. Methods: To analyze the fluid flow, nonlinear partial differential equations (PDEs) governing the system are transformed into ordinary differential equations (ODEs) through similarity transformations and nondimensional variables. The resulting ODEs are solved using the BVP4C technique, yield-ing dual solutions for a range of the parameter $Sv\frac{1}{4}3{:}0$.
https://www.tandfonline.com/doi/full/10.1080/10407782.2023.2252583

35. **Saleem, M., Hussain, M., & Inc, M. (2023). Significance of Darcy–Forchheimer law and magnetic field on the comparison of Williamson–Casson fluid subject to an exponential stretching sheet.** *International Journal of Modern Physics B,* **37(27). doi: 10.1142/S0217979223503150. Musharafa Saleem (Mathematics/KUSC) Date of Publication: October 2023** HJRS: X (Null)
Non-Newtonian fluid mechanics is becoming more and more relevant as time marches on due to the increasing number of fluids encountered in everyday life that exhibit non-Newtonian behavior. It is our intention to cover the multitude of aspects of non-Newtonian fluid mechanics: The effects of magnetohydrodynamic (MHD) laminar boundary layer flow with heat and concentration transfers are considered in the case of Darcy–Forchheimer Williamson–Casson fluids installed over an exponentially extending sheet. There has been an examination and comparison of the effects of momentum fields, thermal radiation, Joule heating, suction/injection, and compound responses. By using a suitable closeness change, the boundary conditions (BCs) and partial differential equations (PDEs) are reduced to dimensionless structures. The following set of ordinary differential equations (ODEs) and associated BCs are to be clarified using the bvp4c technique. The investigation's findings indicate that boundary layer thicknesses for velocity, temperature, and concentration normally decline as we get farther from the sheet's edge, and it is discovered that the Williamson–Casson parameter interferes with velocity profiles. Graphs are developed for Darcy–Forchheimer Fc��, magnetic parameter *M*, Lewis number *Le*, radiation parameter Rc��, porosity parameter Da��, and Eckert number Ec��. The numeric values of $-2Rex----\sqrt{C}fx-2Re$���� and $-\theta'(0)-$�$'(0)$ are validated with available data and found to be in excellent agreement.
https://www.worldscientific.com/doi/abs/10.1142/S0217979223503150

36. **Saleem, M., Hussain, M., Ould Sidi, M., Iqbal, Z., & Alqahtani, B. (2023). Numerical examination of the Darcy–Forchheimer Casson model with instigation energy and second-order momentum slip: Thermal features.** *Numerical Heat Transfer, Part B: Fundamentals.* **doi: 10.1080/10407790.2023.2257881. Musharafa Saleem (Mathematics/KUSC) Date of Publication: September 2023** HJRS: X (Null)
In this study, the Darcy–Forchheimer model is examined in relation to magnetohydrodynamic (MHD) Casson fluid flow over a stretchable expo-nential surface. The investigation incorporates several factors not previ-ously considered, including Arrhenius activation/instigation energy, second- order slip, Joule heating, thermal radiation, viscous dissipation, and chem-ical reactions. The Darcy–Forchheimer model is employed to characterize flows within permeable materials under the influence of instigation energy. Additionally, we analyze the electrically conducting flows induced by an exponentially stretched and dissipated sheet. To transform the partial dif-ferential equations (PDEs) into ordinary differential equations (ODEs), appropriate similarity transformations are applied. Numerical and graphical results are presented using the Lobatto IIIA technique across various sys-tem scenarios, demonstrating the effectiveness of this approach as a reli-able, accurate, and viable solver. Through the utilization of the BVP4C technique in MATLAB, a numerical representation of the formulation is achieved. Graphs are generated, illustrating the variations in ongoing parameters such as concentration velocity. This velocity increases with higher values of E and C, but decreases with r:The fluid temperature rises with larger values of R, and it responds positively to first-order slip while decreasing with second-order slip
https://www.tandfonline.com/doi/full/10.1080/10407790.2023.2257881

37. Saleem, M., & Tufail, M. N. (2023a). Analysis of an aligned magnetic nano-Casson fluid flow along with bio-convection based on Stefan's blowing. *Physica Scripta,* **98(9). doi: 10.1088/1402-4896/acf0f7. Musharafa Saleem (Mathematics/KUSC) Date of Publication: August 2023 HJRS: X (Honorable Mention)**

This theoretical study illustrates the effect of an inclined stretching sheet with bio-mixed convection, aligned magnetohydrodynamics (MHD), porous medium, Joule heating, viscous dissipation, the Buongiorno nanofluid model, and chemical reaction effects. Stefan blowing (SB) and partial slips, as well as our presumptions and laws, like the conservation of mass, momentum, and energy, must all be taken into consideration when solving our partial differential equations (PDEs). Similarity transformations are used in the context of a gyro-tactic motile microorganism flowing through an inclined stretched surface to produce ordinary differential equations (ODEs). The BVP4C method generates numerical results for different parameters through MATLAB programming. Additionally, a numerical and graphical exploration of the effects of numerous developing variables on the velocity, temperature, concentration, and density of motile bacteria is done. To verify the accuracy of the numerical model, the findings of the numerical research are compared to experimental data. Microbial distribution decreases with both negative and positive SB (suction and injection) attitudes, as indicated by the Peclet number and microbe movement coefficient. The mobility of microorganisms increases with higher values of the Lewis number, which governs their motility. The Lewis number and chemical reaction parameters affect the volume fraction transfer during the flow of the nano-Casson fluid in both the suction and injection cases of the SB effect, leading to increased concentration transfer.
https://iopscience.iop.org/article/10.1088/1402-4896/acf0f7/meta

38. Saleem, M., & Tufail, M. N. (2023b). Analysis of the unsteady upper-convected Maxwell fluid having a Cattaneo–Christov heat flux model via two-parameters Lie transformations. *Indian Journal of Physics.* **doi: 10.1007/s12648-023-02929-z. Musharafa Saleem (Mathematics/KUSC) Date of Publication: September 2023 HJRS: X (Clay)**

The study investigates the dynamics of an upper-convected Maxwell fluid flow within the framework of magnetohydrodynamics (MHD) over an stretching surface. The analysis incorporates the Cattaneo–Christov heat flux model to explore the system's thermal behavior. The inclusion of thermal radiation, heat generation-absorption, and suction-injection effects significantly augments the thermal characteristics. Despite its linear nature, the system demonstrates a pronounced level of nonlinearity in its temporal behavior. Through the application of a two-parameter Lie method, nonlinear partial differential equations (PDEs) are transformed into ordinary differential equations (ODEs). This method amalgamates three independent variables into a single independent similarity variable, n. Graphical representations are employed for momentum and thermal analyses, and the ODEs are numerically solved using the bvp4c function in MATLAB. The model's validity is confirmed through tables and graphs with a consistent assessment. An increase in Hartmann number Ms boosts the system's internal energy but slows down fluid velocity. The momentum Deborah number b1 escalates velocity amplitude but decreases fluid temperature over time, whereas the heat Deborah number b2 results in a decrease in fluid temperature.
https://link.springer.com/article/10.1007/s12648-023-02929-z

39. Ullah, A., Zaman, S., Hussain, A., Jabeen, A., & Belay, M. B. (2023). Derivation of mathematical closed form expressions for certain irregular topological indices of 2D nanotubes. *Scientific Reports,* **13(1). doi: 10.1038/s41598-023-38386-1. Asma Jabeen (Mathematics/KUSC) Date of Publication: July 2023 HJRS: W (Platinum)**

A numeric quantity that characterizes the whole structure of a network is called a topological index. In the studies of QSAR and QSPR, the topological indices are utilized to predict the physical features related to the bioactivities and chemical reactivity in certain networks. Materials for 2D nanotubes have extraordinary chemical, mechanical, and physical capabilities. They are extremely thin nanomaterials with excellent chemical functionality and anisotropy. Since, 2D materials have the largest surface area and are the thinnest of all known materials, they are ideal for all applications that call for intense surface interactions on a small scale. In this paper, we derived closed formulae for some important neighborhood based irregular topological indices of the 2D nanotubes. Based on the obtained numerical values, a comparative analysis of these computed indices is also performed.
https://www.nature.com/articles/s41598-023-38386-1#Abs1

40. Yousaf, Z., Bhatti, M. Z., Aman, H., & Malik, A. (2023). Bouncing Cosmology with 4D-EGB Gravity. *International Journal of Theoretical Physics,* **62(7). doi: 10.1007/s10773-023-05409-6. Adnan Malik (Mathematics/KUSC) Date of Publication: July 2023 HJRS: X (Clay)**

Not long ago, a novel gravitational scheme i.e, 4D – EGB (Einstein-Gauss-Bonnet) gravity have been proposed by Glavan and Lin 2020. They rescaled the coupling factor α with α D–4 and developed the field equations. The purpose of this paper is to workout the cosmic bounce with a cubic form of scale factor and workout the bouncing scenario under these assumptions. The flat FLRW metric is used along with the perfect fluid to study the energy conditions. The conditions are scrutinized by using different coupling factors α and cosmological

constant values. The stability of the assumed scale factor model is in evidence of universal expansion and allows the universal bounce by developing the validations of energy conditions.
https://link.springer.com/article/10.1007/s10773-023-05409-6

41. **Yousaf, Z., Bhatti, M. Z., Khan, S., Malik, A., Alrebdi, H. I., & Abdel-Aty, A. H. (2023). Stability of Anisotropy Pressure in Self-Gravitational Systems in f(G) Gravity.** *Axioms,* **12(3). doi: 10.3390/axioms12030257. Adnan Malik (Mathematics/KUSC) Date of Publication: March 2023 HJRS: X (Clay)**
This investigation aims to explore certain variables which are considered responsible for generating pressure anisotropy in dynamical spherically symmetric stellar systems against the background of the stringy-inspired Gauss–Bonnet modification of general relativity. We explore the hydrostatic equilibrium of self-gravitating systems by taking into account the modified form of Tolman–Oppenheimer–Volkoff for the quadratic-$(\mathcal{G})$ gravitational model. In this respect, we formulate a differential equation in terms of the Weyl curvature scalar, also described as an evolution equation, which is essential for understanding the evolution of the stellar structure. Finally, we conclude that the existence of some fluid variables such as shear, heat flux and the irregular behavior of energy density in the presence of an extra degree $f(\mathcal{G})$
-terms in the fluid flow that are the elements that cause anisotropy in the initially isotropic stellar structure. The comparison of the presented results with those of the classical model shows that they are physically relevant and compatible.
https://www.mdpi.com/2075-1680/12/3/257

42. **Zulqarnain, R. M., Siddique, I., Ali, R., Jarad, F., & Iampan, A. (2023a). AggregationOperators for Interval-Valued Pythagorean FuzzyHypersoft Set with Their Application to SolveMCDMProblem.** *CMES - Computer Modeling in Engineering and Sciences,* **135(1), 619-651. doi: 10.32604/cmes.2022.022767. Rana Muhammad Zulqarnain, Imran Siddique (Mathematics/KUSC) Date of Publication: March 2023 HJRS: X (Clay)**
Experts use Pythagorean fuzzy hypersoft sets (PFHSS) in their investigations to resolve the indeterminate and imprecise information in the decision-making process. Aggregation operators (AOs) perform a leading role in perceptivity among two circulations of prospect and pull out concerns from that perception. In this paper, we extend the concept of PFHSS to interval-valued PFHSS (IVPFHSS), which is the generalized form of interval-valued intuitionistic fuzzy soft set. The IVPFHSS competently deals with uncertain and ambagious information compared to the existing interval-valued Pythagorean fuzzy soft set. It is the most potent method for amplifying fuzzy data in the decision-making (DM) practice. Some operational laws for IVPFHSS have been proposed. Based on offered operational laws, two inventive AOs have been established: interval-valued Pythagorean fuzzy hypersoft weighted average (IVPFHSWA) and interval-valued Pythagorean fuzzy hypersoft weighted geometric (IVPFHSWG) operators with their essential properties. Multi-criteria group decision-making (MCGDM) shows an active part in contracts with the difficulties in industrial enterprise for material selection. But, the prevalent MCGDM approaches consistently carry irreconcilable consequences. Based on the anticipated AOs, a robust MCGDM technique is deliberate for material selection in industrial enterprises to accommodate this shortcoming. A real-world application of the projected MCGDM method for material selection (MS) of cryogenic storing vessels is presented. The impacts show that the intended model is more effective and reliable in handling imprecise data based on IVPFHSS.
https://cdn.techscience.cn/ueditor/files/cmes/TSP_CMES-135-1/TSP_CMES_22767/TSP_CMES_22767.pdf

43. **Zulqarnain, R. M., Siddique, I., Ali, R., Jarad, F., & Iampan, A. (2023b). Einstein Weighted Geometric Operator for Pythagorean Fuzzy Hypersoft with Its Application in Material Selection.** *CMES - Computer Modeling in Engineering and Sciences,* **135(3), 2557-2583. doi: 10.32604/cmes.2023.023040. Rana Muhammad Zulqarnain, Imran Siddique (Mathematics/KUSC) Date of Publication: March 2023 HJRS: X (Clay)**
Hypersoft set theory is a most advanced form of soft set theory and an innovative mathematical tool for dealing with unclear complications. Pythagorean fuzzy hypersoft set (PFHSS) is the most influential and capable leeway of the hypersoft set (HSS) and Pythagorean fuzzy soft set (PFSS). It is also a general form of the intuitionistic fuzzy hypersoft set (IFHSS), which provides a better and more perfect assessment of the decision-making (DM) process. The fundamental objective of this work is to enrich the precision of decision-making. A novel mixed aggregation operator called Pythagorean fuzzy hypersoft Einstein weighted geometric (PFHSEWG) based on Einstein's operational laws has been developed. Some necessary properties, such as idempotency, boundedness, and homogeneity, have been presented for the anticipated PFHSEWG operator. Multi-criteria decision-making (MCDM) plays an active role in dealing with the complications of manufacturing design for material selection. However, conventional methods of MCDM usually produce inconsistent results. Based on the proposed PFHSEWG operator, a robust MCDM procedure for material selection in manufacturing design is planned to address these inconveniences. The expected MCDM method for material selection (MS) of cryogenic storing vessels has been established in the real world. Significantly, the planned model for handling inaccurate data based on PFHSS is more operative and consistent.
https://cdn.techscience.cn/ueditor/files/cmes/TSP_CMES-135-3/TSP_CMES_23040/TSP_CMES_23040.pdf

44. **Wang, D., Koussour, M., Malik, A., Myrzakulov, N., & Mustafa, G. (2023). Observational constraints on a logarithmic scalar field dark energy model and black hole mass evolution in the Universe.** *European Physical Journal C,* 83(7). doi: 10.1140/epjc/s10052-023-11744-z. **Adnan Malik (Mathematics/KUSC) Date of Publication: July 2023 HJRS: W (Platinum)**

We propose a logarithmic parametrization form of energy density for the scalar field dark energy in the framework of the standard theory of gravity, which supports the necessary transition from the decelerated to the accelerated behavior of the Universe. The model under consideration is constrained by available observational data, including cosmic chronometers data-sets (CC), Baryonic Acoustic Oscillation (BAO) data-sets, and Supernovae (SN) datasets, consisting of only two parameters α and β. The combined CC+BAO+SN data-sets yields a transition redshift of $z_{tr} = 0.79+0.02 -0.02$, where the model exhibits signature-flipping and is consistent with recent observations. For the combined data-sets, the present value of the deceleration parameter is calculated to be $q_0 = -0.43+0.06 -0.06$. Furthermore, the analysis yields constraints on both the parameter density value for matter and the present value of the Hubble parameter, with values of $m_0 = 0.25849+0.00026 -0.00025$ and $H_0 = 67.79+0.59 -0.59$ km/s/Mpc, respectively, consistent with the results obtained from Planck 2018. Finally, the study investigates how the mass of a black hole evolves over time in a Universe with both matter and dark energy. It reveals that the black hole mass increases initially but stops increasing as dark energy dominates.

https://link.springer.com/article/10.1140/epjc/s10052-023-11744-z

Department of Chemistry

1. **Aziz, T., Nasim, H. A., Ahmad, K., Parveen, S., Ahmad, M. M., Majeed, H., ... & Ashfaq, M. (2023). Rational synthesis, biological screening of azo derivatives of chloro-phenylcarbonyl diazenyl hydroxy dipyrimidines/thioxotetrahydropyrimidines and their metal complexes.** *Heliyon*, 9(1).doi: 10.1016/j.heliyon.2022.e12492. **Khalil Ahmad, Hammad Majeed (Chemistry/KUSC) Date of publication: January 2023 HJRS: W (Silver)**

Herein, a new series of azo ligands HL-1 (5-(2-chloro-6-(phenylcarbonyl)phenyl)diazenyl)-6-hydroxydihydropyrimidines-2,4dione), HL-2 (5-(2-chloro-6-(phenylcarbonyl)phenyl)diazenyl)-6-hydroxy-2-thioxottetrahydropyrimidin-4one), HL-3 (5-(2,4-dichloro-6-(phenylcarbonyl)phenyl) diazenyl)-6-hydroxydihydropyrimidines-2,4dione), HL-4 (5-(2,4-dichloro-6-(phenylcarbonyl) phenyl)diazenyl)-6-hydroxy-2-thioxotetrahydropyrimidin-4one) and their metal complexes with Cu(II) & Ni(II) were synthesized successfully having excellent yield, in reproducible conditions and for structure elucidation different advance spectroscopic techniques (FTIR, 1H NMR, 13C NMR and Mass Spectrometry) were applied. In FTIR analysis, the absence of peak at 3450-3550 cm-1 due to –NH2 and presence of a new peak of N=N at 1390-1520 cm−1 confirmed synthesis of the ligands. The 1H NMR spectra of azo ligands showed singlet peak at 11.5–13.5 ppm (Ar-OH) for hydroxyl group and –NH2 signals disappearance of anilines at 4–5 ppm also gives strong indication for the synthesis of azo compounds. On complexation two most important peaks (M-O, M-N) appeared in all the metal chelates in the range of 400–600 cm−1 which were not present in any of the ligands, confirmed the formation of complexes. Molecular ion peaks in mass spectra at 273, 388, 407 and 423 m/z value for ligands as well as for complexes at 803, 835, 871 and 904 m/z also give strong indication that proposed ligands and their metal complexes are produced successfully. Biological screening of the synthesized compounds were also carried out against different bacterial strains (E.coli, S.typhi, and B.subtilis), antifungal (C.albicans, A.niger, and C.glabrata) strains and antioxidant activity. From results it was observed that HL-4 and Cu complexes exhibited maximum inhibition against all bacterial and fungal strains as compared to other ligands and standard drug.

https://www.sciencedirect.com/science/article/pii/S240584402203780X

2. **Ansari Moghaddam, A., Mohammadi, L., Bazrafshan, E., Batool, M., Behnampour, M., Baniasadi, M., . . . Nadeem Zafar, M. (2023). Antibiotics sequestration using metal nanoparticles: An updated systematic review and meta-analysis.** *Inorganica Chimica Acta, 550*. doi: 10.1016/j.ica.2023.121448. **Maria Batool (Chemistry/KUSC) Date of publication: May 2023 HJRS: X (Clay)**

Nanomaterials have been widely used in wastewater treatment. There has been a lot of work on the removal of antibiotics from aqueous and wastewater media by metal nanoparticles. Realizing the importance of metal nanoparticles in antibiotics removal, the meta-analysis study was conducted to investigate the removal of antibiotics from aqueous environment with metal nanoparticles. The selected articles from 2019 to 2021 were reviewed to investigate the types of metal nanoparticles used to remove antibiotics, the conditions and effects of these metal nanoparticles during and after the removal process. From 34 studies included in metanalysis, the mean and 95% confidence interval were 75.53 (68.38–82.68). The results showed that several metal nanoparticles have succeeded in complete elimination of antibiotics from wastewater with 100% removal efficiency. The lowest adsorption capacity among the studies reviewed in this article belongs to penicillin family and from penicillin family, its amoxicillin. Studies have shown that metal nanoparticles degraded the antibiotics in a wide range of pH values without compromising efficiency. Due to the increasing need for nanostructured

materials for wastewater treatment and toxicity of metal nanoparticles synthesized by chemical methods, it seems necessary to use green synthesis methods to produce metal nanoparticles.
https://www.sciencedirect.com/science/article/pii/S0020169323000725

3. Muhammad Irfan, R., Zaman, M. K., Tahir, M. H., Ahmad, A., Tayyab, M., **Arshad, I.,** . . . Shaheen, M. A. (2023). Highly Efficient Photocatalytic Syngas Production from Formic Acid Using Iron-Porphyrins as Catalysts Integrated with CdS/CNTs Heterojunctions under Visible Light. *ACS Applied Energy Materials*, 6(3), 1834-1844. doi: 10.1021/acsaem.2c03698. **Ifzan Arshad** (Chemistry/KUSC) Date of publication: February 2023 **HJRS: W (Silver)**

Syngas (H_2 + CO) is a compatible fuel for internal combustion engines, or it can be transformed to liquid fuels, which can help overcome future energy crises sustainably. In this study, we report an inexpensive and highly active photocatalytic system for production of syngas from formic acid under ambient conditions. The photocatalytic system comprising CdS/CNT hybrids and a porphyrin-based catalyst showed remarkable H_2 and CO evolution at ambient conditions. Using monochromatic light (420 nm), the highest values of apparent quantum yields reached 22.8 and 12.5% for H_2 and CO, respectively. Photoluminescence spectra and photocurrent responses proved the efficient electron transfer between the hybrid photosensitizer and the molecular catalyst, which enhanced the performance of the present photocatalytic system. Mechanistic insights regarding the molecular catalyst were obtained using cyclic voltammetry, inferring the generation of Fe(I) species as a critical step in the photocatalytic decomposition of formic acid.
https://pubs.acs.org/doi/full/10.1021/acsaem.2c03698

4. Saleem, F., Abid, M. Z., Rafiq, K., Rauf, A., **Ahmad, K.,** Iqbal, S., ... & Hussain, E. (2023). Synergistic effect of Cu/Ni cocatalysts on CdS for sun-light driven hydrogen generation from water splitting. *International Journal of Hydrogen Energy*. https://doi.org/10.1016/j.ijhydene.2023.05.048. **Khalil Ahmad** (Chemistry/KUSC) Date of Publication: May 2023 **HJRS: W (Gold)**

High cost and depletion of fossil fuels obligate the researchers to find energy sources that are not only renewable but can also replace the conventional sources. In this work, various catalysts namely, CdS, Cu@CdS, Ni@CdS and Cu/Ni@CdS were synthesized by the hydrothermal technique. To enhance the activity and stability, Cu/Ni cocatalysts were in-situ deposited over CdS surfaces by chemical reduction method. As-prepared catalysts were employed for photoreaction to generate hydrogen from water-splitting. The optical characteristics of catalysts were determined by UV-VIS/DRS and PL techniques. Morphology of catalysts was evaluated by XRD, Raman, SEM and AFM analysis. The surface properties and elemental compositions were justified via EDX and XPS analysis. Comparative H2 generation activities were monitored at GC-TCD (Shimadzu-2010). Results depict that an optimized ratio of cocatalysts (i.e. 2% Cu and 1% Ni) over the CdS exhibits higher H2 evolution activities (i.e. 14.16 mmol g−1 h−1 with 72% quantum efficiencies). Higher activities were attributed to synergism between Cu and Ni cocatalysts. The Cu cocatalysts supplement the electron populations over the CdS surfaces by surface plasmon resonance, whereas Ni cocatalysts suppress the back reaction due to the formation of Schottky junctions. The photocatalytic H2 productions were optimized for various factors such as, pH, temperature, photocatalyst dosage and light intensity. On the basis of results, it could be concluded that this research will add new promises for renewable energy applications.
https://www.sciencedirect.com/science/article/abs/pii/S0360319923023005

5. Naseem, K., Arif, M., Ahmad Haral, A., Tahir, M. H., Khurshid, A., **Ahmed, K.,** ... & Aziz, A. (2023). Enzymes encapsulated smart polymer micro assemblies and their tuned multi-functionalities: a critical review. International *Journal of Polymeric Materials and Polymeric Biomaterials*, 1-32, https://doi.org/10.1080/00914037.2023.2213379, **Khalil Ahmad** (Chemistry/KUSC) Date of Publication: June 2023 **HJRS: X (Clay)**

Polymer microgels are smart materials used to fabricate and encapsulate different enzymes. Encapsulation of enzymes in the polymer gel particles prolong their life span, enhance and tune their activity in biomedical field to prevent cell damage and make possible tunable drug delivery. Enzymes are natural catalysts and have prodigious ability to make the reaction kinetically feasible. Enzymes encapsulated polymer microgels gained much attention due to their synergistic properties. Here, different methods adopted for the synthesis of enzyme encapsulated polymer microgels, their properties, and classification based on responsive behavior have been described in detail. Applications of these enzyme encapsulated polymer microgels in sensing, catalysis, environmental remediation, useful product formation, and biomedical field to prevent disabilities have also been elaborated with future directions.
https://www.tandfonline.com/doi/full/10.1080/00914037.2023.2213379

6. Farva, K., **Majeed, H.,** Iftikhar, T., Altaf, F., Sattar, H., Danish Mahmood, M., . . . Batool, R. (2023). Exploring the occurrence, relationship and in vitro culturing behaviors of bacterial populations associated with dental caries in adult patients. *Zeitschrift fur Physikalische Chemie,* 237(9), 1409-1420. doi: 10.1515/zpch-2023-0278. **Hammad Majeed** (Chemistry/KUSC) Date of Publication: August 2023 **HJRS: X (Clay)**

Dental caries, a widespread oral infection affecting people worldwide, has significant societal impact due to its high prevalence. The issue of antibiotic resistance in the oral environment was investigated in rural areas in the antimicrobial susceptibility patterns and biofilm development in the bacteria causing dental caries. Cross-sectional study was conducted between September 2021 and October 2022. Standardized questionnaires were used to collect data on sociodemographic characteristics, behavioral habits, and clinical issues. The study included 900 individuals suspected of having dental caries, who were categorized into three groups based on their initial symptoms at the time of diagnosis. Among the patients, 61 % reported tooth discomfort only, 12 % experienced gum bleeding in addition to tooth discomfort, and 27 % had both problems. To assess the effectiveness of antibiotics and extracts against the identified pathogens, the collected samples were transferred to a microbiological laboratory. Data analysis was conducted using SPSS version 22. A statistically significant difference was concluded when the P-value was less than 0.05. Each strain possessed unique molecular and biochemical properties, allowing for their independent utilization without reliance on other strains.

https://www.degruyter.com/document/doi/10.1515/zpch-2023-0278/html

7. Huang, X., Kainat, I., Hasan, M., Zafar, A., Tariq, T., Ahmad, K., . . . Ghorbanpour, M. (2023). Investigation of pretreatment parameters for bioethanol production from Spirogyra using ZnO nanoparticles. *Biomass Conversion and Biorefinery.* doi: 10.1007/s13399-023-05024-9. Khalil Ahmad (Chemistry/KUSC) Date of Publication: November 2023 HJRS: X (Honorable Mention)

Reduction and widespread consumption of fossil fuels have been diverted researcher attention towards alternative energy resources and a variety of biomass resources (energy crops, agricultural waste, animal waste and municipal waste) conversion into bioethanol production. Here, we have evaluated the effectiveness of green synthesized zinc oxide in term of harvesting efficiency, reducing sugar and fermentation products. Biomass was harvested by ZnO nanoparticles and got 92.9% harvesting efficiency within 5 min at 200 mg/L of ZnO nanoparticles. ZnO-harvested algae treated with nitric acid, sodium hydroxide, and potassium hydroxide give highest reducing sugars ranging from 150 to 200 μg/μL. The average value of bioethanol percentage varies between 1.60 and 6.02% among all samples which were fermented using Saccromyces cerivicae (yeast) as fermenting agent. Highest ethanol was shown by ZnO-harvested algae treated with nitric acid, sodium hydroxide, and potassium hydroxide which was in range of 3.78–6.02% v/v. Green synthesized nanoparticles method with reducing agent coating is an interesting and fascinating multiple application as compared to conventional physical and chemical methods. The outcome of this work is very useful for local biomass conversation into first and second-generation bioethanol production on large scale commercial process.

https://link.springer.com/article/10.1007/s13399-023-05024-9#Abs1

8. Ahmad, K., Naseem, K., Shah, H. U. R., Riaz, N. N., Alhadhrami, A., Majeed, H., . . . Abd Elsalam, H. E., Awan, M.M.A. (2023). Towards sustainable water purification: MOFs as a promising solution to eliminate toxic water pollutant resorcinol. *Zeitschrift fur Physikalische Chemie,* 237(10), 1669-1689. doi: 10.1515/zpch-2023-0264. Khalil Ahmad, Hammad Majeed (Chemistry/KUSC) Muhammad Mateen Afzal Awan (Electrical Engineering/KUEN) Date of Publication: September 2023 HJRS: X (Clay)

Future connected and autonomous vehicles (CAVs) must be secured against cyberattacks for their everyday functions on the road so that safety of passengers and vehicles can be ensured. This article presents a holistic review of cybersecurity attacks on sensors and threats regarding multi-modal sensor fusion. A comprehensive review of cyberattacks on intra-vehicle and inter-vehicle communications is presented afterward. Besides the analysis of conventional cybersecurity threats and countermeasures for CAV systems, a detailed review of modern machine learning, federated learning, and blockchain approach is also conducted to safeguard CAVs. Machine learning and data mining-aided intrusion detection systems and other countermeasures dealing with these challenges are elaborated at the end of the related section. In the last section, research challenges and future directions are identified. This article is categorized under:

Commercial, Legal, and Ethical Issues > Security and Privacy
Technologies > Machine Learning
Technologies > Internet of Things

https://www.degruyter.com/document/doi/10.1515/zpch-2023-0264/html

9. Arshad, I., Qureshi, K., Lee, S. L., Khan, S., Abid, M. A., Bokhari, A., . . . Ahmed, M. N. (2023). Melamine-benzaldehyde tris-schiff base as an efficient corrosion inhibitor for mild steel in 0.5 molar hydrochloric acid solution: Weight loss, electrochemical, theoretical and surface studies. *Korean Journal of Chemical Engineering,* 40(10), 2555-2564. doi: 10.1007/s11814-023-1527-7. Khizar Qureshi (Chemistry\KUSC) Date of Publication: October 2023 HJRS: X (Clay)

In the current study, the N,N',N''-(1,3,5-triazine-2,4,6-triyl)tris(1-phenylmethanimine) (MBSB) condensation product of melamine (triazine) and benzaldehyde was investigated as a mild steel corrosion inhibitor in a 0.5 M HCl. The ability of the synthesized tris-Schiff base to suppress corrosion was evaluated utilizing weight loss measurements and electrochemical techniques. The maximum inhibition efficiency of 94.78%, 93.99% and

93.80% was achieved using 100 ppm of MBSB in weight loss measurements, polarization, and EIS tests, respectively. It was observed that increasing inhibitor concentration enhanced inhibition performance, whereas increasing temperature lowered inhibition performance. The analyses demonstrated that the synthesized tris-Schiff base inhibitor followed the Langmuir adsorption isotherm, and the inhibitor was an effective mixed-type inhibitor having a low cathodic predominance. According to the electrochemical impedance measurements, the Rct values increased with the increase of inhibitor concentration. In addition, theoretical calculations using density functional theory (DFT) were performed to reveal the anticorrosion mechanism. The weight loss and electrochemical assessments were also supported by surface characterization analysis and show a substantial smoothness in the surface morphology.
https://link.springer.com/article/10.1007/s11814-023-1527-7

10. **Majeed, H.,** Iftikhar, T., Ahmad, K., Qureshi, K., Tabinda, Altaf, F., . . . Khalid, A. (2023). **Bulk industrial production of sustainable cellulosic printing fabric using agricultural waste to reduce the impact of climate change.** *International Journal of Biological Macromolecules,* **253. doi: 10.1016/j.ijbiomac.2023.126885.** Hammad Majeed (Chemistry/KUSC) Date of Publication: December 2023 HJRS: W (Gold)
In this research paper, a novel process was developed for reactive printing of cotton fabric, with the objective of producing a high-quality printed fabric that is sustainable, eco-friendly, and low-cost which will ultimately reduce the impact of climate change. The study incorporated substituted tamarind polysaccharide (STP) obtained from agricultural waste, trichloro-ethanoic acid (TCEA), and polyethylene glycol (PEG-400) in the reactive printing paste. Tamarind starch was extracted from the seeds having 72 % yield, and substitution was performed to use it as a thickener in the printing paste. The conventional printing system was formulated with sodium alginate, urea, and sodium bicarbonate at dose levels of 2 %, 15 %, and 2.5 %, respectively, while the modified recipe was formulated with STP and TCEA at 5 % and 3 % dose levels, respectively along with varying doses of PEG-400 (0 %, 1 %, and 2 %) in novel prints. Various factors such as shade comparison, penetration, staining on the white ground, washing, rubbing, light and perspiration fastness, sharpness of edges, and fabric hardness were evaluated for all the recipes. The study demonstrated that the optimal outcomes were obtained with a 2 % PEG-400 dose level. This study represents a significant contribution to sustainable textile production, as tamarind agriculture waste was used as a raw material, which is an environmentally friendly alternative of sodium alginate that reduces the wastewater load. Additionally, PEG-400 was utilized as a nitrogen-free solubilizing moisture management substitution of urea for printing, while TCEA dissociated at high temperature to make alkaline pH during curing of the printed fabric to replace sodium bicarbonate. This research is a novel contribution to the printing industry, as these three constituents have not been previously used together other than this research group, in the history of reactive printing.
https://www.sciencedirect.com/science/article/abs/pii/S0141813023037820

11. **Naseem, K., Ahmad, K., Anwar, A., Farooqi, Z. H., Najeeb, J., Iftikhar, M. A., . . . Akhtar, M. S. (2023). Raphanus caudatus biomass powder as potential adsorbent for the removal of crystal violet and Rhodamine B dye from wastewater.** *Zeitschrift fur Physikalische Chemie.* **doi: 10.1515/zpch-2023-0259.** Khalil Ahmad (Chemistry/KUSC) Date of Publication: October 2023 HJRS: X (Clay)
In this work, *Raphanus caudatus* (radish pod) leaves biomass was used as an adsorbent for the removal of crystal violet (CV) and Rhodamine B (RhB) dye from water medium. Adsorption process was performed by changing different adsorption factors such as adsorbent dose, agitation time, adsorbate concentration, pH and temperature to get maximum removal of dyes. It was observed that *R. caudatus* leaves biomass showed 48.7 and 19.0 mg/g value of adsorption capacity for CV and RhB dyes, respectively. High adsorption capacity value for CV was observed due to its less complex structure and small sized molecules as compared to the RhB dye molecules. Dyes removal process followed pseudo second order with the values of regression factor (R^2) found as 0.999 and 0.998 for CV and RhB, respectively. Values of R^2 were found as 0.999 and 0.998 for the removal of CV and RhB respectively while following the Langmuir adsorption isotherm model. It illustrates the single layered dye molecules adsorption over the homogeneous surface of the adsorbent. Value of enthalpy ($\Delta H°$) was found as 11.983 and 12.28 kJ/mol for CV and RhB, respectively. It indicates endothermic nature of the process along with the increased entropy at the surface of the adsorbent during the process. Increase of salt concentration in adsorption medium caused the decreased percentage removal of dyes. Reported adsorbent also showed potential for the removal of toxic dyes from industrial wastewater.
https://www.degruyter.com/document/doi/10.1515/zpch-2023-0259/html

12. **Naseem, K., Aziz, A., Tahir, M. H., Ameen, A., Ahmad, A., Ahmad, K., Arif, M., Rao, E. (2023). Biogenic synthesized nanocatalysts and their potential for the treatment of toxic pollutants: environmental remediation, a review.** *International Journal of Environmental Science and Technology.* **doi: 10.1007/s13762-023-05166-3.** Khalil Ahmad (Chemistry/KUSC) Muhammad Arif (Chemistry/SSC) Date of Publication: September 2023 HJRS: W (Bronze)
Water is the most valuable resource of human civilization and other earth beings. Industrial wastes and dyes are the major threat to these water assets. Untreated industrial wastewater drained into the rivers and oceans

results in the water pollution. Therefore, prior to release of these industrial effluents into natural water resources, it is necessity of time to make it environment friendly. For this purpose, various physical and chemical methods have been in practice. But, these methods are more time consuming, expensive and less effective. Consequently, in modern nanotechnology era, use of nanoparticles for the treatment of wastewater has been considered as a better option due to their excellent surface properties which facilitate the catalytic degradation of toxic dyes into environmental benign products. Thus, use of some biological materials for the successful fabrication of metal nanoparticles as well as metal oxides nanoparticles and their use as catalyst for various organic reactions are gaining attention nowadays because of their eco-friendliness nature and easy availability. Here, this review article provides the updated role played by phytocompounds present in plants extract toward the preparation of different metal and metal oxide NPs along with their use as catalyst for photo- and chemical degradation of different toxic pollutants present in water sources. Different conditions to optimize the activity of nanomaterials in cleaning water process have also been reviewed critically. Future prospective of green-synthesized nanomaterials role as water cleaner has also been enlighten here in detail.
https://link.springer.com/article/10.1007/s13762-023-05166-3#Abs1

13. **Nguyen, T. L., Ayub, A., Anam, A., Aljuwayid, A. M., Alwash, S. W., Abbass, R., Ahmad, K., . . . Pham Thi, H. H. (2023). Fabrication of ZnO decorated porous chitosan beads for the sustainable bioremediation of Cr(VI) contaminated water. *Journal of Environmental Chemical Engineering,* 11(5). doi: 10.1016/j.jece.2023.110445. Khalil Ahmad (Chemistry/KUSC) Date of Publication: October 2023 HJRS: W (Gold)**

Chromium contamination, particularly in industrial and mining sectors, has become a serious issue for the aquatic system, globally. Until now, the removal of Cr(VI) have been accomplished by a variety of approaches. However, these existing techniques are economically not efficient. Here, we demonstrate quick and effective removal of Cr(VI) from water by biosorption method using simple polymer modification technique. Specifically, we synthesized native chitosan beads (NCB) and ZnO NPs modified chitosan beads (ZMCB) for the adsorptive elimination of Cr(VI) from aqueous medium. Some advanced analytical techniques such as BET, SEM-EDX, XRD and FTIR were applied to characterize the biosorbents. Both NCB and ZMCB followed Langmuir isotherm model and maximum adsorption capacity of 23.16 mg/g and 130.28 mg/g, respectively was observed at optimal conditions (1.5 g dose, pH 2, initial concentration 50 ppm at 293 K). The results showed that pseudo 2nd order (PSO) kinetic was best fitted for the biosorption process, as coefficient regression constant for PSO have highest value ($R^2 > 0.999$). Additionally, it was observed that the ZMCB composite may be used in many Cr(VI) adsorption cycles with little decrease in adsorption efficiency (91% adsorption up to the 5th cycle). Overall, this study offers a quick and easy approach for synthesizing low-cost materials that will be extremely useful for environmental applications.
https://www.sciencedirect.com/science/article/abs/pii/S2213343723011843

14. **Rajpoot, S. R., Ahmad, K., Asif, H. M., Madni, M. A., Tasleem, M. W., Zafar, F., Majeed, H., . . . Hayee, A. (2023). Study of anti-inflammatory and anti-arthritic potential of curcumin-loaded Eudragit L100 and hydroxy propyl methyl cellulose (HPMC) microparticles. *Polymer Bulletin.* doi: 10.1007/s00289-023-04899-y. Khalil Ahmad, Hammad Majeed (Chemistry/KUSC) Date of Publication: July 2023 HJRS: X (Honorable Mention)**

Curcumin is derived from *Curcuma longa's* dried root rhizomes possessing extensive variety of therapeutic actions such as antifungal, anti-inflammatory, antibacterial, antispasmodic, antioxidant and anti-arthritic. The current study was conducted to fabricate, characterize and optimize curcumin-loaded Eudragit L^{100} and hydroxy propyl methyl cellulose (HPMC) sustained release and improved bioavailable microparticles for anti-arthritis and anti-inflammatory activities. Curcumin-loaded microparticles made with Eudragit L100 and HPMC via ESE having different polymer and emulsifier concentrations. Optical microscope showed spherical microparticles, and FTIR spectroscopic analysis displayed characteristic peaks at 3519 cm^{-1}, 1366 cm^{-1}, 950 cm^{-1} and 728 cm^{-1} due to O–H group, C–OH bending and bending vibration of –CH groups, respectively. SEM analysis showed that mean microparticles diameter was 30.2–76.7 μm having encapsulation efficiency 78.8–96.2%. Curcumin (600 μg/ml) showed 52%HRBC membrane stabilization and 71% protein denaturation inhibition. Curcumin (600 μg/ml) produced microparticles with 30.2 μm-diameter showed highest encapsulation, sustained drug release, significant anti-arthritic potential with good anti-inflammatory activity make it suitable as new therapeutic anti-arthritic agent. From results, it was suggested that this is a promising strategy for the development and treatment of chronic ailments like arthritis and inflammation.
https://link.springer.com/article/10.1007/s00289-023-04899-y#Abs1

15. **Shahbaz, A., Ahmad, K., Qureshi, K., Majeed, H., Arshad, I., Tabinda, T., Khair, K.U . . . Lee, S. L. (2023). Porous materials: Covalent Organic Frameworks (COFs) as game-changers in practical applications, a review. *Reviews in Inorganic Chemistry.* doi: 10.1515/revic-2023-0018. Amsal Shahbaz, Khalil Ahmad, Khizar Qureshi, Hammad Majeed, Ifzan Arshad, Tabinda Tabinda, Kashaf-ul Khair (Chemistry/KUSC) Date of Publication: September 2023 HJRS: X (Clay)**

Covalent Organic Frameworks (COFs) represents a class of remarkable porous materials composed of organic building blocks that are covalently linked in a periodic manner to form crystalline structures. High surface area, high porosity, tunable pore size, and high stability are their exceptional properties, which make them attractive candidates for various applications in the fields of catalysis, energy storage devices, biomedical applications, gas separation and storage applications. In fact, the great interest shown in COFs gave us a stimulus to review the output of the recent substantial efforts in this area. Meanwhile, the development of portable and sophisticated systems based on these particles is believed to create deeper insights for the scientists to embark on new investigations to pave the way for discovering new fundamental characteristics of COFs, modifications. Furthermore, the effect of modifications/fractionalizations on the performance of COFs will be thoroughly explained and challenging problems are mentioned. Moreover, the paper covers an inclusive collection of referenced recent research articles, providing readers with a comprehensive understanding of the subject matter and an extensive bibliography for further exploration. Through this comprehensive overview, the paper alleviates the noteworthy contributions of COFs in driving innovation and progress in a range of key scientific disciplines.
https://www.degruyter.com/document/doi/10.1515/revic-2023-0018/html

Book Chapter

1. **Abid, Z., Wahad, F., Gulzar, S., Ashiq, M. F., Aslam, M. S., Shahid, M., Ashraf, R. S. (2023). Solar Cell Efficiency Energy Materials Fundamentals of Solar Cell Design (pp. 271-315). Munazza Shahid, Raja Shahid Ashraf (Chemistry/KUSC) Date of publication: January 2023**
Energy is vital for the sustainability of modern human society. The primary sources of energy, i.e., fossil fuels, are depleting at an alarming pace. Additionally, the excessive burning of fossil fuels has resulted in health disorders and environmental pollution. In this scenario, renewable energy resources, like solar energy, offer a promising alternative to fossil fuels. Solar energy can be collected by light-absorbing materials and converted into electrical energy using solar cells (SCs). For successful commercialization, SCs must deliver high power conversion efficiency (PCE) at affordable costs. The interdisciplinary area of SC development has drawn attention from diverse science and engineering research communities. Consequently, a myriad of SC materials was produced, followed by a dramatic increase in PCEs. We reviewed all the major classes of SC materials, including inorganic semiconductors, organic semiconductors, and organic-inorganic hybrid materials with notable PCE reports. Major challenges faced by material classes and remediation strategies are discussed briefly. At present, crystalline silicon SCs retain their dominance in the commercial market with a maximum PCE of 27.6%. On the other hand, perovskite SCs, cadmium telluride SCs, organic SCs, and dye-sensitized SCs have emerged as cheaper and flexible alternatives with maximum PCEs of 25.2%, 22.1%, 17.4%, and 12.3%, respectively. Emerging solar technologies have undoubtedly an enormous scope ahead as a mainstream source of energy.
https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119725022.ch10

2. **Yamin, N., Khalid, W., Altaf, M., Ashraf, R. S., Shahid, M., & Zulfiqar, A. (2023). Conventional Fuel Cells vs Biofuel Cells Biofuel Cells: Materials and Challenges (pp. 377-422). Munazza Shahid (Chemistry/KUSC) Date of publication: January 2023**
This chapter is aimed to report conventional fuel cells vs biofuel cells. These cells are the most promising innovations for electricity production. Fuel and biofuel cells are being used for many years and modifications are being done with time. A fuel cell has many advantages such as zero-emission, noiseless and good efficiency. The interest in science has quickly grown in biofuel cells that could generate electricity from biodegradable resources. Biofuel cells provide an appropriate solution for energy generation and waste treatment. This chapter discusses the introduction, working principle, design, operation, types, use of microorganisms as a biocatalyst in the biofuel cells, and application/uses of fuel cells and biofuel cells. In this chapter, special consideration is paid to the working principle and types of conventional fuel cells and biofuel cells. Although the operation and design of these cells are challenging and scientifically important, the practical applications of the biofuel cell are not discussed in most papers, and only focused on improving the stability, performance and mechanisms of bioelectrochemical cells.
https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119725008.ch14

Department of Physics

1. **Abdullah, A., Zaidi, S. M. J., Khan, M. I., Sahar, M. S. U., & Saleemi, A. S. (2023). Assimilation of electronic, elastic, mechanical, optical, and thermal profiles in metal halide perovskite CsPbCl3, for optoelectronic applications.** *Computational Condensed Matter,* **35. doi: 10.1016/j.cocom.2023.e00804. Ali Abdullah, Awais Siddique Saleemi (Physics/KUSC) Date of publication: June 2023 HJRS: Y (Null)**

Potential applications for organic free Cs-based perovskite materials include optoelectronics and electronics. To examine the suitability of this material for optoelectronic devices, a thorough investigation of the mechanical, electrical, optical, and thermodynamic properties of CsPbCl3 was carried out using density functional theory with Generalized Gradient Approximation (GGA). For appropriate device applications, we estimated structural and elastic parameters to identify a better agreement of damage tolerance and electrical and optical responses. The values of Young's modulus (E), Bulk modulus (B), and Shear modulus (G) at 0–15 GPa range were found. Similarly, the values of basic mechanical parameters, Poisson's ratio (σ), Cauchy pressure (CP), and Pugh's ratio (B/G) for 0–15 GPa were also calculated. In all cases, the ductile nature of the material was found. Applied stress caused the thermodynamic properties to change. While the Debye temperature decreased as the temperature rose, the values for enthalpy and heat capacity were found to be at their highest for 15 GPa. The free energy, and entropy exhibit slightly erratic behavior. The results promise a real-world tool to tune the optical and elastic properties with applied stress in similar materials.

https://www.sciencedirect.com/science/article/pii/S2352214323000217

2. **Arshad, I., Qureshi, K., Saleemi, A. S., Abdullah, A.,** Bahajjaj, A. A. A., Ali, S., & Bokhari, A. (2023). Melamine–isatin tris Schiff base as an efficient corrosion inhibitor for mild steel in 0.5 molar hydrochloric acid solution: weight loss, electrochemical and surface studies. *RSC Advances, 13*(28), 19301-19311. doi: 10.1039/d3ra00357d. **Ifzan Arshad, Khizar Qureshi (Chemistry\KUSC) Awais Siddique Saleemi, Ali Abdullah (physics\ KUSC) Date of Publication: June 2022 HJRS: W (Bronze)**

In the current study, 3,3',3''-((1,3,5-triazine-2,4,6-triyl)tris (azaneylylidene))tris(indolin-2-one) (MISB), which is the condensation product of melamine (triazine) and isatin, was investigated as a mild steel corrosion inhibitor in 0.5 M HCl. The ability of the synthesized tris-Schiff base to suppress corrosion was evaluated utilizing weight loss measurements, electrochemical techniques and theoretical computation. The maximum inhibition efficiency of 92.07%, 91.51% and 91.60% was achieved using 34.20 × 10−3 mM of MISB in weight loss measurements, polarization, and EIS tests, respectively. It was revealed that an increase in temperature decreased the inhibition performance of MISB, whereas an increase in the concentration of MISB increased it. The analysis demonstrated that the synthesized tris-Schiff base inhibitor followed the Langmuir adsorption isotherm and was an effective mixed-type inhibitor, but it exhibited dominant cathodic behavior. According to the electrochemical impedance measurements, the Rct values increased with an increase in the inhibitor concentration. The weight loss and electrochemical assessments were also supported by quantum calculations and surface characterization analysis, and the SEM images showed a smooth surface morphology.

Knowledge Unit of Engineering

Department of Electrical Engineering

1. **Hussain, I., Haider, A., Ullah, Z.,** Russo, M., Casolino, G. M., & Azeem, B. (2023). Comparative Analysis of Eight Numerical Methods Using Weibull Distribution to Estimate Wind Power Density for Coastal Areas in Pakistan. *Energies,* 16(3), 1515. **Iqrar Hussain, Aun Haider, Zahid Ullah** (Electrical Engineering/KUEN) **Date of publication: February 2023 HJRS: W (Bronze)**

Currently, Pakistan is facing severe energy crises and global warming effects. Hence, there is an urgent need to utilize renewable energy generation. In this context, Pakistan possesses massive wind energy potential across the coastal areas. This paper investigates and numerically analyzes coastal areas' wind power density potential. Eight different state-of-the-art numerical methods, namely an (a) empirical method, (b) graphical method, (c) wasp algorithm, (d) energy pattern method, (e) moment method, (f) maximum likelihood method, (g) energy trend method, and (h) least-squares regression method, were analyzed to calculate Weibull parameters. We computed Weibull shape parameters (WSP) and Weibull scale parameters (WCP) for four regions: Jiwani, Gwadar, Pasni, and Ormara in Pakistan. These Weibull parameters from the above-mentioned numerical methods were analyzed and compared to find an optimal numerical method for the coastal areas of Pakistan. Further, the following statistical indicators were used to compare the efficiency of the above numerical methods: (i) analysis of variance (R2�2), (ii) chi-square (X2�2), and (iii) root mean square error (RMSE). The performance validation showed that the energy trend and graphical method provided weak performance for the observed period for four coastal regions of Pakistan. Further, we observed that Ormara is the best and Jiwani is the worst area for wind power generation using comparative analyses for actual and estimated data of wind power density from four regions of Pakistan.

https://www.mdpi.com/1996-1073/16/3/1515

2. **Awan, M. M. A.,** Asghar, A. B., Javed, M. Y., & Conka, Z. (2023). Ordering Technique for the Maximum Power Point Tracking of an Islanded Solar Photovoltaic System. *Sustainability,* 15(4), 3332. **Muhammad Mateen Afzal Awan (Electrical Engineering/KUEN) Date of publication: February 2023 HJRS: W (Bronze)**

The world's attention has turned towards renewable energy due to escalating energy demands, declining fossil fuel reservoirs, greenhouse gas emissions, and the unreliability of conventional energy systems. The sun is the only renewable energy source that is available every day for a specific period of time. Solar photovoltaic (PV) technology is known for its direct conversion of sunlight into electricity using the photoelectric effect. However, due to the non-linear electrical characteristics, the power output of solar PV cells is bound to a lower value and can not produce the power of which it is capable. To extract the maximum possible power, the PV cell needs to be operated at its maximum power point (MPP) uninterruptedly under numerous weather conditions. Therefore, an electronic circuit driven by a set of rules known as an algorithm is utilized. To date, the flower pollination algorithm (FPA) is one of the most renowned maximum power point tracking (MPPT) algorithms due to its effective tracking ability at the local and global positions. After an in-depth analysis of the design, strengths, weaknesses, and opportunities of the FPA algorithm, we have proposed an additional filtration and distribution process named "Random walk" along with the ordering of solutions, to improve its efficiency and tracking time. The proposed structure named "Ordered FPA" has outperformed the renowned FPA algorithm under various weather conditions at all the standard benchmarks. Simulations are performed in MATLAB/Simulink.

https://www.mdpi.com/2071-1050/15/4/3332

3. Iqbal, M., Ullah, Z., Khan, I. A., Aslam, S., Shaheer, H., Humayon, M., . . . Mehmood, A. (2023). Optimizing Task Execution: The Impact of Dynamic Time Quantum and Priorities on Round Robin Scheduling. *Future Internet, 15*(3). doi:10.3390/fi15030104. Zahid Ullah (Electrical Engineering/KUEN) Date of publication: March 2023 HJRS: X (Clay)

Task scheduling algorithms are crucial for optimizing the utilization of computing resources. This work proposes a unique approach for improving task execution in real-time systems using an enhanced Round Robin scheduling algorithm variant incorporating dynamic time quantum and priority. The proposed algorithm adjusts the time slice allocated to each task based on execution time and priority, resulting in more efficient resource utilization. We also prioritize higher-priority tasks and execute them as soon as they arrive in the ready queue, ensuring the timely completion of critical tasks. We evaluate the performance of our algorithm using a set of real-world tasks and compare it with traditional Round Robin scheduling. The results show that our proposed approach significantly improves task execution time and resource utilization compared to conventional Round Robin scheduling. Our approach offers a promising solution for optimizing task execution in real-time systems. The combination of dynamic time quantum and priorities adds a unique element to the existing literature in this field.

https://www.mdpi.com/1999-5903/15/3/104

4. Awan, M. J., Awan, M. M. A., Khan, A. U., Umer, M., Zia, M., & Bux, M. (2023). Frequency limited impulse response gramians based model reduction. *Mehran University Research Journal of Engineering & Technology, 42*(2), 71-74. https://doi.org/10.22581/muet1982.2302.08. Muhammad Mateen Afzal Awan (Electrical Engineering/KUEN) Date of publication: April 2023 HJRS: X (Null)

In order to simplify the analysis of complex electronic systems, they needs to be modeled accurately. Model reduction is further required to streamline the procedural and computational complexities. Further the instability caused by the model reduction techniques worstly effects the accuracy of a system. Therefore, we have proposed some improvements in the frequency limited impulse response Gramians based model order reduction techniques for discrete time systems. The propsed techniques assures the stability of the model after it get reduced. The proposed techniques provided better results than the stability preserving techniques.

https://publications.muet.edu.pk/index.php/muetrj/article/view/2493

5. Awan, M. M. A., Khan, A. U., Siddiqui, M. U., Karim, H., & Bux, M. (2023). Optimized hill climbing algorithm for an islanded solar photovoltaic system. *Mehran University Research Journal of Engineering & Technology, 42*(2), 124-132. https://doi.org/10.22581/muet1982.2302.13. Muhammad Mateen Afzal Awan (Electrical Engineering/KUEN) Date of publication: April 2023 HJRS: X (Null)

Conventional energy generation technologies face unreliability due to the depletion of fossil fuels, soaring energy prices, greenhouse gas emissions, and continuously increasing energy demand. As a result, researchers are searching for reliable, cheap, and environmentally friendly renewable energy technologies. Solar photovoltaic (PV) technology, which directly converts sunlight into electricity, is the most attractive sustainable energy source due to the sun's ubiquitous presence. However, the non-linear behaviour of solar PV demands maximum power point tracking (MPPT) to ensure optimal power production. Although Hill Climbing (HC) is a simple, cheap, and efficient MPPT algorithm, it has a drawback of steady-state oscillations around MPP under uniform weather conditions. To overcome this weakness, we propose some modifications in the tracking structure of the HC algorithm. The proposed optimized HC (OHC) algorithm achieves zero steady-state oscillations without compromising the strength of the conventional HC algorithm. We applied both algorithms to an off-grid PV system under constant and changing weather conditions, and the results demonstrate the superiority of the proposed OHC algorithm over the conventional HC algorithm.

https://publications.muet.edu.pk/index.php/muetrj/article/view/2637

Conference Proceeding

1. **Asghar, R., Sulaiman, M. H., Saeed, S., Wadood, H., Mehmand, T. K., & Ullah, Z. (2023, 7-9 Dec. 2022).** *Application of linear and nonlinear control schemes for the stability of Smart Grid.* **Paper presented at the 2022 International Conference on Emerging Technologies in Electronics, Computing and Communication (ICETECC). Zahid Ullah (Electrical Engineering/KUEN) Date of Publication: March 2023**

   Reliability and controls are essential for preventing outages, load disparity, and synchronization mismatch in a power system. Smart Grid (SG) is a cost-effective solution for minimizing inter-regional variations, optimizing load demand, stabilizing equipment operations, and managing conventional and renewable power sources. However, SGs are still in their infancy, and abrupt changes in demand, grid disruptions, and weather-related variations in renewable energy have a significant impact on their stability. Various hardware and software controls are designed to preserve the stability of SG systems during disturbances and uncertainty. This paper examines the various forms of power system disturbances and their impacts on SG stability. In addition, an overview of the most common linear and nonlinear control strategies applied to SG systems is provided. Finally, advantages, disadvantages, and applications are discussed to highlight the need for more robust operational and control approaches to enhancing SG stability.

   https://ieeexplore.ieee.org/abstract/document/10069570

2. **Kalair, A. R., Seyedmahmoudian, M., Abas, N., Saleem, M. S., Stojcevski, A., Mekhilef, S., & Koh, K. (2023).** *Energy Audit in Buildings for Sustainable Economic Development.* **Paper presented at the the 2022 International Conference of Applied Economics. Muhammad Shoaib Saleem (Electrical Engineering/SEN) Date of Publication: 20 July 2023**

   Building sector consumes 40% of energy, 60% of electricity, and 25% of global water. Hot humid countries consume 46% electricity for cooling in summer and 47% gas for heating in winter. Buildings consume 40% of the world's energy resources and contribute 33% of global GHG emissions. Buildings with HVAC systems, lacking heat recovery, have 30% no-cost or low-cost energy-saving potential. The energy audit identifies energy conservation opportunities (ECOs) in residential, commercial, and industrial buildings, which is in phase with IPCC climate change mitigation policy. Zero net energy (ZNE) or zero energy buildings (ZEB) have minimum energy consumptions, yet these are not green buildings. Zero-emission plants and beyond zero-emission (BZE) free energy buildings (FEB) integrate solar heating and cooling (SHC) systems. Carbon-emission pinch analysis (CEPA) and carbon absorption pinch analysis (CAPA) techniques are used to build model zero-emission cities (ZEC). The energy audit in existing buildings identifies energy conservation opportunities (ECOs. Energy consumption analysis of 48 double story homes in sector-I/9 Islamabad shows 25% energy-saving potential. Integration of solar heating and geothermal cooling in buildings reduces net energy demand. This work reports energy audit-based consumption spectra in residential buildings and reduction in demand by integration of a CO_2 fluid-mediated solar water-heating system to develop ZNE buildings.

   https://link.springer.com/chapter/10.1007/978-3-031-22749-3_37#copyright-information

Department of Mechanical Engineering

1. **Khalid, M. Y., Arif, Z. U., Hossain, M., & Umer, R. (2023). Recycling of wind turbine blades through modern recycling technologies: A road to zero waste.** *Renewable Energy Focus, 44*, **373-389. doi: 10.1016/j.ref.2023.02.001. Zia Ullah Arif (Mechanical Engineering/KUEN) Date of Publication: March 2023 HJRS: Y (Null)**

   Wind is a clean, efficient, fastest-growing, renewable energy source, which is extensively applied for power generation. The expected design lifetime of a wind turbine lies between 20 to 25 years and requires decommissioning at its end-of-life (EOL) stage. In recent years, the global trend is shifted towards power generation through wind turbines and has globally increased the decommissioned wind turbine blades (WTBs). Compared to other components of wind turbines, it is not convenient to recycle the carbon/glass fiber-reinforced composite-based WTBs, due to their complicated nature and inhomogeneity. Additionally, it is extremely harmful to landfill or incinerate WTBs, as these strategies may result in severe health and environmental issues. Consequently, recycling of WTBs is a viable pathway for the renewable energy sector that ensures the sustainability of wind turbines. To date, only 80% - 85% of the wind turbine materials can be recycled but have potential to reach at 100 % through proper attention required on recovery of all wind turbine materials and adaptation of circular economy (CE) models. The motivation behind this review is to emphasize the importance of sustainable options to treat WTB wastes and minimize the utilization of conventional EOL approaches such as landfilling and incineration. This review also shed lights on the current research and development (R&D) projects, which are related to the adaption of various hybrid recycling technologies and CE

models. Moreover, this review also highlights current challenges and future developments of WTB composites. It is concluded that consistent and collaborative efforts should be made by each of the individuals, such as researchers, policy makers, and legislative and industrialist stake holders to improve the viability and effectiveness of the wind energy.

https://www.sciencedirect.com/science/article/pii/S1755008423000121

2. **Shahid, M. I., Asim, M., Farhan, M., Sheikh, M. F., Ashraf, M. U., Arshad, H., . . . Almarhabi, K. A. (2023). Design and performance analysis of salinity gradient solar pond under different climatic and soil conditions.** *PLoS ONE, 18*(2 February). doi: 10.1371/journal.pone.0279311. **Muhammad Ihsan Shahid, Muhammad Farhan, Muhammad Fahad Sheikh, Hassan Arshad** (Mechanical Engineering/KUEN) **Date of Publication: February 2023 HJRS: W (Gold)**

A salinity gradient solar pond (SGSP) is capable of storing a significant quantity of heat for an extended period of time. It is a great option for providing hot water at a reduced energy cost. Additionally, SGSP is used in low-temperature industrial applications such as saltwater desalination, space heating, and power generation. Solar pond thermal performance is dependent on a variety of operational variables, including the soil conditions, the climate of the particular site, the thickness of the solar pond layers, the depth of the water table, and the salt content of the pond. As such, this study examines the thermal performance of a solar pond under a variety of operational conditions. The solar pond model is used to test the thermal performance by simulating two-dimensional heat and mass transport equations. The equations are solved using the finite difference technique utilizing MATLAB® scripts. Salt distributions and temperature profiles are computed for a variety of factors influencing SGSP's thermal performance. The main distinguishing variables influencing the thermal performance of SGSP are soil conditions, such as soil texture, types, the moisture level in soil, and water table depth. The final findings indicated that the fine sand dry soil performed better than the other soil types owing to its poor heat conductivity. The economic results indicated that the period of return (POR) of the intended system is around 2 years. The solar pond construction costs such as excavation, transportation, salt and lining, were considered based on the local prices. This modeled study extracted the greatest possible energy is $110W/m^2$, with the fine sand dry at 62.48°C lowest temperature. This study suggested that the climatic conditions of Lahore is better than climatic conditions of Islamabad. Additionally, deeper water tables are suggested for improved thermal performance of the pond.

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0279311

3. **Adil, A., Baig, T., Jamil, F., Farhan, M., Shehryar, M., Ali, H. M., & Khushnood, S. (2023). Nanoparticle-based cutting fluids in drilling: a recent review.** *International Journal of Advanced Manufacturing Technology*. doi: 10.1007/s00170-023-11048-2. **Muhammad Farhan** (Mechanical Engineering/KUEN) **Date of Publication: February 2023 HJRS: W (Silver)**

The successful operations in the field of drilling requires high quality of the drilling fluids. The nanoparticle-based materials can be used in a variety of ways in the oilfield such as drilling fluids to enhance the efficiency of system. Drilling fluids play crucial role during the drilling operations. Nanoparticles (NPs) depict significant performance in the enhancement of the drilling fluid properties. The current manuscript summarizes the various types of nano-based drilling fluids for drilling operations. Nano-based drilling fluids are a new kind of fluids that are used to enhance the performance of working fluids. Graphene-based drilling fluids, carbon nanotube–based drilling fluid, and nanocellulose and its derivative-based drilling fluids investigated by various researchers are summarized in this review. Different reviews have been published on nano-based drilling fluids in literature, but few studies reported on nanoparticle-based fluids in drilling industry. Therefore, this review especially highlights the recent advances of nanoparticle-based fluids in drilling fluid system. The thermal conductivity, density, viscosity, and specific heat capacity of the nano-based drilling fluids are also critically discussed in this manuscript. Finally, this review indicates some future directions about nano-based drilling fluids in oil and gas exploration which will also give direction to young researchers to explore new kinds of drilling fluids in the drilling field.

https://link.springer.com/article/10.1007/s00170-023-11048-2

4. **Khalid, M. Y., Arif, Z. U., Noroozi, R., Hossain, M., Ramakrishna, S., & Umer, R. (2023). 3D/4D printing of cellulose nanocrystals-based biomaterials: Additives for sustainable applications.** International Journal of Biological Macromolecules, 251. doi: 10.1016/j.ijbiomac.2023.126287. **Zia Ullah Arif** (Mechanical Engineering/KUEN) **Date of Publication: November 2023 HJRS: W (Gold)**

Cellulose nanocrystals (CNCs) have gained significant attraction from both industrial and academic sectors, thanks to their biodegradability, non-toxicity, and renewability with remarkable mechanical characteristics. Desirable mechanical characteristics of CNCs include high stiffness, high strength, excellent flexibility, and large surface-to-volume ratio. Additionally, the mechanical properties of CNCs can be tailored through chemical modifications for high-end applications including tissue engineering, actuating, and biomedical. Modern manufacturing methods including 3D/4D printing are highly advantageous for developing sophisticated and intricate geometries. This review highlights the major developments of additive manufactured CNCs, which

promote sustainable solutions across a wide range of applications. Additionally, this contribution also presents current challenges and future research directions of CNC-based composites developed through 3D/4D printing techniques for myriad engineering sectors including tissue engineering, wound healing, wearable electronics, robotics, and anti-counterfeiting applications. Overall, this review will greatly help research scientists from chemistry, materials, biomedicine, and other disciplines to comprehend the underlying principles, mechanical properties, and applications of additively manufactured CNC-based structures.
https://www.sciencedirect.com/science/article/pii/S0141813023031835

5. Albagmi, F. M., Hussain, M., Kamal, K., Sheikh, M. F., AlNujaidi, H. Y., Bah, S., . . . BinDhim, N. F. (2023). Predicting Multimorbidity Using Saudi Health Indicators (Sharik) Nationwide Data: Statistical and Machine Learning Approach. *Healthcare (Switzerland),* 11(15). doi: 10.3390/healthcare11152176. Muhammad Fahad Sheikh (Mechanical Engineering/KUEN) Date of Publication: July 2023 HJRS: W (Bronze)

The Saudi population is at high risk of multimorbidity. The risk of these morbidities can be reduced by identifying common modifiable behavioural risk factors. This study uses statistical and machine learning methods to predict factors for multimorbidity in the Saudi population. Data from 23,098 Saudi residents were extracted from the "Sharik" Health Indicators Surveillance System 2021. Participants were asked about their demographics and health indicators. Binary logistic models were used to determine predictors of multimorbidity. A backpropagation neural network model was further run using the predictors from the logistic regression model. Accuracy measures were checked using training, validation, and testing data. Females and smokers had the highest likelihood of experiencing multimorbidity. Age and fruit consumption also played a significant role in predicting multimorbidity. Regarding model accuracy, both logistic regression and backpropagation algorithms yielded comparable outcomes. The backpropagation method (accuracy 80.7%) was more accurate than the logistic regression model (77%). Machine learning algorithms can be used to predict multimorbidity among adults, particularly in the Middle East region. Different testing methods later validated the common predicting factors identified in this study. These factors are helpful and can be translated by policymakers to consider improvements in the public health domain.
https://www.mdpi.com/2227-9032/11/15/2176

6. Arif, Z. U., Khalid, M. Y., Noroozi, R., Hossain, M., Shi, H. H., Tariq, A., . . . Umer, R. (2023). Additive manufacturing of sustainable biomaterials for biomedical applications. *Asian Journal of Pharmaceutical Sciences,* 18(3). doi: 10.1016/j.ajps.2023.100812. Zia Ullah Arif, Ali Tariq (Mechanical Engineering/KUEN) Date of Publication: May 2023 HJRS: W (Silver)

Biopolymers are promising environmentally benign materials applicable in multifarious applications. They are especially favorable in implantable biomedical devices thanks to their excellent unique properties, including bioactivity, renewability, bioresorbability, biocompatibility, biodegradability and hydrophilicity. Additive manufacturing (AM) is a flexible and intricate manufacturing technology, which is widely used to fabricate biopolymer-based customized products and structures for advanced healthcare systems. Three-dimensional (3D) printing of these sustainable materials is applied in functional clinical settings including wound dressing, drug delivery systems, medical implants and tissue engineering. The present review highlights recent advancements in different types of biopolymers, such as proteins and polysaccharides, which are employed to develop different biomedical products by using extrusion, vat polymerization, laser and inkjet 3D printing techniques in addition to normal bioprinting and four-dimensional (4D) bioprinting techniques. It also incorporates the influence of nanoparticles on the biological and mechanical performances of 3D-printed tissue scaffolds, and addresses current challenges as well as future developments of environmentally friendly polymeric materials manufactured through the AM techniques. Ideally, there is a need for more focused research on the adequate blending of these biodegradable biopolymers for achieving useful results in targeted biomedical areas. We envision that biopolymer-based 3D-printed composites have the potential to revolutionize the biomedical sector in the near future.
https://www.sciencedirect.com/science/article/pii/S1818087623000399

7. Shaukat, A. R., Lan, P., Wang, J., Wang, T., & Lu, N. (2023). In-plane nonlinear postbuckling and buckling analysis of Lee's frame using absolute nodal coordinate formulation. *Curved and Layered Structures,* 10(1). doi: 10.1515/cls-2022-0212. Abdur Rahman Shaukat (Mechanical Engineering/KUEN) Date of Publication: September 2023 HJRS: X (Clay)

In this study, four absolute nodal coordinate formulation (ANCF)-based approaches are utilized in order to predict the buckling load of Lee's frame under concentrated load. The first approach employs the standard two-dimensional shear deformable ANCF beam element based on the general continuum mechanics (GCM). The second approach adopts the standard ANCF beam element modified by the locking alleviation technique known as the strain-split method. The third approach has the standard ANCF beam element with strain energy modified by the enhanced continuum mechanics formulation. The fourth approach utilizes the higher-order ANCF beam element based on the GCM. Two buckling load estimation methods are used, *i.e.*, by tracing the nonlinear equilibrium path of the load–displacement space using the arc-length method and applying the energy criterion,

which requires tracking eigenvalues through the dichotomy scheme. Lee's frame with different boundary conditions including pinned–pinned, fixed-pinned, pinned-fixed, and fixed–fixed are studied. The complex nonlinear responses in the form of snap-through, snap-back, and looping phenomena during nonlinear postbuckling analysis are simulated. The critical buckling loads and buckling mode shapes obtained through the energy criterion-based buckling method are obtained. After the comparison, higher-order beam element is found to be more accurate, stable, and consistent among the studied approaches. https://www.degruyter.com/document/doi/10.1515/cls-2022-0212/html

8. **Tariq, A., Arif, Z. U.,** Khalid, M. Y., Hossain, M., Rasool, P. I., Umer, R., & Ramakrishna, S. (2023). Recent Advances in the Additive Manufacturing of Stimuli-Responsive Soft Polymers. *Advanced Engineering Materials*, 25(21). doi: 10.1002/adem.202301074. **Ali Tariq, Zia Ullah Arif** (Mechanical Engineering/KUEN) Date of Publication: November 2023 HJRS: W (Silver)

Stimuli-responsive polymers (SRPs) are special types of soft materials, which have been extensively used for developing flexible actuators, soft robots, wearable devices, sensors, self-expanding structures, and biomedical devices, thanks to their ability to change their shapes and functional properties in response to external stimuli including light, humidity, heat, pH, electric field, solvent, and magnetic field or combinations of two or more of these stimuli. In recent years, additive manufacturing (AM) aka 3D printing technology of these SRPs, also known as 4D printing, has gained phenomenal attention in different engineering fields, thanks to its unique ability to develop complex, personalized, and innovative structures, which undergo twisting, elongating, swelling, rolling, shrinking, bending, spiraling, and other complex morphological transformations. Herein, an effort has been made to provide insightful information about the AM techniques, type of SRPs, and their applications including, but not limited to tissue engineering, soft robots, bionics, actuators, sensors, construction, and smart textiles. This article also incorporates the current challenges and prospects, hoping to provide an insightful basis for the utilization of this technology in different engineering fields. It is expected that the amalgamation of 3D printing with SRPs would provide unparalleled advantages in different engineering arenas. https://onlinelibrary.wiley.com/doi/full/10.1002/adem.202301074

9. **Zia, U. U. R., Aslam, H., Zulfiqar, M., & Ullah, S.** (2023). Prospects of low carbon development for Pakistan's energy and power sector in the post Covid scenario. *International Journal of Renewable Energy Development,* 12(4), 677-690. doi: 10.14710/ijred.2023.49927. **Sibghat Ullah** (Mechanical Engineering/KUEN) Date of Publication: July 2023 HJRS: X (Clay)

In the backdrop of COVID19 recovery, Pakistan is still struggling to cope with the economic challenges and disruptions caused in the energy supply chain. On one hand where COVID has brought serious socio-economic costs and prolonged delays, it has also provided opportunity for developing countries such as Pakistan to "build-forward-better" their economies in a more sustainable and climate friendly manner. This study particularly highlights the impact of COVID on energy supply and demand sectors of Pakistan, its near- and long-term impacts, and what policy interventions can be adopted to put Pakistan on-track to achieve its Nationally Determined Contributions (NDCs). The economic focus in on "Green Recovery" and what key interventions will foster a rapid transition towards decarbonization in Pakistan. Low Emission Analysis Platform (LEAP) model is used to provide energy sector outlook (2020-2040) of Pakistan under different scenario i.e., Pre COVID growth, Business-as-Usual, Slow Recovery, and Green Recovery from COVID. The results obtained from the model depicts that following a green recovery scenario, Pakistan can reduce around 10 Mtoe (9%) of its total energy use, 53 TWh of electricity, 19 Mt of emissions from demand sectors, and 11 Mt of emissions from the power sector by 2030. For total levelized cost of the power sector, the green recovery scenario represents a generation cost of $13 billion by 2030 which further highlights that energy efficiency could lead to cost savings of approximately $3 billion each year by 2030. Green recovery is however still a daunting task as it would require economic stimulus of $8 billion only to recover to its pre COVID scenario and total investments of $120 billion by 2030. https://ijred.cbiore.id/index.php/ijred/article/view/49927

Knowledge Unit of Commerce and Accountancy

1. **Iram, T., Bilal, A. R., Ahmad, Z., & Latif, S.** (2023). Does Financial Mindfulness Make a Difference? A Nexus of Financial Literacy and Behavioural Biases in Women Entrepreneurs. *IIM Kozhikode Society & Management Review*, 12(1), 7-21.doi: 10.1177/22779752221097194. **Shahid Latif** (KUCA) Date of Publication: January 2023 HJRS: Y (Null)

This article aims to determine the intervening strength of financial mindfulness between financial literacy and behavioural biases in women entrepreneurs. The literature has an enduring discussion regarding the profoundly unique financial behaviour of women. Financial literacy and behavioural biases constitute a recurrent research topic, yet how this nexus exists in the premise of women's entrepreneurship is not well known. Building on this gap, we examined the impact of financial literacy on women entrepreneurs' behavioural biases by focusing on

financial mindfulness as a potential moderator. A random sample of 346 women entrepreneurs operating in Pakistan was analysed using structural equation modelling through AMOS 21. The results revealed a significant direct impact of financial literacy on reducing anchoring and herding bias; however, financial literacy was found to be unrelated to mental accounting bias. The moderation analysis further revealed interesting indirect impacts, such that financial literacy strongly reduced mental accounting and herding bias for financially mindful women. Nonetheless, financial mindfulness does not negatively catalyse the relationship between financial literacy and anchoring bias. By encompassing the concepts of financial literacy, mindfulness and behavioural biases, we offer a unique theoretical strand with practical implications for women entrepreneurs. We suggest new avenues for the longstanding dilemma related to the factors instigating suboptimal financial decision-making in women entrepreneurs in developing markets.
https://journals.sagepub.com/doi/abs/10.1177/22779752221097194?journalCode=ksma

Knowledge Unit of Business, Economics, Accountancy and Commerce (KUBEAC)

1. **Liu, S., Junaid, M., Sadaf, M., Ai, W., Lan, X., & Wang, J. (2023). A novel framework-based meta-analysis for in-depth characterization of microplastic pollution and associated ecological risks in Chinese Bays.** *Journal of Hazardous Materials*, *444*, 130423.doi: 10.1016/j.jhazmat.2022.130423. **Mamona Sadaf (Economics/KUBEAC) Date of Publication: February 2023 HJRS: W (Platinum)**

   Among aquatic ecosystems, bays are ubiquitously contaminated with microplastics (MPs, size <5 mm), but a comprehensive understanding of their pollution characterization in Chinese Bays is largely elusive. The current study aims to systematically highlight factors intricating MP contamination as well as their geographic distribution, interactions, risk evaluation, and abundance prediction in bays. MPs' abundance was varied in different bays, at concentrations ranging between 0.26 ± 0.14–89, 500 ± 20, 600 items/m3 in water, 15 ± 6–6433.5 items/kg dry weight in sediment and 0.21 ± 0.10–103.5 items/individual in biota. Redundancy analysis, Permannova, and GeoDetector model revealed that the sampling and extraction/identification methods, and geographical locations were the major drivers affecting MP distribution and characteristics. The Mantel test highlighted that the MP characteristics changed with geographic distance, higher in water than that in sediment and biota. ANOSIM results showed that the different environmental media exhibit significant differences in MP characteristics (e.g., color, shape, and polymer). The ARIMA model predicted that Sanggou Bay and Hangzhou Bay have a higher potential for significantly increasing MP contamination in the future. The highest hazard index (HI) values for water, sediment, and biota were respectively reported at Jiaozhou Bay (18,844.16), Bohai Bay (11,485.37), and Dongshan Bay (48,485.11). The highest values for the ecological risk index (RI) in water, sediment, and biota were detected at Beibu Gulf (6,129,559.02), Haikou Bay (2229.14), and Dongshan Bay (561,563.05), respectively. Overall, this framework can be used at different scales and in different environments, which makes it useful for understanding and controlling MP pollution in the ecosystem.
   https://www.sciencedirect.com/science/article/pii/S03043894220221783

2. **Yihua, W., Meng, F., Farrukh, M., Raza, A., & Alam, I. (2023). Twelve years of research in The International Journal of Islamic and Middle Eastern Finance and Management: a bibliometric analysis.** *International Journal of Islamic and Middle Eastern Finance and Management*, 16(1), 154-174. doi; 10.1108/IMEFM-03-2020-0134. **Ali Raza (Marketing/KUBEAC) Date of Publication: January 2023 HJRS: W (Honorable Mention)**

   Purpose: This study aims to analyze the International Journal of Islamic and Middle Eastern Finance and Management (IMEFM) publication structure based on broad criteria including citations, authors, institutions, countries, papers and keywords using the Scopus database over a period of 12 years. Design/methodology/approach: In this paper, the bibliometric technique is used to analyze the advancement of IMEFM. Bibliometrics is a research field of library and information science that studies bibliographic material with quantitative methods. Findings: The results show a steady increase in the citation and publication structure of the IMEFM. That reflects its developing stature as a key academic outlet. The journal is advancing knowledge in Islamic finance and management research.Practical implications: This study presents a macro view of the journey of IMEFM over the past 12 years. That presents the audience with an opportunity to understand the trend and focus of the journal. Originality/value; Bibliometric analysis contributed to the theoretical development of the IMEFM journal in the following ways. First, it describes the evolution and intellectual structure by identifying and classifying the most common themes in the journal. More specifically, this analysis underscores two important milestones: IMEFM has emerged as a robust academic outlet, and its comprehensive focus on Islamic finance and other related areas. Furthermore, the bibliometric analysis of IMEFM's citations and knowledge stock pattern summarizes the scientific community contributing to its evolution and development. Finally, this study's results offer future research directions.
   https://www.emerald.com/insight/content/doi/10.1108/IMEFM-03-2020-0134/full/html

3. **Farrukh, M., Raza, A., & Waheed, A. (2023). Your network is your net worth: political ties and innovation performance.** *European Journal of Innovation Management*, *26*(1), 256-264. doi: 10.1108/EJIM-04-2021-

0174. Ali Raza (Marketing/KUBEAC) Abdul Waheed (Marketing/HSM) Date of Publication: January 2023 HJRS: W (Bronze)

Purpose – Based on the social network theory, this study investigates the impact of political ties on innovation performance. Besides, this study also tests a mediation role of absorptive capacity (AC) and a moderation role of technology turbulence. Design/methodology/approach – A hypothetico-deductive approach is adopted to test the hypotheses. Data were collected from the small and medium enterprises (SMEs) managers/owners through a structured questionnaire. Findings – Partial least square structural equation modeling technique is used to analyze the hypothesized relationships; the findings showed that political ties significantly impact the innovation performance, and this relationship is mediated by AC. Moreover, technological turbulence moderated the relationship between political ties and innovation performance. Originality/value – Despite the increasing attention to the role of networking in improving innovation, there is a scarcity of studies on the role of political ties, AC and technology turbulence in fostering organizational innovation; thus, this study is a unique contribution to literature.

https://www.emerald.com/insight/content/doi/10.1108/EJIM-04-2021-0174/full/html

4. **Chang, L., Iqbal, S., & Chen, H. (2023). Does financial inclusion index and energy performance index co-move?** *Energy Policy,* **174, 113422. doi: https://doi.org/10.1016/j.enpol.2023.113422. Sajid Iqbal (Financial Management/KUBEAC) Date of Publication: March 2023 HJRS: W (Platinum)**

Financing strategies and energy performance have been extensively studied previously, and researchers frequently overlook the co-movements of integration of financial inclusion and energy performance index in the E7 Context. To address this gap, current research estimates the co-movement between the financial inclusion index and sustainable energy performance index to reflect the consequences of the COVID-19 crisis. Our findings show that in E7 economies, China exceeds the other nations in terms of energy performance. With a steady score, Russia is second in the group. Indonesia and Turkey are respectively fourth and fifth, and their total results show excellent prospective performances for sustainability. Mexico and Brazil follow this ranking with bad results and the lowest scores reported in the study results. The study findings are helpful for policy formulation and assessment. The study presented recommendations about financial inclusion and energy management practices in COVID-19 and delivered insights about the energy performance index in E7 economies.

https://www.sciencedirect.com/science/article/pii/S0301421523000071

5. **Farrukh, M., Meng, F., Raza, A., & Wu, Y. (2023). Innovative work behaviour: the what, where, who, how and when.** *Personnel Review, 52***(1), 74-98. doi: 10.1108/PR-11-2020-0854. Ali Raza (Marketing/KUBEAC) Date of Publication: February 2023 HJRS: W (Bronze)**

Purpose – This study aims to analyse the current trends and set the future research agenda in employee-level innovative work behaviour (IWB) research. Design/methodology/approach – A portfolio of 910 publications on IWB collected from the Scopus database was systematically analysed using different bibliometric techniques. Findings – Based on the performance analysis and science mapping of innovative work behaviour research, the study identifies the most prolific sources of IWB publications and lists several future research directions. Originality/value – This paper could serve as one-stop information that may facilitate transdisciplinary endeavours by assisting scholars and practitioners in identifying peer-recognised publications and scholarly communities.

https://www.emerald.com/insight/content/doi/10.1108/PR-11-2020-0854/full/html

6. **Farrukh, M., Raza, A., Mansoor, A., Khan, M. S., & Lee, J. W. C. (2023). Trends and patterns in pro-environmental behaviour research: a bibliometric review and research agenda.** *Benchmarking, 30***(3), 681-696. doi: 10.1108/BIJ-10-2020-0521. Ali Raza (Marketing/KUBEAC) Date of Publication: March 2023 HJRS: X (Honorable Mention)**

Purpose – The paper aims to analyse the current trends and set the future research agenda for pro-environmental behaviour (PEB) research. Design/methodology/approach – The bibliographic data on pro-environmental behaviour research have been extracted from the Scopus database. Findings – Based on the analysis of 2,173 publications, the study presents a performance overview of PEB research in the perspective of different aspects such as the most influential publications, authors, institutes and countries. Also, the study visualises the intellectual network by mapping bibliographic coupling (BC) and co-citation. Originality/value – The study provides a holistic view of trends and future research directions for PEB research based on performance and science mapping, which is a unique contribution to the literature.

https://www.emerald.com/insight/content/doi/10.1108/BIJ-10-2020-0521/full/html

7. **Farrukh, M., Raza, A., & Rafiq, M. (2023). Environmentally specific authentic leadership and team green creative behavior based on cognitive-affective path systems.** *International Journal of Contemporary Hospitality Management,* **35(10), 3662-3680. doi: 10.1108/IJCHM-04-2022-0530. Ali Raza (Marketing/KUBEAC) Date of Publication: August 2023 HJRS: W (Platinum)**

Purpose: This study aims to investigate the role of environmentally specific authentic leadership (ESAL) and cognitive-affective path systems (team passion and goal clarity) in enhancing green creativity at the team level. Design/methodology/approach: Data were collected from hotel employees through a structured questionnaire. Findings: According to the investigation of 130 teams, ESAL influences team green creative behavior (TGCB), and this link was mediated by the team environmental goal clarity (TEGC). Furthermore, the study also finds a moderating role of team environmental harmonious passion (TEHP) between the hypothesized links. Based on these findings, the study discusses theoretical and practical implications. Practical implications: Hospitality organizations looking to encourage teams to participate in TGCB as a whole should make sure that leaders are able to express their true selves. Further, leaders should focus on developing team members' environmental passion and awareness of their TGCB. Originality/value: To the best of the authors' knowledge, this is the first study that summarizes the literature on ESAL, TEHP and TEGC in the new managerial framework of TGCB. The analysis also advances the creativity literature by further expanding green creativity research to the hotel/ tourism discipline and adding authentic leadership to the subtle body of predictors for green creativity at the team level.

https://www.emerald.com/insight/content/doi/10.1108/IJCHM-04-2022-0530/full/html

8. **Latif, S.,** Salleh, S. I. M., Ghani, M. A., & Ahmad, B. (2023). **Developing Management Accounting Systems as a Change Process for Economic Sustainability: A Case of Sportswear Manufacturing SME.** *South Asian Journal of Business and Management Cases,* **12(2), 207-221. doi: 10.1177/22779779231182727.** Shahid Latif (Marketing/KUBEAC) Date of Publication: August 2023 HJRS: Y (Null)

This study intends to explore the change process in developing management accounting systems to ensure economic sustainability under the theoretical underpinnings of dynamic capabilities. A single case study design has been incorporated to explore the change process at a sportswear manufacturing small and medium-sized enterprises (SMEs) based in Sialkot, Pakistan. The rationale for choosing this case site is that this firm has undergone a recent change in the form of developing and using management accounting systems to address economic sustainability concerns. Data were collected via interviews and documents. We conducted 10 interviews and reviewed some internal documents to comprehend the change process. Due to the involvement of multiple organizational actors, the study finds that dynamic capabilities are reflected collaboratively. Due to the collaborative nature of interactions among organizational actors, sensing, seizing and transformation capabilities were termed collaborative dynamic capabilities. Under these dynamic capabilities, the case firm has successfully implemented the change process by developing management accounting systems. The CEO also arranged two training sessions for the workers to facilitate the change process. Furthermore, replacement and production innovation decisions were taken to reflect the change process by bringing change to the existing resource base. This research has contributed theoretically by addressing recent calls to comprehend the change process in the form of management accounting systems to address economic sustainability in the context of SMEs.

https://journals.sagepub.com/doi/abs/10.1177/22779779231182727

9. **Raza, A., & Farrukh, M. (2023). Going green: an application of personal value theory to understand consumers visiting intention toward green hotels in Pakistan.** *International Journal of Contemporary Hospitality Management,* **35(9), 3322-3343. doi: 10.1108/IJCHM-05-2022-0602.** Ali Raza (Marketing/KUBEAC) Date of Publication: August 2023 HJRS: W (Platinum)

Purpose – Personal values, ascribed responsibility and green self-identity (GSI) have been analyzed separately for a long time, but a more in-depth investigation is required on the relationships between these variables and their combined effects on consumers' visiting intention toward green hotels. Thus, this study aims to draw on Schwartz's (1992) personal values framework and ascribed responsibility. It expands the Schwartz personal values framework by incorporating GSI as a moderator to understanding consumers' visiting intention toward green hotels. Design/methodology/approach – Partial least squares-structural equation modeling was used to analyze 387 responses collected through a self-administered structured questionnaire from hotel consumers in Pakistan. Findings – The findings revealed that ascribed responsibility and self-transcendence values were significant factors in predicting consumers' intention toward green hotels. Moreover, GSI significantly moderated between self-conservation values, self-transcendence values and attitude. However, the association between self-conservation values and attitude was found insignificant. Practical implications – This study can assist hotel management in planning and implementing efficient hotel marketing strategies. Hospitality marketers should heed attention to self-transcendence values, ascribed responsibility and stress on using these aspects to sustain green hotels' adoption. Originality/value – The study contributes to the literature on the antecedents of consumers' visiting intention toward green hotels by expanding the Schwartz personal values framework by adding ascribed responsibility. Further, the authors incorporated GSI as a moderator to understand consumers' visiting intentions toward green hotels in Pakistan.

https://www.emerald.com/insight/content/doi/10.1108/IJCHM-05-2022-0602/full/html

10. **Raza, A.,** Farrukh, M., Wang, G., **Iqbal, M. K., & Farhan, M.** (2023). Effects of hotels' corporate social responsibility (CSR) initiatives on green consumer behavior: Investigating the roles of consumer engagement, positive emotions, and altruistic values. *Journal of Hospitality Marketing and Management,* **32**(7), 870-892. doi: 10.1080/19368623.2023.2223571. **Ali Raza, Muhammad Khalid Iqbal, Muhammad Farhan (Marketing/KUBEAC) Date of Publication: October 2023** HJRS: W (Gold)

Recently the hotel industry has been facing immense pressure from several stakeholders, including the government, society, and consumers, to reduce the adverse impact of their activities on the environment. To respond to this pressure, hotels have started implementing various strategies to mitigate their detrimental environmental impact, and one of the strategies is to boost consumers' green behavior. However, there is limited knowledge about the decision-making process behind consumers' green behavior in hotels. Hence, this study aims to provide new insights and fill this critical research gap by exploring why and how hotels' perceived Corporate Social Responsibility (CSR) initiatives influence consumers' green behavior. To achieve this objective, the study investigates the mediating role of consumer engagement and positive emotions and the moderating role of altruistic values on the relationship between CSR and consumer engagement and positive emotions. Data is collected through a structured survey of hotel consumers in Pakistan. The results show that consumers' positive emotions and engagement mediate the effect of hotels' perceived CSR initiatives on consumers' green behavior. Moreover, the study confirms that altruistic values moderate the relationship between CSR, positive emotions, and consumer engagement. Theoretical and managerial implications are also discussed at the end of the paper.

https://www.tandfonline.com/doi/full/10.1080/19368623.2023.2223571

11. **Sharif, S., Yousaf, H. Q., Shaikh, S., Mirza, F., & Gantulga, U. (2023). Hotels' experience of green environment management and innovation performance: stewardship of multiple green drivers.** *Journal of Environmental Planning and Management,* **66**(11), 2295-2322. doi: 10.1080/09640568.2022.2070462. **Farhan Mirza (Marketing/KUBEAC) Date of Publication: September 2023** HJRS: W (Gold)

Drawing on underpinning theories, this study conceptually develops a model helping organizations to transform green strategic mechanisms into a higher hotel's green process innovation performance (GPIP). Using a multi-source survey, the study collected data from 401 respondents in hotels (e.g. 213 CEOs and 188 managing directors/general managers, 198 front-desk managers and 203 production managers). PLS-SEM was used to run regression analysis. The results support that green creativity (GC) is the top among five mediating green drivers, e.g. green organizational identity (GOI), green human capital (GHC), green organizational capital (GOC), and green relational capital (GRC) that strongly supports green strategic intent (GSI) to translate environment strategies into hotel GPIP. Accordingly, GOC highly supports GHC toward the hotel's GPIP compared to GRC. Green knowledge sharing (GKS) negatively moderates the link between GC and the hotel GPIP, but fails to moderate GOI and the hotel GPIP.

https://www.tandfonline.com/doi/full/10.1080/09640568.2022.2070462

Knowledge Units of Social Sciences and Humanities

1. **Khalid, A., Rehman, F. U., Zain Saddique, U. R., & Ilyas, M. Z.** (2023). Relinking Structural Violence: Social Discrimination in Mohsin Hamid's The Reluctant Fundamentalist. *Journal of Survey in Fisheries Sciences*, **10**(2S), 3250-3263. https://doi.org/10.17762/sfs.v10i2S.1519 . **Asad Khalid, Fazeel Ur Rehman, Zain Saddique, Ume Ruqaiya, Muhammad Zaeem Ilyas** (Department of Linguistics & Communication/KUSSH) Date of Publication: 2023 HJRS: Y (Null)

This thesis examines the link between social discrimination and structural violence in Mohsin Hamid's novel The Reluctant Fundamentalist. Structural violence is the theory or a form of violence wherein some social structures or social institutions may harm people by preventing them from meeting their basic needs. The research highlights the protagonist, Changez's identity and shares his experience of how he feels ashamed while living in America and faces issues like social discrimination, and social grievance in the post-event of 9/11. Social and political discourses create discrimination against Muslims in the Western world. Thus, Joan Galtung's theory of structural violence has been used as the primary theoretical framework for the textual analysis of the novel. Therefore, the selected text illustrates oppression and injustice for having different identities. Furthermore, Galtung contends that this type of violence is more hazardous than direct physical violence. Specifically, Hamid portrays the misrepresentation of Muslims in America and the dark face of American society revealing his prominent side. This thesis makes the connection between readers and the protagonist, Changez. The research is qualitative as the data has been analysed through textual analysis techniques. This research may be beneficial to new researchers to analyse other texts of Hamid for exploring the problems of trans nationality of Muslims in America and around the globe.

http://sifisheriessciences.com/journal/index.php/journal/article/view/1519

2. **Nisa, N. U., Aslam, S., & Rashid, T. (2023). Studying the Impact of Social Media on Pakistani ESL Students' Writing.** *Pakistan Languages and Humanities Review, 7*(2), 564-576. https://doi.org/10.47205/plhr.2023(7-II)50 . **Sibtain Aslam, Tayyba Rashid (Department of Linguistics & Communication/KUSSH). Date of Publication: May 2023 HJRS: Y (Null)**

The purpose of this study is to explore the impact of social media on Pakistani ESL students' writing; they used different types of writing (formal and informal) on Facebook and in class settings. The primary data was collected using a questionnaire consisting of 35 questions in five sections. Two hundred questionnaires were distributed among the B.S. (English) students and faculty members of Govt. College & University Lahore and the University of Lahore to collect the data. Facebook was used as an independent and writing as the dependent variable. The SPSS analysis, English assessment test, and the Facebook group were selected for this study to investigate the impact of social media on Pakistani ESL students' writing. The descriptive results showed that Facebook has an impact on Pakistani ESL students writing. The future research should be focused on students' writing improvement using other social networks sites with different research designs.
https://ojs.plhr.org.pk/journal/article/view/465

3. **Nafeesa, S. U., Naseem, M., & Aslam, S.** (2023). **Flipgrid's Role in Enhancing the High School-Level Pakistani ESL Learners' Speaking Skills: A Case Study.** *Annals of Human and Social Sciences, 4*(2), 676-688. http://doi.org/10.35484/ahss.2023(4-II)61. **Maria Naseem, Sibtain Aslam (Department of Linguistics & Communication/KUSSH) Date of Publication: May 2023 HJRS: Y (Null)**

This research aims to explore the general attitude of high school-level Pakistani ESL learners about, Flipgrid to enhance their English-speaking skills and investigate its effectiveness. A technology tool Flipgrid has transformed teaching and learning methods from traditional to nontraditional, promoting ESL learning. This research implied a quantitative method. Data was collected from questionnaires and students' speaking videos from 30 high school-level Pakistani ESL learners with poor English-speaking skills. In data analysis, the results of questionnaires and students' speaking videos were analyzed descriptively through IBM SPSS Statistics version 25. The results showed that above 90% of high school-level Pakistani ESL learners attitude is highly optimistic about Flipgrids's role in enhancing their English-speaking skills (fluency and vocabulary), and it is perceived as approximately 92% effective. This study implies that more research on Flipgrid is required to comprehend how it influences students' speaking skills.
https://ojs.ahss.org.pk/journal/article/view/279

4. **Maqsood, A., Mateen, M., & Husnain, M.** (2023). **IRAN-CHINA DEAL: GEOSTRATEGIC-BALANCING AGAINST US.** *Pakistan Journal of Social Research, 5*(01), 86-93. https://doi.org/10.52567/pjsr.v5i01.1012 . **Asia Maqsood, Muhammad Mateen (IR/KUSSH) Muhammad Husnain (Media and Communication/KUSSH) Date of Publication: March 2023 HJRS: Y (Null)**

The signing of a $400 billion 25-year strategic and economic deal between Iran and China in March 2021 is the latest sign of the two countries' resolve to work together more closely. As a counterbalance to the US and its allies in the Middle East (ME), this bilateral deal is expected to reduce the US influence in the ME. In this context, this paper focuses on China's strategic objectives behind the deal and explores Iran's procures from this deal. Further, the paper also analyses the nature of regional implications incurred by the bilateral arrangement. The study underlines that by strengthening strategic connections with Iran, China will have an unaffected and uninterrupted oil supplies from the Persian Gulf. Apart from the energy supplies, the recent deal offers China a relative strategic advantage in Middle East. Owing to the mounting influence of China through its extensive investments in the Middle East, the paper examines the region as a new front for Beijing to challenge the American supremacy—this time through Iran. Unlike the US, China has taken a development-oriented approach to the region, leveraging Iran's regional power to expand economic ties with neighboring countries through what it refers to as the developmental peace, rather than the Western concept of democratic peace. On the other hand, through this strategic and economic accord, Iran has found it more profitable to pursue an eastward policy for economic and strategic dividends. Likewise, India is cautious of Beijing's two-pronged embrace, with its shrinking cooperation with Iran, notably at the Chabahar, and its recent battle with China in the Himalayas. Given that, this paper not only examines the economic and strategic gains associated with the strategic partnership but also explores its implications over the US footprints in the Middle East and South Asian regions.
https://pjsr.com.pk/ojs/index.php/PJSR/article/view/1012

5. **Abbas, S., & Atta, A.** (2023). **Exploring the Multidimensional Relationship between Second Language Acquisition and Personality Development among Adolescents: An Empirical Inquiry Utilizing a Mixed-Methods Research Paradigm.** *Global Sociological Review, VIII*(II), 136-146. https://doi.org/10.31703/gsr.2023(VIII-II).15 . **Saira Abbas, Aqsa Atta (Department of Linguistics & Communication/KUSSH) Date of Publication: June 2023 HJRS: Y (Null)**

This paper presents a study that explores the dynamic connection between second language acquisition (SLA) and personality development in the context of adolescent learners. The research integrates Albert Bandura's

SocioCognitive Theory (1986) and the Big Five Inventory frameworks to examine various correlated factors. The study consists of two distinct investigations. Drawing upon the theoretical framework proposed by Albert Bandura's Socio-CognitiveTheory (1986), the first analysis delves into the social factors that influence the process of SLA among adolescents. The second study employs a quantitative methodology with a cross-sectional research design. A sample of 300 participants was selected using a sampling technique employed by the investigator. In the quantitative analysis, both descriptive and inferential statistics were applied using the SPSS software. The findings of the Pearson Moment correlation (= .311, P < 0.01) reveal a positive relationship between SLA (M= 79.72, SD= 10.620) and the personality trait of Extroversion (M=110.54, SD= .16.640). In summary, the present research sheds light on the influence of SLA on the development of extroverted personality traits in adolescents. Furthermore, this study provides a framework for future researchers to investigate the multidimensional relationship between second language acquisition and personality development.

https://www.gsrjournal.com/article/exploring-the-multidimensional-relationship-between-second-language-acquisition-and-personality-development-among-adolescents-an-empirical-inquiry-utilizing-a-mixedmethods-research-paradigm

6. **Awan, A., & Atta, A.** (2023). Impact of Online Chat Language on Second Language Learners' written composition: A Corpus Based-Study. *Global Language Review, VIII*(II), 268-294. **https://doi.org/10.31703/glr.2023(VIII-II).24** . **Alia Awan, Aqsa Atta (Department of Linguistics & Communication/KUSSH) Date of Publication: June 2023** HJRS: Y (Null)

This study investigates the impact of online chat language on second language learners and has gained significant attention in the field of language acquisition. The study examines how online chat language influences learners' proficiency, accuracy, vocabulary acquisition, and sociolinguistic competence. By analyzing relevant research studies conducted using the corpus-based methodology, the study aims to provide insights into the advantages and challenges associated with online chat language for second language acquisition. A sample of the corpus of online chat conversations via WhatsApp chat will be compiled, representing various language learners' interactions and finding out the KWIC through online software programmer Sketch Engine. The corpus analysis will be complemented questionnaire conducted with a subset of participants. The findings of this study will contribute to our understanding of the role of online chat language in second language acquisition and provide insights for language learners.

https://www.glrjournal.com/article/impact-of-online-chat-language-on-second-language-learners-written-composition-a-corpus-basedstudy#

7. **Akbar, K., Atta, A., & Awan, A.** (2023). Unveiling Language Hurdles: Exploring Errors in Written English Paragraphs by Secondary School English Learners. *Global Social Sciences Review, VIII*, 443-454. **https://doi.org/10.31703/gssr.2023(VIII-II).41.** **Komal Akbar, Aqsa Atta, Alia Awan (Department of Linguistics & Communication/KUSSH) Date of Publication: June 2023** HJRS: Y (Null)

This study examines error analysis in written English paragraphs by secondary school-level English learners. It focuses on 20 participants from Government Girls High School Sambrial, Sialkot, shedding light on their challenges. These learners from the English group navigate a linguistic landscape where English is not their primary mode of communication. Using Chanquoy's (2001) framework, the study categorizes errors in the learners' written paragraphs. It reveals challenges in spelling,capitalization, prepositions, verbs, and sentence structure, with the most common error being improper usage of English articles. The study offers tangible suggestions and recommendations to empower EFL instructors in addressing the hurdles faced by English language learners. It aims to unlock their potential for confident expression in English. This research invites the   scholarly   community   to   delve into language acquisition and error analysis. Addressing challenges faced by secondary school English learners, it aims to enhance education, empowering the new generation to thrive in an interconnected world.

https://www.gssrjournal.com/article/unveiling-language-hurdles-exploring-errors-in-written-english-paragraphs-by-secondary-school-english-learners#

8. **Abbas, S., & Atta, A.** (2023). Deconstructing Dualities and Challenging Conventions: A Critical Discourse Analysis of John Keats" Ode to Nightingale" as a Postmodernist Manifesto on Art, Nature, Mortality and Existential Consciousness. *Tahqeeqi Jareeda, 7*(1), 1-23. **Saira Abbas, Aqsa Atta (Department of Linguistics & Communication/KUSSH) Date of Publication: June 2023** HJRS: Y (Null)

This paper presents a rigorous critical discourse analysis of John Keats' renowned poem" Ode to a Nightingale" as a postmodernist manifesto on art, nature, mortality, and existential consciousness. The study employs a combination of stylistic analysis, postmodernism, and critical discourse analysis frameworks to examine the intricacies of Keats' poetic discourse. Drawing on the theoretical concepts proposed by Leech and Short (2007), Lyotard (1984), Jameson (1991), and Fairclough (2003), the analysis delves into the challenging of conventional notions, the exploration of postmodernist themes and symbols, and the engagement in postmodernist discourse through language choices and discourse structures employed by Keats in the poem. The stylistic

analysis section employs Leech and Short's (2007) framework to meticulously analyze the various literary devices employed by Keats, including imagery, metaphor, alliteration, assonance, rhyme, and rhythm, in relation to their subversion of conventional notions of art, nature, mortality, and existential consciousness. The postmodernism section draws on the fragmented and multi-perspective approach proposed by Lyotard (1984) and Jameson (1991) to interpret how Keats' exploration of complexities in these themes is reflected through the employment of postmodernist themes and symbols in the poem. The critical discourse analysis section, following Fairclough's (2003) framework, analyzes the language choices and discourse structures employed by Keats, revealing his engagement in a postmodernist discourse that challenges traditional binary oppositions and constructs a nuanced understanding of art, nature, mortality, and existential consciousness. The findings of this study provide valuable insights into Keats'" Ode to a Nightingale" as a postmodernist manifesto, shedding light on the deconstruction of dualities and the subversion of conventional notions in the poem. The study contributes to the scholarly understanding of Keats' literary techniques and thematic exploration from a postmodernist perspective, enriching the discourse on art, nature, mortality, and existential consciousness in Keats' works
https://ojs.gcwus.edu.pk/index.php/tj/article/view/396/244

9. **Razaq, H. R., Aslam, S., Mukhtar, A., & Shahid, C. (2023). An Exploration of Various Ideologies in Pakistani social media: A Critical Discourse Analysis.** *Review of Education, Administration & Law, 6*(2), 227-240. **https://doi.org/10.47067/real.v6i2.326 . Hafiz Raza Razaq, Sibtain Aslam, Abdullah Mukhtar (Department of Linguistics & Communication/KUSSH) Date of Publication: June 2023 HJRS: Y (Null)**

Ideologies are the representations of social practices resulted from particular perspectives of the members of a society. Social media has been credited with playing a major part in the projection of some hidden ideologies. The study tries to analyze how language is manipulated in the construction of ideologies and how these ideologies represent or challenge the sociocultural norms of a society. Moreover, it also investigates the role of social media in propagation and circulation of specific beliefs and perspectives. CDA is a particular study which attempts to analyze and highlight the ideologies proposed both implicitly and explicitly. CDA is primarily concerned with the issues of racism, gender stereotypes and sociocultural norms of a society. The data consists of nine posts selected from different pages of Instagram and drawn through purposive sampling. Qualitative approach is used to analyze the data. The study draws its theoretical framework from Van Dijk's socio-cognitive model. The findings reveal that social media plays a pivotal role in the representation of some sociocultural ideologies as well as the construction of anti-sociocultural ideologies.
https://real.spcrd.org/index.php/real/article/view/326

10. **Khan, M. A., Aslam, S., Shahid, C., & Mukhtar, A. (2023). The Effectiveness of Using Communicative Language Teaching in ESL Classroom by EFL Teachers; An Exploratory Study.** *Review of Applied Management and Social Sciences, 6*(2), 337-350. **https://doi.org/10.47067/ramss.v6i2.328 . Muhammad Abdullah Khan, Sibtain Aslam, Abdullah Mukhtar (Department of Linguistics & Communication/KUSSH) Date of Publication: June 2023 HJRS: Y (Null)**

Success of any innovation in the field of education directly associated with learners' perceptions about that. Communicative Language Teaching is an innovation and this article attempts to discover learners' attitude and perceptions regarding this. This study will be very useful in Pakistan where implementation of CLT is in hot discussion and mostly researchers worked on the perceptions and attitude of teachers. This study is quantitative in nature. Data was collected from students through questionnaire that was adapted from the study of Sandra J. Savignon and Chaochang Wang (2003). The goal of the study is to explore: what reputation Grammar Translation Method and Communicative Language Teaching are enjoying, what new is introduced to fit CLT in Pakistani educational system, whether learners have positive attitude towards communication based activities or not, what are the problems that challenge the implementation of CLT in classrooms, what perceptions do students have towards communication based activities, which classroom activities are serious threat in meeting the goal of communicative ability. Findings show that teachers are aware about the importance of CLT and learners have positive attitude and perception towards communication-based activities. Functional English and English Comprehension is taught that resulted learners can understand classic literature and English movies as well. There is a fair possibility of adopting CLT but their prolonged attachment with Grammar Translation Method, examination system, emphasis on accuracy, preference of mother tongue are the hindrances that blur the concept of implementation of CLT in Pakistan's classrooms.
https://ramss.spcrd.org/index.php/ramss/article/view/328

11. **Abbas, S., Aslam, S., & Nisa, N. U. (2023). Critical Discourse Analysis of Muniba Mazari's Motivational Speeches: Annihilating Conventional Construction of Disability, Gender, Perfection, and Existence.** *Global Sociological Review,* **VIII(I), 146-154. https://doi.org/10.31703/gsr.2023(VIII-I).13. Saira Abbas, Sibtain Aslam, Najam Un Nisa (Department of Linguistics & Communication/KUSSH) Date of Publication: June 2023 HJRS: Y (Null)**

This paper presents a critical discourse analysis of Muniba Mazari's motivational speeches, focusing on deconstructing conventional notions related to disability, gender, perfection, and existence. The study combines stylistic analysis, motivational theory, and critical discourse analysis frameworks to examine the uniqueness of Mazari's speeches. Drawing on the theoretical concepts proposed by Leech and Short (2007), Maslow's Pyramid (1943), and Fairclough (2003), the analysis scrutinizes traditional perceptions through language choices and discourse formation. The stylistic analysis section utilizes Leech and Short's (2007) framework to thoroughly explore the literary devices employed by Mazari to convey her message and persuade the audience. In line with Fairclough's (2003) framework, the critical discourse analysis section examines Mazari's language choices and discourse structures, revealing her engagement in a contemporary discourse that challenges traditional binary oppositions and constructs a fresh understanding of gender, disability, perfection, and existence. Maslow's Pyramid (1943) framework investigates Mazari's speeches' psychological and motivational aspects, highlighting how she influences the audience's psychology and motivates them. This research offers new insights that counter conventional notions and promote a novel perception of gender, disability, perfection, and existence, providing an intellectual understanding of Mazari's figurative language and thematic exploration.

https://www.gsrjournal.com/article/critical-discourse-analysis-of-muniba-mazaris-motivational-speeches-annihilating-conventional-construction-of-disability-gender-perfection-and-existence

Knowledge Units of Health Sciences

1. **Shah, S., Muzammil, S., Khalid, G., Javed, R., Ahmed, D., Altaf, F., & Khalid, A. (2023). The Prevalence of Coccydynia among Postpartum Females in Allama Iqbal Memorial Teaching Hospital, Sialkot: Prevalence of Coccydynia among Postpartum Females.** *THE THERAPIST (Journal of Therapies & Rehabilitation Sciences),* **66-69. https://doi.org/10.54393/tt.v4i1.112 . Saman Shah, Sana Muzammil, Ghannia Khalid, Rameesha Javed, Danyal Ahmed, Faiza Altaf (KUHS) Date of publication: March 2023 HJRS: Y (Null)**

The coccydynia refers to the pain in the coccyx. Its incidence is increasing due to sedentary lifestyles. The problem is commonly seen in postpartum females caused due to prolong sitting, poor breast-feeding position or due to internal and external trauma during labor. ObjectiveTo evaluate the prevalence of coccydynia and its association with postpartum females in Allama Iqbal Memorial Teaching Hospital, Sialkot. This is an observational study and convenient sampling technique is used in it. MethodsThis study includes 90 postpartum females of age between 20 to 44. Data were collected by using a questionnaire containing 16 questions. ResultsOut of 90 postpartum females, the total number of patients having tailbone pain were 86.7% whereas, 8.2% participants had no pain after delivery. ConclusionThe study concludes that the prevalence rate of coccyx pain is very high in postpartum females, due to several reasons. The study mainly focus on providing guidance to the females about the correct positioning, exercises and postural guidance in order to maintain the active lifestyle.

https://www.thetherapist.com.pk/index.php/tt/article/view/112

2. **Altaf, F., Ahmad, D., Zahra, T., Ameen, Z., Tanveer, R., Afzal, M., ... & Khalid, A. (2023). Sleep Quality and Nocturnal Pain in The Patients of Lumbar Disc Herniation: Sleep Quality and Nocturnal Pain.** *Pakistan Journal of Health Sciences*, **197-201. https://doi.org/10.54393/pjhs.v4i05.643. Faiza Altaf, Danyal Ahmad, Zahra Ameen, Rimsha Tanveer Maryam Afzal, Seerat Batool (DPT/KUHS) Date of publication: May 2023 HJRS: Y (Null)**

Patients with lumbar disc herniation frequently report experiencing nocturnal back discomfort that interferes with their ability to sleep adequately. This study's objective is to describe and evaluate the pain and sleep quality of individuals with disc herniation diagnoses. Objective To assess sleep quality and nocturnal pain in patients of lumbar disc herniation. Methods Patients range from 24-65 years, both males and females with positive straight leg raise and prone knee bending test were selected with random sampling technique. Data were collected after filling a comprehensive questionnaire. PSQI questionnaire was used to access quality of sleep disturbance. Visual analog scale was the tool that used to help the person rate the intensity of pain at night. Results The results showed that 6 (12%) had mild disturbance in sleep, 33 (66%) had moderate disturbance in sleep and 11 (22%) had severe disturbance in sleep according to global PSQI. Conclusions According to the findings from our study, lumbar disc herniation has negatively impacted the participants' ability to sleep. Sleep disruption and pain were connected, and nocturnal discomfort affected patient's activities of daily living.

https://www.thejas.com.pk/index.php/pjhs/article/view/643

Summary of UMT Research Outlook 2023
Table I
School/Department wise listing of Publications (Lahore Campus)

School\Departments	Articles	Conference Proceeding/ Papers	Books/Book Chapter	Total
School of Sciences (SSC)				
Department of Mathematics	231	1	1	233
Department of Chemistry	96	-	-	96
Department of Life Sciences	56	-	-	56
Department of Physics	30	-	-	30
Total	**413**	**1**	**1**	**415**
Dr. Hasan Murad School of Management (HSM)				
Department of Banking and Finance	24	11	-	35
Department of Economics and Statistics	61	-	-	61
Department of Quantitative Method	4	-	-	4
Department of Operation & Supply Chain	7	2	-	9
Department of Management	22	-	-	22
Department of Marketing	8	-	-	8
Department of Information System	6	-	-	6
Total	**132**	**13**	**-**	**145**
School of Systems & Technology (SST)				
Department of Computer Science	56	-	3	59
Department of Informatics and System	12	1	-	13
Department of Artificial Intelligence	7	-	1	8
Department of Software Engineering	16	-	1	17
Total	**91**	**1**	**5**	**97**
School of Engineering (SEN)				
Department of Civil Engineering	11	-	-	11
Department of Industrial Engineering	4	-	3	7
Department of Electrical Engineering	11	-	-	11
Department of Mechanical Engineering	7	-	-	7
Total	**33**	**-**	**3**	**36**
School of Social Science & Humanities (SSSH)				
Department of Education	35	-	1	36
Department of Islamic Thoughts and Civilization	7	-	-	7
Department of Sociology	5	-	-	5
Department of Political Science and International Relations	35	2	-	37
Total	**82**	**2**	**1**	**85**

School of Governance and Society (SGS)	6	-	-	6
School of Law and Policy (SLP)	2	-	-	2
School of Design and Textile (SDT)	7	-	-	7
School of Food & Agriculture Sciences	36	-	-	36
School of Health Sciences (SHS)				
Department of Nutrition and Dietetics	13	1	-	14
Department of Biomedical Laboratory Sciences	2	1	-	3
Department of Physical Therapy and Rehabilitation	24	-	-	24
Department of Clinical Services	1	-	-	1
Total	**40**	**2**	**-**	**42**
School of Pharmacy (SPH)	4	1	-	5
Institute of Aviation Studies (IAS)	1	-	-	1
School of Media & Communication Studies (SMCS)	19	-	-	19
Institute of Liberal Arts (ILA)				
Department of Linguistics and Communications	22	1	-	23
Department of English and Literary Studies	10	-	-	10
Total	**32**	**1**	**-**	**33**
School of Professional Psychology (SPP)				
Department of Clinical Psychology	15	1	-	16
Department of Applied Psychology	9	-	-	9
Total	**24**	**1**	**-**	**25**
School of Architecture and Planning (SAP)				
Department of City and Regional Planning	12	-	-	12
School of Professional Advancement (SPA)	8	-	1	9
School of Commerce and Accountancy (SCA)	11	-	-	11
UMOs				
Office of Research Innovation and Commercialization (ORIC)	31	-	-	31
Knowledge and Research Support Services (KRSS)	3	-	-	3
Learning Resource Center (LRC)	1	-	-	1
Total	**988**	**22**	**11**	**1021**

Table II

School/Department wise listing of Journal Articles (Lahore Campus)

Name of School/Department	W Category	X Category	Y Category	Total Articles
School of Sciences (SSC)				
Department of Mathematics	151	62	18	231
Department of Chemistry	58	31	7	96
Department of Life Sciences	36	14	6	56
Department of Physics	14	15	1	30
Total	**259**	**122**	**32**	**413**
Dr. Hasan Murad School of Management (HSM)				
Department of Banking and Finance	11	3	10	24
Department of Economics and Statistics	30	11	20	61
Department of Quantitative Method	1	3	-	4
Department of Operation & Supply Chain	3	3	1	7
Department of Management	8	6	8	22
Department of Marketing	4	1	3	8
Department of Information System	3	-	3	6
Total	**60**	**27**	**45**	**132**
School of Systems & Technology (SST)				
Department of Computer Science	40	14	2	56
Department of Informatics and System	5	4	3	12
Department of Artificial Intelligence	4	3		7
Department of Software Engineering	12	2	2	16
Total	**61**	**23**	**7**	**91**
School of Engineering (SEN)				
Department of Civil Engineering	6	3	2	11
Department of Industrial Engineering	3	1	-	4
Department of Electrical Engineering	8	3	-	11
Department of Mechanical Engineering	6	-	1	7
Total	**23**	**7**	**3**	**33**
School of Social Science & Humanities (SSSH)				
Department of Education	4	5	26	35
Department of Islamic Thoughts and Civilization	1	-	6	7
Department of Sociology	1	1	3	5

Department of Political Science and International Relations	32	3	-	35
Total	**38**	**9**	**35**	**82**
School of Governance and Society (SGS)	**2**	**1**	**3**	**6**
School of Law and Policy (SLP)	**-**	**-**	**2**	**2**
School of Design and Textile (SDT)	**3**	**4**	**-**	**7**
School of Food & Agriculture Sciences	**22**	**5**	**9**	**36**
School of Health Sciences (SHS)				
Department of Nutrition and Dietetics	6	2	5	13
Department of Biomedical Laboratory Sciences	1	-	1	2
Department of Physical Therapy and Rehabilitation	1	-	23	24
Department of Clinical Services	-	-	1	1
Total	**8**	**2**	**30**	**40**
School of Pharmacy (SPH)	**1**	**1**	**2**	**4**
Institute of Aviation Studies (IAS)	**1**	**-**	**-**	**1**
School of Media & Communication Studies (SMCS)	**2**	**-**	**17**	**19**
Institute of Liberal Arts (ILA)				
Department of Linguistics and Communications	6	2	14	22
Department of English and Literary Studies	1	-	9	10
Total	**7**	**2**	**23**	**32**
School of Professional Psychology (SPP)				
Department of Clinical Psychology	1	5	9	15
Department of Applied Psychology	-	1	8	9
Total	**1**	**6**	**17**	**24**
School of Architecture and Planning (SAP)				
Department of City and Regional Planning	4	1	7	12
School of Professional Advancement (SPA)	**6**	**2**	**-**	**8**
School of Commerce and Accountancy (SCA)	**3**	**1**	**7**	**11**
UMOs				

Office of Research Innovation and Commercialization (ORIC)	16	5	10	31
Knowledge and Research Support Services (KRSS)	1	-	2	3
Learning Resource Center (LRC)	1	-	-	1
Total	**519**	**218**	**251**	**988**

Table III

School/Department wise listing of Publications (Sialkot Campus)

Name of School/Department	Articles	Books/Books Ch	Conference Proceedings/ Papers	Total no of Publications
Knowledge Unit of Systems and Technology				
Department of Computer Sciences	9	1	3	13
Total	**9**	**1**	**3**	**13**
Knowledge Unit of Science				
Department of Biotechnology	6	-	-	6
Department of Mathematics	44	-	-	44
Department of Chemistry	15	2	-	17
Department of Physics	2	-	-	2
Total	**67**	**2**	**-**	**69**
Knowledge Unit of Engineering				
Department of Electrical Engineering	5	-	2	7
Department of Mechanical Engineering	9	-	-	9
Total	**14**	**-**	**2**	**16**
Knowledge Unit of Commerce and Accountancy	**1**	**-**	**-**	**1**
Knowledge Unit of Business, Economics, Accountancy and Commerce (KUBEAC)	**11**	**-**	**-**	**11**
Knowledge Units of Social Sciences and Humanities	**11**	**-**	**-**	**11**
Knowledge Units of Health Sciences	**2**	**-**	**-**	**2**
Total	**115**	**3**	**5**	**123**

Table IV

School/Department wise listing of Journals Articles (Sialkot Campus)

Name of School/Department	W Category	X Category	Y Category	Total Articles
Knowledge Unit of Systems and Technology				
Department of Computer Sciences	7	1	1	9
Total	**7**	**1**	**1**	**9**
Knowledge Unit of Science				
Department of Biotechnology	2	2	2	6
Department of Mathematics	19	24	1	44
Department of Chemistry	6	9		15
Department of Physics	1		1	2
Total	**28**	**35**	**4**	**67**
Knowledge Unit of Engineering				
Department of Electrical Engineering	**2**	**3**	**-**	**5**
Department of Mechanical Engineering	**6**	**2**	**1**	**9**
Total	**8**	**5**	**1**	**14**
Knowledge Unit of Commerce and Accountancy	-	-	1	1
Knowledge Unit of Business, Economics, Accountancy and Commerce (KUBEAC)	9	1	1	11
Knowledge Units of Social Sciences and Humanities	-	-	11	11
Knowledge Units of Health Sciences	-	-	2	2
Total	**52**	**42**	**21**	**115**

Table V

Total Number of 2023 UMT Publications

Campus	Total Publications	Total Number of Articles
Lahore Campus	**1021**	**988**
Sialkot Campus	**123**	**115**
Total	**1144**	**1103**