ICASEE

INTERNATIONAL CONFERENCE ON APPLIED SCIENCE, ENERGY AND ENVIRONMENT 2025

ABSTRACT BOOK

January 28th - 30th 2025

Abstracts, Participants & Program

Welcome to the ICASEE-2025

Abstract Book of ICASEE-2025

7th International Conference on Applied Science, Energy, and Engineering (ICASEE-25)

Jan 28-30th, 2025

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FOREWORD

This abstract book comprises the proceedings of the 7th International Conference on Applied Science, Energy, and Engineering (ICASEE-25), co-organized by the Faculty of Education at Tishk International University and Salahaddin University. The conference serves as a prominent platform for the dissemination of innovative research and the exchange of ideas in the fields of applied science, energy, and engineering.

ICASEE-25 highlights a multidisciplinary approach, focusing on diverse disciplines such as Pure and Applied Mathematics and Statistics, Biology and Biomedical Sciences, Pure and Applied Physics, Chemistry and Chemical Engineering, Computer and Data Science, and Environmental Sciences. Emphasis is placed on addressing contemporary global challenges, including clean energy technologies, alternative power resources, climate change mitigation, and environmental sustainability.

This year, over 110 abstracts were submitted from researchers representing 32 universities and institutions. All submissions underwent a rigorous peer-review process by the scientific committee, ensuring the academic quality and relevance of the presented research.

The conference aims to enhance academic collaboration, foster interdisciplinary research, and provide a platform for knowledge sharing among local and international participants. It is particularly significant for researchers in the Kurdistan Region of Iraq, offering opportunities for engagement and scholarly exchange that align with the mission of both Tishk International University and Salahaddin University.

Acknowledgment is extended to the authors, reviewers, organizing committee members, and administrative teams for their contributions to the success of ICASEE-25. The commitment to advancing scientific research and addressing critical challenges is reflected in the quality of the work included in this abstract book.

It is anticipated that the research presented at ICASEE-25 will inspire further innovation and contribute to the development of solutions to pressing scientific and engineering challenges.

Conference Chair
7th ICASEE-25

22	ICASEE-007	Dereen Najat	Survival of hypoalbuminemic burn patients and effect of albumin supplementation on clinical outcomes in critically ill burn patients
23	ICASEE-008	Didar Swara Salih, Shaida Anwar Kakil, Mohammed Issa Hussein	Radiation Protection Properties of Binary and Tertiary Tellurite Glasses: Comparative Study
24	ICASEE-009	Durra H. Farhan, Ghassan A. Bilal, Abdullateef A. Jadallah	Performance Evaluation and Enhancement Opportunities of Photovoltaic Solar Technologies-A Review
25	ICASEE-010	Farhad Ahmed Mohammad, Dashti Arf. Suliaman	Geochemistry Study of Carbonate components in Barzewa and Barsarin Sections, Sargelu Formation, Kurdistan Region, Iraq
26	ICASEE-011	Farhad Abdulrahman Hamad, Maha Raoof Hamoudi	Review of produced oil and gas back allocation approaches in the Iraqi oil and gas fields
27	ICASEE-012	Farhad Abdulrahman Hamad, Maha Raoof Hamoudi	The approach of linking the technology for removing downhole scale in Near-Wellbore Regions of injection wells for Optimizing the Debottlenecking Production Allocation: Methodologies and Case Study Insights from Subsurface Wellbore Constraints
28	ICASEE-013	Goran Saman Nariman, Hozan Khalid Hamarashid	Hierarchical Federated Learning for Health Trend Prediction and Anomaly Detection Using Pharmacy Data: From Zone to National Scale
29	ICASEE-014	Harmand A. Hama	CRISPR-Cas9 Mediated Genome Editing a Promise to Cure HIV: A Systematic Review
30	ICASEE-015	Shayma Hamza Sadon, Prof. Dr. Hassan Hassoon ALDelfi	Utilizing Well Logging Tools to Evaluate Modulus Circulations in Fractured Reservoirs by Techno Software
31	ICASEE-016	Arqam Alomar, Kamal Benyamin Esho, Maab M. O. Mohammed	Study of genetic variance for some genotypes of cabbage plant by using RAPD-PCR technique method in Mosul city

32	ICASEE-017	Dheia G. Salih Al-Khafajy, Lqaa T. Hadi	The effect of the oscillatory flow velocity of an Eyring-Powell fluid through a mag-netized porous channel on its concentration and temperature
33	ICASEE-018	Mahdi Khairi Aswad, Shokhan Azad, Helin Mohammed	Strategic Drilling Decisions Based on Seismic Fault Inclination Analysis for Enhancing Hydrocarbon Recovery in Bijeel and Harir Oil Fields
34	ICASEE-019	Mehmet Ozdemir	How to minimize transportation noise pollution and transportation noise- related diseases using artificial intelligence or techniques. (Systematic) Literature review
35	ICASEE-020	Mohammed Merza	The inhibitor of interleukin-3 protects against Neutrophil Migration in severe acute pancreatitis
36	ICASEE-021	Muhsin Jamil Abdulwahid	Hemolysin Downregulation in Pseudomonas aeroginose and Staphylococcus aureus Induced by Ginger, Red pepper and Mint Extract
37	ICASEE-022	Najat Ameen Saeed	Comparison of aqueous and alcoholic extracts of several compounds isolated from the leaves of Myrtus communis L.
38	ICASEE-023	Namam M. Salih, Dimtriy A. Martyushev, Razaw H. Taha, Akbar A. Saad	Enhancing Well Stimulation Efficiency through Evaluation and Improvement of Matrix Acidizing Design in Upper Cretaceous carbonate reservoir formation
39	ICASEE-024	Oxidative Stress Parameters in Rats Exposed to glyphosate Nazar M.Shareef Mahmood, Shorish Mustafa Abdullah Gorony, Ranjbar Muksy Mohammed Shareef, Kurdo Bapir Chato, Mahnaz Nooruldeen Yousif, Awring	Protective Impact of Scutellaria pinnatifida Extract on Some Biochemical, Haematological and Oxidative Stress Parameters in Rats Exposed to glyphosate

		Ibrahim Mhamadamin	
40	ICASEE-025	Orhan Tug	On the Hahn seuence space h^(2)
41	ICASEE-026	Azad Hussein Amin, Radwan R. Mohammed, Jihan Hussein Rasool, Halmat Ahmed Sulaiman, Bestoon Shekhany	Association of vitamin D deficiency in pregnant and healthy women: A case-control study
42	ICASEE-027	Rebar Ali Tahsen, Shevan Jameel Jirjees, Masoud Hussein Hamed	Delineation of Groundwater Potential Zones (GWPZ) Map Using Geoinformatics by Analytic Hierarchy Process (AHP) Techniques in Central Erbil Sub-basin, North â€“Iraq
43	ICASEE-028	Prof. Dr. Nadhum J. Ismaiel, MS.c Safa Mohammed Salim	Molecular Cytogenetic Study of Chronic Lymphocytic Leukemia Patients Diagnosed in Erbil City Using Fluorescence in Situ Hybridization (FISH) Technique.
44	ICASEE-029	Saif Saad Ali, Mahmoud Mustafa mahdi, Majida Khaleel Ahmed	A Comprehensive Review of Solar-Thermal Water Pumping Mechanisms
45	ICASEE-030	Sardar Qader Othman, Barzan Nehmat Sabr	Noise Pollution from Electrical Power Generators in different Areas of Erbil city and Its Effects on The Health of It Is Workers
46	ICASEE-031	Sawza Saadi Saeed, Sleman Yahya, Umar Sa’ad Aliyu, Azlan Muhammad Noorazlan, Shaymaa Muhammed, Rzgar Asad, Faisal Usman Muhammad, Musa Muhammad Tanko, Shaibatu Ibrahim Hassan	Spectroscopic and Radiation Shielding Properties of Er2O3 Nanoparticles Doped Silica Borotellurite Glasses

47	ICASEE-032	Sawza Saadi Saeed	The Effect of Hard Work and Environment of Work Place on Blood Pressure and Heart Rate
48	ICASEE-033	Shayma Muhammed Amed, Salih Omer Haji, Sawza Saadi Saeed, Sleman Yahya Rasul	Evaluating Electron Radiation - Stopping Power in some Organic of Human Tissues
49	ICASEE-034	Sharmeen I Hasan, Salisu Ibrahim	Chebyshev-Based Methods for Solution of Nonlinear Differential Equations
50	ICASEE-035	Shevan Jameel	Assessment and Comparison of Meteorological Drought Indices Using the Reconnaissance Drought Index (RDI) and Standardized Precipitation Index (SPI) in Duhok City, Northern Iraq
51	ICASEE-036	Shevan Jameel Jirjees, Masoud Hussein Hamed	Drought Analysis in Kurdistan Governorates (Duhok, Erbil and Sulaimaniyah) By Using Standardized Precipitation Indices
52	ICASEE-037	Suran Dunun Yaseen	High-Power Detection Solutions using Laser Fabry-Perot Interferometers
53	ICASEE-038	Wareen Farzand Madhat, Runj Mazher Alnakishbandi, Nawzad Aziz	THE INFLUENCE OF HUMIDITY ON SHEEP PERFORMANCE AND ECTOPARASITE FAUNA DENSITY DURING WINTER IN THE ERBIL PLAINS
54	ICASEE-039	Wasfi Kahwachi	Image Deblurring: Journals and Articles Survey and Statistical Analysis
55	ICASEE-040	Wazeera R. Abdullah, Asia A. M. Saadullah	Prevalence, Molecular identification, and Genetic relationships of oral and nasal Candidiasis in COVID-19 patients
56	ICASEE-041	Zhikal Omar Khudhur	Artificial Intelligence in Ovarian Cancer: Advancing in Diagnosis, Prognosis, and Therapeutic Strategies

57	ICASEE-042	Hero M. Hussein, Younis A. Sabawi	Numerical Study of Nonlinear Reaction-Diffusion Equation in Catalytic Pellet Model Using Finite Element Method
58	ICASEE-043	Aamer M. Al-Ma'thidy, Kamal B. Esho, Noor N. Al-Talab	Classification Of Some Onion (Allium cepa L.) Cultivars By Using Molecular Markers
59	ICASEE-044	Mohammad Salim, Aya Sarkwat, Taha Basheer	Exploring the Adoption of AI in Governmental Work: Pathways to Sustainable Development
60	ICASEE-045	Abdullah Kurudirek	Examining the Relationship Between Area and Perimeter in Galilean Geometry for Similar Quadrilaterals
61	ICASEE-046	Goran Saman Nariman, Hozan Khalid Hamarashid	Analyzing and Classifying Data Format Strategies for Efficient Communication in Federated Learning
62	ICASEE-047	Dr. Mahdi Khairi Aswad	Source Rock Evaluation through Well Logging Data and Pyrolysis Analysis: A Study of the Kurra Chine Formation in Well-6, Peshkhabir Oil Field, Kurdistan, Iraq
63	ICASEE-048	Ardalan H. Awlla, Tarik A. Rashid, Ronak M. Abdullah	A review on fitness dependent optimizer: past, present, and future
64	ICASEE-049	Sazan Moffaq Abdulaziz, Heshu Jalal Ahmed, Rezhin Sleman Ashqi, Saba Hawar Mustafa, Samyan Elham Khalid	Exploring oral colonization of Candida species in Diabetic individuals: A case-control study
65	ICASEE-050	Dana Luqman	MORPHOLOGY AND MEDICINAL USES OF PUNICA GRANATUM IN KURDISTAN REGION
66	ICASEE-051	Runj Alnakishbandi	Winter Cold Stress and Ectoparasite Adaptation in the Erbil Plains: Sustainable Strategies Amid Climate Change

67	ICASEE-052	Hawzhin Abdulkhaleq Asaad, Ali Hassan Ahmed	Radiological assessment of radon concentration in meal plates available in Erbil city, Kurdistan Region of Iraq
68	ICASEE-053	Anvarjon Sharipov, Fayzulla Topvoldiyev, Mirzabek Mamasoliyev	Restoration of The Surface by Conditional External Curvature
69	ICASEE-054	Sarah Hassan Awad Al – taee, *Rana Fadhel Atiyah*, Waleed Amin Mahmoud Al – Jawher	COOT- Optimized Feature Selection Combined with Multiwavelet Transform and Neural Networks for Liver Tumor Classification.
70	ICASEE-055	Abulfadhel Amer Altufaili	A Novel Hybrid Approach Combining Autoencoders and Ensemble Learning for Heart Disease Classification
71	ICASEE-056	Israa Sh. A. R. Al-kadi, Zainab A. Jabarah, Sana H. Awad, Mayson Thafir Hadi	Grafting Azobenzoic Compounds with Paracetamol Units and Biological Activity Evaluation (A Comparative Study)
72	ICASEE-057	Alaa Hussein Ali, Faris Salih Alatallah, Yahya Abdulkareem Salman	Nano-Zirconium Oxide Reinforcement in Aluminum 7075: A Study of Thermal, Electrical, and Physical Enhancements
73	ICASEE-058	Maryam Nadhim, Salam Alaugby	Personalized Book Recommendation Based on MBTI (Myers Briggs Type Indicator)
74	ICASEE-059	Pary Hadi, Amani Tahsin	Optimizing Nutrition and Dietetics: Sustainable Approaches for Health and Environmental Impact
75	ICASEE-060	Khaled Baamran, Qasim AL-Naddaf, Shane Lawson, A. Ali Rownaghi, Fateme Rezaei	Kinetic process assessment of H2 purification over highly porous carbon sorbents under multicomponent feed conditions

76	ICASEE-061	Nibras Hadi Jawad, Prof. Dr. Salah Abdulhadi	Adapting CNN to work with homomorphic algorithms for secure prediction
77	ICASEE-062	Aynda A. Rasool, Sara Q. Kamal	The Effect of Household Storage Tanks and User Practices on the Physical, Chemical, and Microbiological Quality of Water in Erbil City.
78	ICASEE-063	Pure. K. Al-Asadi, Ahmed A. Omran, Zainab Yasir Alrikabi	Exploring Co-0,1-Neighborhood Captive Domination in Graphs
79	ICASEE-064	Wala Dizayee, Mayyada M. Hamarashid, Mohammed Zorah, HassabAlla M. A. Mahmoud , Mohammed Al-Bahrani, Anmar Ghanim Taki, G. Abdulkareem-Alsultan, Maadh Fawzi Nassar	Synergistic effect of Ni(OH)2 and MXene nanosheets in 3D framework on the improvement of dielectric, energy storage, mechanical and thermal characteristics of polyvinylidene fluoride(PVDF) polymeric composites
80	ICASEE-065	Ibrahim Fatih Rasul, Omar Azad Khorsheed, Nabaz Ali Abdulrahman, Mohammed Ariwan	Reservoir Characterization Through Comprehensive Interpretation of Well Log Data
81	ICASEE-066	Reham Mahmood Yaseen, Ali Khalid Jassim	A Reconfigurable Reflectarray Structure based on Metamaterial Unit Cells for 5G Applications
82	ICASEE-067	Sawsan Al-Rawi, Ahmad H. Ibrahim, Alaa Ahmad Hamdy	A Holistic Natural approach:Potential Therapeutic Interventions in Ovarian Cancer
83	ICASEE-068	Iman Mohsin Hassan, Haider M. Al-Mashhadi	Attendance Management System for the Students in College of Information Technology using IoT and QR Code
84	ICASEE-069	Chenar Abdulla	Exploring Lattice-based Key Exchange protocols

85	ICASEE-070	Abdullah Kurudirek, Delan Sarhang, Bnar Karim, Sanzharbek Erdolatov	An Approach to Solving Transcendental Equations for High School Students Using Technology: A Case for Curriculum Integration
86	ICASEE-071	Abdullah Kurudirek	Introducing High School Students to the Mystery of Lobachevsky Geometry
87	ICASEE-072	Omar Azad Khorsheed, Ibrahim Fatih Rasul, Al-Hussein Z. Altaher, Mohammed Shihab A. Arkawazi	Advancing Oil Recovery: Systematic Evaluation of EOR Techniques from Primary to Tertiary Stages
88	ICASEE-073	Shnyar Qadir, Sawsan Hamid, Ahmed Hamdy	Therapeutic pathways mechanism of Angiogenesis
89	ICASEE-074	Yara Arjuman Hashim	Personalized Nutrition Plans: A Strategy for Preventing Overweight and Related Health Conditions using Machine Learning
90	ICASEE-075	Maria Kawa, Prof. Dr. Nabeel Ezzulddin Arif	Computation of Some Topological Indices of Certain Chemical Structure
91	ICASEE-076	Sivar Aziz	Temperature variations effect on physical behaviors of Ti50Ni39Zr10Nb1 low temperature shape memory alloy (LTSMA)
92	ICASEE-077	Slvar Abdulazeez, Saia Hasan, Ahmad Shwan	Let me pass: Development of a Car Parking Communication System for Enhancing Urban Traffic Management in Erbil, Kurdistan
93	ICASEE-078	Aisha Koprulu, Abdulelah Yaseen, yahya khaleel karee, Afrah Turki Awa, Adem Atmaca	The effects of temperature, dust and cement-coal particles on PV panel performance: a case study in Iraq
94	ICASEE-079	Alaa Dhari Jawad Al-Bavati, Qusay Al Obaidi, Thamer Adnan Abdullah, Khalida A1 Azawi, Zainab J. Abdul-	Titanium Dioxide/Manganese Oxide Nanoparticles Modified MWCNTs for Bromothymol Blue Removal from Water

		Zahra, Mukhtar Ali Hussein	
95	ICASEE-080	Hadeel K. Abood, Abdul Rahman S. Juma	Study of Univalent Functions on Quasi Subordination Associated with Hadamard Product
96	ICASEE-081	Ahmed Kareem Shibeeb, Salah Albermany, Sadiq A. Mehdi	Chaos-Enhanced Image Security: Leveraging Josephus Trajectory and Simultaneous Confusion-Diffusion
97	ICASEE-082	Ahmad Aswad, Muslim Ahmed, Aland Qader	Chamk: A Crowdsourcing Approach for Increasing Multimedia Data in the Kurdish Language
98	ICASEE-083	Van Abubakir, Govand S Kadir	Augmented Reality: Developing Augmented Reality Technology Based Business Card
99	ICASEE-084	Noor Rabah Taha, Faleh Lafta Mater	Study of the effect of continuous laser (450nm) on the optical and structural properties of a thin film of organic semiconductor (TPD)
100	ICASEE-085	Suzan.B Ismail, Dalshad.A Darwesh	Impacts of Landfill leachate on Soil quality in Kani-Qrzhala landfill area Erbil city and using biochar as remediation agent
101	ICASEE-086	Shahla Sherwan Rasool, Raad Mohammed Abdullah, Karwan Kawa Hamakarim, Badir Qadir Surchi and Dalshad Aziz Darwesh	Health Risk Assessment of Heavy Metals in Selected Culinary and Medicinal Herbs: A Case Study of Rose, Thyme, Turmeric, Chamomile, and Fenne
102	ICASEE-087	Diman Jacksi[1], Sevar Dilkhaz[2], and Manal Maher[3]	**FLOOD RISK AND IMPACT ASSESSMENT IN THE KURDISTAN REGION OF IRAQ: A COMPREHENSIVE LITERATURE REVIEW**

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Keynote Speakers

Iraq and the Kurdistan Region: Unlocking Natural Gas Potential Amid Global Energy Challenges

Howri Mansurbeg

Directorate of Scientific Research Center, Salahaddin University, Erbil, Iraq

Abstract

Iraq and the Kurdistan Region collectively hold vast untapped natural gas reserves across key petroleum provinces, positioning them as potential contributors to addressing global energy demands. This study explores the feasibility of Iraq and the Kurdistan Region transitioning into significant natural gas exporters, with a focus on poorly explored fields such as Akkas and other untapped resources in the Western Desert of Iraq, alongside Bina Bawi, Miran West, and Khor Mor in the Kurdistan Region. Despite shared opportunities, each region faces distinct challenges. Iraq's fields suffer from flaring inefficiencies, infrastructure deficits, and regulatory complexities. Meanwhile, the Kurdistan Region grapples with unresolved political disputes, limited pipeline connectivity, and competition, as well as uncertainties over market access. The analysis highlights the critical role of targeted infrastructure investments, enhanced security, and strategic partnerships to unlock full export potential. By leveraging their respective advantages, Iraq and the Kurdistan Region could become part of the solution to Europe's energy crisis, while fostering regional economic growth and supporting global energy diversification.

Water Scarcity and Water Conflicts: Their Environmental Impacts and Threats to International Security and Peace

Abdelazim Mohamed Negm

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ABSTRACT

Water scarcity, transboundary water, aging infrastructures, climate change, water quality degradation, and institutional limitations are all or some the main challenges facing arid and semi-arid countries, particularly Iraq and Egypt. Both countries are implementing comprehensive plans to manage water resources, considering the sustainability pillars, namely, social, economic and environmental pillars. The integrated water resources management, water conservation, development of alternative water resources, seeking regional collaboration, infrastructures modernization, capacity building, reform of the existing water governance and involvement of public-private partnership are some of the ongoing strategies in both countries. On the other hand, the implemented storage dams upstream of both countries affected significantly and partially the water supply to both countries. This presentation will focus on the balance of water resources, the water shortage situation, and how upstream dams affect water resources in both countries. On the other hand, water scarcity leads to water conflicts between countries sharing the same water resources. The water conflicts in both countries with the countries sharing the same main source of water will be discussed too. Furthermore, the impacts of water conflicts on then the local environments of both countries will be discussed. Additionally, some water conflicts and their threats to international security and peace will be discussed. In closing the presentation, several recommendations will be presented for future research to help both countries tackle the water resources challenges they face.

Keywords: Water scarcity, Water resources challenges, Water conflicts, Transboundary water, Environmental impact.

Artificial intelligence for a better world: sustainable health and environment

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ABSTRACT

The fourth industrial revolution has brought many societal and technological improvements that changed the way we live. The fourth industrial revolution has built on the preceding revolutions in automating processes, scaling them up and connecting them. This was facilitated by many industry 4.0 technologies of which key players were big data, artificial intelligence, sensing and block chain. Big data storage was facilitated by high performance computing, cloud computing and edge computing that enabled storing large amounts of data and sharing it in real-time across the globe. Generating big data was facilitated by automation, blockchain and sensor technologies that allowed collecting and sharing large samples in short time frame. Such examples of sensors included environmental sensors for collecting soil, water and air quality. Yet, big data availability on its own was not sufficient if the outcomes of the data were not sustainable or of use to the planet and population. In these terms, the AI revolution enabled to learn from big data, understand problems, and make predictions above and beyond these problems. AI started initially with narrow intelligence that was limited to one area of research on one problem. Then this expanded to general intelligence that was equivalent to humans in performing tasks. General intelligence evolved later to super intelligence where computers outperformed human intelligence in every field. The latter is known as machine consciousness and was seen in autonomous humanoids that are able to make predictions and take decisions independent of human intervention. All AI, whether narrow, general or super, showed many benefits to the environment and population on the planet. In terms of environment, AI showed affordable, safe, adaptable and sustainable solutions for diverse issues such as climate change, food security, decreased crop levels. This was facilitated by sensors, robots, GPS systems and databases that enabled AI algorithms to learn optimal procedures, make early predictions and interventions in real time. Likewise, in the healthcare and medical sector, AI advanced medical diagnosis, prevention and treatment and that was accelerated by sensors, robots, software and intelligent algorithms. Specifically deep learning algorithms addressed issues in medical data linked to unstructured and large datasets that had missing information and/or incomplete information. Challenges to such data is usually encountered in many fields of medicine including disease diagnosis, surgical procedures, medicine error, personalised treatment, and medical supply chain. By applying deep learning in such area treatment and decision-making developed to be more accurate and precise. In summary, AI and industry 4.0 technologies showed a promising present and future in speeding up and scaling up processes while at the same time maintaining prediction accuracy.

Nature’s Hidden Treasures "Unleashing the Potential of Microbial metabolites for Therapeutics

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ABSTRACT

The development of antibiotic resistance has become a huge worldwide health concern, which has been made worse by the growing consumption of antibiotics in human medicine and veterinary activities, as well as the misuse of antibiotics. It is clear that there is an immediate and critical need for innovative therapeutic compounds that are capable of efficiently combating diseases that are resistant to treatment. When it comes to the search for new therapeutic molecules, natural sources including microorganisms have emerged as a potentially fruitful frontier. Studying microbial metabolomics is essential for understanding the biochemical process of new pharmacologically active substances. Microbes’ metabolic skills allow scientists also to discover and produce novel medicinal molecules. The presentation explores the complex genetic and metabolic mechanisms of multi-modular complex and hybrid polyketide synthase and non-ribosomal peptide synthetase enzymes that are involved in production of these bioactive compounds. By examining these pathways’ mega-enzymes, we can learn about the full biosynthesis mechanism as well as genetic regulation that generates bioactive chemicals and creating new molecules through combinatorial biosynthesis and synthetic biology. Through the presentation we demonstrate the latest findings and advances in this field, focusing on how secondary metabolites of microbial cells play an essential role in transforming healthcare, and explain the enormous potential of bacterial metabolites to improve healthcare by reviewing all of the newest discoveries in this area. Moreover, to get people thinking again about how important it is to protect and use the biochemical variety found in nature in order to solve important medical problems. Discovering how microbes produce new substances has the potential to revolutionize healthcare by allowing us to create treatments that are more efficient, longer lasting, and creative.

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Abstracts

Large-Scale Deep Learning Based Face Recognition Utilizing Vector Database Technologies: Current Trends, Challenges and Solutions

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ABSTRACT

The increasing reliance on face recognition systems across industries such as security, healthcare, and social media has spurred significant advancements in the underlying technolo-gies. This study explores the integration of vector database technologies in large-scale, deep learning-based face recognition systems, focusing on current trends, challenges, and solutions. Advancements in deep learning methodologies, particularly convolutional neural networks (CNNs), have significantly improved feature extraction capabilities for face recognition. These systems demand efficient management of high-dimensional data outputs, which vector data-bases address effectively. The research identifies critical challenges, including scalability, computational resource constraints, latency, and security, which must be overcome to ensure efficient deployment. Various approaches are discussed to enhance the performance and robust-ness of these systems while maintaining real-time application capabilities. Emphasis is placed on the potential of vector databases to optimize the management and retrieval of data, facilitating faster and more accurate face recognition. The findings contribute to the development of more efficient and scalable face recognition systems, supporting their application in diverse real-world scenarios.

Keyword: Deep Learning, Face Recognition, Vector Databases, High-Dimensional Data, Convolutional Neural Networks (CNNs).

Isometry and Similarity of Surfaces in Semi-Euclidean Spaces

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ABSTRACT

The fact that the metric in semi-Euclidean spaces consists of two parts requires solving the problems of surface isometry and shape similarity differently from the case in Euclidean geometry. The article defines a multidimensional semi-Euclidean space and shows how the first quadratic form of a surface is determined within it. It is demonstrated that in Galilean space, which is a three-dimensional semi-Euclidean space, the first quadratic form of a surface does not fully define the Gaussian curvature of the surface in Galilean space. It has been proven that only within the class of surfaces of revolution does the full isometry of the surface lead to the equality of the surfaces. In the Galilean plane, which is the only semi-Euclidean plane, the similarity of triangles has been defined in several ways, and theorems concerning the similarity of triangles have been proven.

Keyword: curvature, isometry, Galilean space, semi-Euclidean space, similarity, special line.

Biological activity of Citrullus lanatus (Thunb.) Matsum. and Nakai: A Review

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ABSTRACT

Throughout history, plants have been used as reliable and effective medicines to treat a wide range of diseases. One such plant is Citrullus lanatus, commonly known as watermelon. C. lanatus belongs to the Cucurbitaceae family, genus Citrullus, species Citrullus lanatus. Citrullus lanatus is widely consumed globally owing to its flavor and substantial water composition. This research harmonizes Citrullus lanatus research, enabling direct comparison of findings from many sources to arrive at a scientific consensus. Research publications were retrieved from Elsevier, Springer, Google Scholar, Taylor & Francis, Pubmed, and Scopus databases using keywords such as "C. lanatus," "chemical composition," "antioxidant," "antibacterial," "anti-diabetic," "anticancer," and other relevant topics. This paper discovered that research conducted in vitro and in vivo shows that C. lanatus by-products, mainly fruit and seed extracts, can help prevent and treat a variety of ailments due to their antioxidant, antimicrobial, antidiabetic, anticancer, anti-analgesic, antiulcer, and hepatoprotective properties. The review results showed that the extract is safe for consumption at a 2000 mg/kg dosage. Ethanol is extensively utilized, primarily due to its ability to safely facilitate internal consumption of the final products by consumers of herbal extracts. Studies have scientifically demonstrated that C. lanatus fruit has medicinal potential, and this research showcases the significant potential of C. lanatus as a medicine that can be effectively harnessed for pharmacological purposes. However, well-designed clinical trials should further determine the mechanisms of action and clinical assessments to validate preclinical data.

Keyword: Antioxidants, Cancer, Drug, Medical, Pharmacology, Plants.

Properties of Certain Sequence Spaces and Corresponding Matrix Classes

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ABSTRACT

For k = 1, 2, 3, ..., this paper establishes that the sequence spaces Mk, bvk and $bv_0(k)$ introduced in (Dawson, 1969) are Banach spaces. Their topological properties, algebraic properties, α−, β−, γ duals are invetigated. These investigtigations were left open. Further, we characterize the matrix classes (X, Y) corresponding to these sequence spaces, such that X = {M_k, bv_k and $bv_0(k)$} and Y = {c, c_0, $l\infty$} are paired and chracterized interchangeably.

Keyword: Banach spaces, properties, duals, matrix classes and charcterizations.

An analysis of the photometric light curves of the Algol binary star AL GEMINORUM

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ABSTRACT

The Algol-type eclipsing binary AL We analyzed Gem's CCD light curves using Binary maker (BM3) and Wilson-Devinney methods, revealing surprising geometric and absolute properties. Due to the light-time effect, system orbit times may cycle. This means that the light curve solution contains a third light component. Comparisons include light curve analysis and third-body metrics. The absolute properties of the eclipsing binary's individuals dictated its evolutionary phase. We calculated the bolometric magnitude, Roche lobe radii, and spot solution parameters of the selected star. Tertiary entities can cause light curve asymmetry.

Keyword: Binaries stars; Light curve; Light photometric; Roche loop; Third body, Spot parameters.

Facies analysis and Depositional environment of Lower Jurassic (Sehkaniyan Formation), Northeastern Iraq-Kurdistan region

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ABSTRACT

Facies analysis and depositional setting of the Lower Jurassic Sehkaniyan Formation was studied in warte section within Handreen anticline in the Imbrcation Zone, Rawanduz area, Northern Iraq. In the Handreen anticline, the Sehkaniyan Formation overlies the Sarki Formation and underlies the Sargelu Formation with conformable and gradational boundaries. The carbonate successions of the Lower Jurassic Sehkaniyan Formation represent shallow water deposits in the northern Iraq. These successions were investigated using detailed field observation and petrographic study in order to investigate their facies analysis and depositional environment approaches. In the studied area, the Sehkaniyan Formation divided into three parts; the lower part consists of dark grey thick bedded dolomitic limestone and brown to dark brown brecciated dolomitic limestone. The middle part comprised of grey to yellowish grey medium to thick bedded limestone and dark grey dolomitic limestone intercalated with thin bedded shale. While, the upper part consists of dark grey thick bedded dolostone, light grey thick bedded brecciated dolomitic limestone and massive dark grey dolomitic limestone. Facies analysis demonstrated a wide range of facies associations, which suggested the deposition in a Shoal, Lagoon and Tidal flat environments in an inner homoclinal ramp setting.

Keyword: Facies, Lower Jurassic, Northern Iraq, Depositional environment, Sehkaniyan Formation.

Survival of hypoalbuminemic burn patients and effect of albumin supplementation on clinical outcomes in critically ill burn patients

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ABSTRACT

Background: hypoalbuminemia is common in burn patients and is strongly associated with poor prognosis and increased mortality. In clinical practice, serum albumin is corrected in hypoalbuminemic patients through albumin replacement however, this practice is controversial. Purpose: the main aim of this study was 28-day survival of hospitalized burn patients with serum albumin levels of < 3.5gm/dL at admission. Secondary outcome measures included the association of hypoalbuminemia with the total surface burn area (TSBA%), and effect of albumin supplementation on serum albumin levels of burn patients. Methods: this was a retrospective study of 106 burn patients. Patient demographic and serum albumin levels were collected from hospital records. Survival curve of low and normal serum albumin levels was estimated by Kaplanâ€“Meier analysis, and the log-rank test was used for comparison. A $p<0.05$ was considered significant. Results: patients with low serum albumin levels had significantly lower survival compared to those with normal albumin levels ($p <0.05$). 82.2 % of hypoalbuminemic patients died within 28 days hospitalization. Serum albumin level of 71.7% of severely dead burned patients didnâ€™t reach normal range following albumin infusion and/or Biseko supplementation, 21.7% of the patients with severe burn patients had lowered albumin levels even after administration of albumin and Biseko solutions. Conclusion: hypoalbuminemia associated with poor clinical outcomes in major burn patients and albumin supplementation didnâ€™t improve the survival in the majority of burn patients. Considering the cost of albumin and overall clinical advantages, it is essential to reassess the supplementation of albumin in major burn patients.

Keyword: serum albumin, intensive care unit, burn patients, critical medicine.

Radiation Protection Properties of Binary and Tertiary Tellurite Glasses: Comparative Study

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ABSTRACT

The theoretical estimation of the radiation shielding property was done for a series of binary and ternary tellurite glasses. TeO_2-based glasses were modified with some binary chemicals like Bi_2O_3, WO_3, ZnO, and PbO, along with their ternary combinations including Ta_2O_5. Their characteristic parameters such as mass attenuation coefficient, effective atomic number, and electron density have been calculated to test the efficacy of these glasses for shielding gamma radiation. The results demonstrated that the binary system TeO_2 + Bi_2O_3 possesses more substantial shielding performance compared with other investigated binary glasses. Among the ternary combinations, the TeO_2 + Bi_2O_3 + PbO glass was confirmed as the most efficient material. This work testifies to the efficiency of the tellurite glasses for their use as promising materials in radiation shielding applications due to the improved performance with the addition of Bi_2O_3 and PbO.

Keyword: Keywords TeO2, binary, and ternary, half and tenth-value layer, effective atomic number, and electron density state.

Performance Evaluation and Enhancement Opportunities of Photovoltaic Solar Technologies-A Review

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ABSTRACT

The performance of photovoltaic (PV) and photovoltaic thermal (PVT) solar technologies is critically affected by environmental factors like a dust accumulation, shading, wind speed, and temperature. Dust on solar panels reduces light absorption, leading to decreased energy output. A dark cell makes a lot less electricity than one that isn't shaded , Shading causes partial sunlight obstruction which significantly impacts power generation due to the sensitivity of PV cells to uniform illumination. Wind speed affects the thermal regulation of solar panels; high wind speeds can enhance cooling and improve efficiency, while low speeds may cause overheating. Additionally, temperature variations directly influence the electrical efficiency of solar cells; higher temperatures typically reduce their performance. This study conducts extensive experimental and simulation evaluations to assess the impact of these parameters on the efficiency and reliability of PV and PVT systems. Mitigation measures, such as regular cleaning schedules, optimal panel location, and advanced material designs, are presented to address these environmental concerns. The study emphasizes the importance of incorporating environmental issues into solar technology design and maintenance in order to enhance performance and economic feasibility. Addressing these difficulties will improve the efficiency and longevity of solar energy systems.

Keyword: Photovoltaic systems, Performance evaluation, Dust effect, shading, Cell temperature.

Geochemistry Study of Carbonate components in Barzewa and Barsarin Sections, Sargelu Formation, Kurdistan Region, Iraq

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ABSTRACT

Sargelu Formation (Middle Jurassic) is characterized by a wide geographical distribution in Iraq and neighboring countries. This study includes two sections Barzewa and Barsarin locations in Erbil Governorate of Kurdistan region, Iraq.The inorganic Geochemistry and mineralogical properties were recorded. Twenty one samples of Sargelu Formation carbonates were gathered from both locations. The X-ray diffraction and Fourier transform infrared (FRIR) Show that main components of minerals are calcite, dolomite, quartz and some clay minerals. Scanning Electron Microscope (SEM) explained carbonates are euhedral and anhedral calcite and dolomite.Depending on Al_2O_3/TiO_2 ratio and SiO_2 composition source rocks of Sargelu Formation are intermediate in character and have an Al_2O_3/TiO_2 ratio of 17.39, which indicates that their parent rocks are intermediate in composition.The depositional environment of Sargelu Formation situated in shallow marin to marin environments on sea ramps, which bring it sun lights depending on the V vs Al_2O_3 diagram, and as it appears Scanning Electron Microscope show presences of Coccoliths. Coccoliths are almost exclusively marine and are found in large numbers throughout the sunlight zone of the ocean.

Keyword: Erbil Governorate , Inorganic geochemistry, Mineralogy, Trace elements, Coccoliths.

Review of produced oil and gas back allocation approaches in the Iraqi oil and gas fields

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ABSTRACT

The combination of hydrocarbons from various sources or streams have shared production or transportation facilities presents a notable financial benefit in terms of cost savings. Typically, the individual overseeing the joint facility would be required to retrospectively assign the entire volume of hydrocarbon fluids received (or the discrepancy) at the joint facility to each of the contributing channels. This review article approaches the method of hydrocarbon allocation in the Iraqi oil and gas fields and critically examines the frequently misunderstood concepts related to hydrocarbon allocations, including allocation structure, allocation types, and allocation measurement. Every system possesses its own advantages and drawbacks. To arrive at an optimal decision, it is imperative to seek guidance from individuals possessing specialized knowledge and experience established by the state of Iraq. It is often observed that design of metering in every field suffer from lack expertise in metering, therefore requiring the evaluation of an independent specialist is recommended. In certain cases, it is advantageous to establish a standard meter type to facilitate easier calibration, maintenance, and availability of spare parts. The review paper entitles certain obstacles that operators frequently encounter when carrying out hydrocarbon allocation. Several constrains pertaining to allocation exist, including the discrepancy in measurement uncertainty of the allocation flowmeter, incidences of pipeline theft, disruptions in the process, shrinkage factor, and flash factor. Drawing on the existing body of literature, the manuscript has outlined several recommended approaches for promoting fairness and transparency in the allocation of hydrocarbon resources. In the land of meter technology, there exists a wide range of varieties, and at regular intervals, novel approaches are introduced for commercial purposes.

Keyword: Hydrocarbon, production metering, Accuracy, Allocation, oil and gas fields.

The approach of linking the technology for removing downhole scale in Near-Wellbore Regions of injection wells for Optimizing the Debottlenecking Production Allocation: Methodologies and Case Study Insights from Subsurface Wellbore Constraints

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ABSTRACT

This paper investigates the challenges posed by scaling and plugging in the in and near-wellbore regions of oil wells, emphasizing their impact on production performance and allocation strategies. A comprehensive case study is presented, detailing the methodology adopted for clean-out operations to identify and mitigate subsurface wellbore constraints. By integrating field data and analytical models, the study offers a framework for improving production allocation approaches. This work highlights the potential of targeted interventions in sustaining well performance and enhancing reservoir management efficiency. Untreated disposal of effluent water has the potential of scaling and plugging the in and near-wellbore regions. A case study and methodology adopted for the clean-out operation of well with wellbore constrains of Khurmala Field of Iraq is analyzed in the paper. Previous attempts of clean-out using high-pressure hydro- jetting tools along with acid treatment proved futile effort. As last resort, Fluidic Oscillator (WIT) was deployed for clean-out to regain access of TD and plugged fracture network before the eventual decision of work-over is made. Combination of WIT having pulsing, cavitation, and helix jetting action in conjunction with train of fluids consisting of diesel, 28% HCl and gel were utilized. The operational sequence of clean-out was in stages of 10m to clean 79m interval, comprising of slotted liner and open hole, filled with detritus. Low bottom pressure required a dynamic approach for treatment-fluid nitrification based on the success of clean-out and access to liner and open hole. Annular velocities required nitrification once the slotted liner and open hole were open for in-take. Rate of penetration, sequence and volume of fluid-trains, nitrification, and batch cycling were designed in accord to changing downhole dynamics during clean-out. A thorough investigation of detritus, designing of fluids, the accuracy of downhole hydraulics, and application of WIT proved to be an effective solution. It regained access to TD and connectivity between the wellbore and the injection zone. Injection increased from none to 15 bpm at 200 psi. The combination jetting effect of WIT (acoustic pulse (alike), cavitation, and helix) demonstrated to be more effective than rotating jetting tools. Moreover, the merits of operational efficiency supplanted conventional operations and environmental impacts were considerably low in terms of operating time, spent additives, and avoidance of work-over operation. The matching injection parameters post-operation with native parameters post- completion indicated that detritus is removed from wellbore and damage from the critical matrix is removed/ bypassed. Currently, WIT is the only technology that has pulse, cavitation, and helix jetting structures. It has an effective jetting for in and near wellbore region while the kinetic energy transferred via fluid makes the impact stronger in the deeper region. The internal mechanism of the tool allows it to handle high pumping rate and pressures while external finishing offers multi-port orientation for outflow that allows targeting the fill in desired directions. The tool does not require redressing, thus it proves to be an efficient, safe, and cost-effective alternative

Keyword: Wellbore Clean-out, Scaling, Fluidic Oscillator (WIT), Injection. Production allocation.

Hierarchical Federated Learning for Health Trend Prediction and Anomaly Detection Using Pharmacy Data: From Zone to National Scale

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ABSTRACT

In recent years, Federated Learning (FL) has emerged as a pivotal technology within the Internet of Medical Things (IoMT), enabling decentralized model training while preserving data privacy. FL allows multiple entities, such as pharmacies, to train machine learning models locally while only sharing the learning results, safeguarding sensitive patient information. Pharmacy data plays a key role in detecting early health trends, particularly in countries with less systematic healthcare infrastructures, where individuals often purchase medications before seeking hospital care. By analyzing this data and utilizing machine learning models such as One-Class SVM for anomaly detection and Long Short-Term Memory (LSTM) for seasonal health trend prediction, FL provides a decentralized, privacy-preserving way to uncover patterns and detect potential disease outbreaks or unusual health trends. This method adopts a hierarchical structure, enabling health trends to be analyzed and predicted at the zone, city, and national levels. Implementation details, including synthetic dataset generation and hierarchical model aggregation, validate the practicality of this approach. Results highlight the framework's ability to generate distinct insights across levels, empowering decision-makers with actionable health trends and anomaly detections. This makes it particularly valuable for pandemic prediction, optimizing drug inventory management, and helping governments implement timely health measures in specific areas based on local health trends. Moreover, utilizing these techniques could significantly improve disease detection, monitor environmental pollution through public health analysis, and ultimately strengthen disease prevention strategies across healthcare systems worldwide.

Keyword: Federated Learning; Hierarchical Federated Learning; Data Mining; Pharmacy Data; Anomaly Detection; Machine Learning; Health Trend Prediction.

CRISPR-Cas9 Mediated Genome Editing a Promise to Cure HIV: A Systematic Review

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ABSTRACT

Human Immunodeficiency Virus (HIV-1) infection might be controlled using long term antiretroviral therapy. However, it causes various side effects rather than its cost effectivity. Thus, the development of permanent cure for HIV-1 that most probably relies on gene therapy is highly required. Relying on that genome editing approaches like Clustered Regularly Interspaced Short Palindromic Repeats associated with Cas9 (CRISPR-Cas9) has been utilized to target coreceptors including CCR5 and CXCR4 hoping to find a curative method against HIV infection. Accordingly, the current study aims to systematically review CRISPR-Cas9 mediating genome editing studies, mainly CCR5 or CXCR4 or simultaneous genome editing to make HIV resistant primary human CD4+ T cells. A systematic review conducted on original articles focusing the CRISPR- Cas9 mediated genome editing in HIV, published between 2015-2023. In result the CRISPR/Cas9 technology has demonstrated effective gene editing to confer HIV-1 resistance by targeting CCR5 and CXCR4 receptors in CD4+ T cells. Studies show that knockout of CCR5 or CXCR4, through CRISPR-mediated frameshift insertions, base editing, and other genetic interventions, provides substantial resistance to HIV-1, with no major cytotoxic effects observed in primary T cells. Dual knockout of CXCR4 and CCR5 offers resistance to both X4- and R5-tropic HIV strains, suggesting enhanced protective potential. However, challenges remain, particularly due to CXCR4's crucial cellular roles, necessitating careful assessment of functional impacts and off-target effects. Additionally, leveraging natural mutations like CCR5Δ32 has inspired promising avenues for durable HIV-1 resistance. While targeting viral genomes, especially latent reservoirs, appears safer by avoiding host genome alterations, reinfection risks persist. These findings highlight the promise of CRISPR-based HIV therapies, though clinical translation will require rigorous optimization and evaluation.

Keyword: CRISPR-Cas9, HIV, CCR5, CXCR4, Genome editing.

Utilizing Well Logging Tools to Evaluate Modulus Circulations in Fractured Reservoirs by Techno Software

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ABSTRACT

Complete loss circulation of drilling fluid poses a significant challenge during drilling operations, leading to considerable financial and time expenditures. This issue not only reduces the reservoir's production potential but also occasionally results in hazardous blowouts. The A Field, specifically the KH Formation in the northern dome, was selected for this study due to the persistent loss circulation problem hindering its development. This research utilizes comprehensive datasets from the A Field to investigate the causes of loss circulation and propose effective prevention and treatment methods. The study is divided into two main components. The first component focuses on identifying the causes of total mud loss within the KH Formation's northern dome by analyzing and interpreting well logs to detect fractures. Various well logs, including sonic logs for primary porosity and cycle-skipping intervals, resistivity logs to identify zones of separation, caliper logs to detect borehole enlargements, and gamma-ray logs, were employed to achieve this objective. A Pickett plot was applied to determine the cementation factor (m), where values below 2 indicate the presence of fractures. This analysis identified fractures within the KH Formation at a depth interval of 2620-2641 meters. Caliper log readings further revealed borehole enlargements in the KH Formation, attributed to the presence of shale and fractures. These enlargements, with diameters reaching approximately 14 inches, result in the accumulation of rock cuttings. Consequently, the mud density increases, leading to elevated hydrostatic pressure, which causes pressure surges, formation breakdown, and ultimately, complete fluid losses in the KH Formation. The presence of natural fractures was identified as a primary cause of complete fluid loss in the KH Formation. However, interpretations provided by the Chinese company attribute the losses to the presence of caves within the formation.

Keyword: Loss circulation, Well, logs, Fractures, Caliper logs, Techlog Software.

Study of genetic variance for some genotypes of cabbage plant by using RAPD-PCR technique method in Mosul city

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ABSTRACT

Cabbage plant is one of the important winter vegetables in Iraq and it is the member of the cruciferous family. The genotype is the set of genes that are passed on from parents to offspring, and it is fixed throughout the life of the plant. The main subject of the current study is to study the genetic variation of several varieties of cabbage plant. This study was conducted on ten types of cabbage plant, which were imported from outside Iraq as new and exotic plant varieties (species). First, the seeds were planted at the fields of college of Agriculture and Forestry in University of Mosul and the leaves of ten different types of Cabbage were collected. All the samples were processed for DNA isolation and amplified by using RAPD-PCR technique to study genetic variation within and between these types. Moreover, for the evaluation of genetic diversity, five primers were selected from NCBI website and were conducted via using RAPD-PCR technique in the central lab at college Agriculture. Therefore, analysis data of RAPDs experiments for individual type of Cabbage Plant showed The variation of the primers in the sizes of the molecular weight of the resulting bundles ranged between (50-2000) kbp , The number of sites produced by the primer is 25, which of 12 are general sites and 13 are the number of Polymorphic bands. The Total band is 250. Main band is 138 , 112 Polymorphic bands , Unique band is 5 and 3 Absent band . the Opc-08-k primer showed the best of Variance percentage% , primer efficiency%, discriminatory ability%, reached 71.43% 28.00% , 36.61% respectively. RAPD-PCR technique appears to be valuable for taxonomic studies and genetic variation.

Keyword: Cabbage plant , exotic plant varieties, RAPD-PCR technique, genetic diversity.DNA markers.

The effect of the oscillatory flow velocity of an Eyring-Powell fluid through a mag-netized porous channel on its concentration and temperature

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ABSTRACT

The research aims to analyze a mathematical paradigm to study the influence of the oscillatory influx speed of a non-Newtonian "Eyring-Powell" fluid on its temperature and then its concentration through a porous magnetic channel for no-slip flow, the mathematical formula is non-homogeneous partial differential equations, that simulate the movement of fluid through a horizontal pipe. In addition, the temperature and concentration equations for this fluid were adopted to study the influx of fluid speed on its temperature and thus its concentration. We used the method of separating variables and then the perturbation method to solve the system of equations that we obtained. Using the MATHEMATICA program, the solutions of the system were interpreted by analyzing the graphs we obtained. It was observed that the fluid speed increases with the increase in the Reynolds number, Darcy number, oscillation constant, and first Eyring-Powell parameter, while the fluid velocity decreases concerning other parameters.

Keyword: Eyring-Powell fluid , Oscillatory flow , Magnetized porous channel.

Strategic Drilling Decisions Based on Seismic Fault Inclination Analysis for Enhancing Hydrocarbon Recovery in Bijeel and Harir Oil Fields

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ABSTRACT

The seismic method is a well-established technique for delineating subsurface structures and gathering information. This study focuses on the Bijeel and Harir Oil Fields to ascertain subsurface data using seismic techniques. Both 3D and 2D seismic profiles were employed in the Bijeel and Harir blocks respectively. The 3D seismic profiles reveal the subsurface structure of the Bijeel block, exposing various faults and folds. Reflected lines in the profiles extend to Triassic depths, enabling an investigation into the area's geological structure. This information provides valuable insights into the geological characteristics and structural composition of the Bijeel block, aiding in the detailed drilling process and hydrocarbon recovery of this oil field subsurface formations. The 2D seismic profile of the Harir field, particularly in the Mirawa area, depicts significant fluctuations in reflected lines, indicating the presence of a major anticline within the subsurface. Based on this information, numerous faults and folds were identified in this oil field and subsurface formations. These identifications assist oil drilling companies in selecting suitable locations for development drilling operations to enhance hydrocarbon recovery in the fields.

Keyword: Subsurface Geology, Seismic Fault Inclination, Hydrocarbon Recovery, Bijeel and Harir Oil Fields, Kurdistan Region.

How to minimize transportation noise pollution and transportation noise- related diseases using artificial intelligence or techniques. (Systematic) Literature review

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ABSTRACT

Today, humans are spread over large areas and inhabit diverse environments. In day-to-day life, humans are always interacting with biotic and abiotic environments. For the continuity of this relationship, the ecological balance of the environment must be preserved. Rapid urbanization, industrialization, and increased transportation in the modern world have led to unprecedented noise pollution, profoundly impacting both the ecological balance of the natural environment and human society. The ecological balance of the environment is emerging because of human disruptions. Technological developments are experienced at a dizzying pace, and for that reason, many problems that were considered impossible to solve in the past are easily solved. With that being said, the environmental system can be rapidly balanced to the natural environment by using Artificial intelligence. This research aims to use the power of machine learning (ML) or Artificial Neural Networks (ANN) in conjunction with metaheuristic algorithms to minimize transportation noise pollution, vibration, and transportation noise-related diseases.

Keyword: Key Words: Artificial Intelligence, Artificial Neural Networks, Machine Learning, Noise Pollution, Environment, Transportation Noise.

The inhibitor of interleukin-3 protects against Neutrophil Migration in severe acute pancreatitis

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ABSTRACT

Background and purpose: (AP) is linked with leukocyte infiltration and tissue necrosis, but the cellular signaling pathways driving organ destruction in the pancreas remain unknown. IL-3 is a powerful regulator of different cellular processes that promote pro-inflammatory activities. In this study, we investigated the role of IL-3 signaling in acute pancreatitis. Methods: In C57BL/6 mice, pancreatitis was triggered by L-arginine injection (i.p.). Prior to development of pancreatitis, animals were given an IL-3 inhibitor (100 mg/kg). Results: The administration of IL-3 significantly reduced the rise in L-arginine in serum amylase, pancreatic neutrophil infiltration, pancreatic edema formation, an acinar cell necrosis. Furthermore, in response to L-arginine challenge, inhibition of IL-3 decreased the MPO levels in the pancreas and lung. However, IL-3 therapy had a significant impact on L-arginine, provoked macrophage inflammatory protein-2 (MIP-2) induction in the pancreas. Interestingly, in vitro isolation of neutrophils revealed that inhibition of IL-3 significantly reduced MIP-2 and IL-6 pointing to a direct function for IL-3 in regulating chemokine and cytokine expression in neutrophils. Finally, secretagogue-induced activation of trypsinogen in pancreatic acinar cells in vitro, was not directly affected by the inhibition of IL-3.Conclusions: These results show that IL-3 signaling plays a significant role in acute pancreatitis by regulating tissue injury and neutrophil infiltration thus, in addition to clarifying pancreatitis signaling processes, our findings also raise the possibility that IL-3 can represent a new target in the treatment of severe AP.

Keyword: Amylase, Chemokines, Inflammation, Leukocytes, and Pancreas.

Hemolysin Downregulation in Pseudomonas aeroginose and Staphylococcus aureus Induced by Ginger, Red pepper and Mint Extract

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ABSTRACT

Antibiotic resistant is a big problem nowadays, the present study is to using natural products to weakening pathogenicity of each Pseudomonas aeroginose and Staphylococcus aureus by decreasing expression of hemolysin genes. Some plant extracts have a significant role in downregulation of gene expression. On the hemolysin production of Pseudomonas aeroginose and Staphylococcus aureus, the effect of ethanol extraction of ginger, red pepper and mint was investigated. We performed an experiment to assess the minimum inhibitory concentration (MIC), and the results showed that the MICs of ginger, red pepper and mint on Staphylococcus aureus were 20, 10 and 2 mg/ml respectively, whereas the MICs of these same substances on Pseudomonas aeroginose were 30, 10 and 6 mg/ml respectively. During growing tested bacteria with sub inhibitory concentration (SIC) of plant extracts then subculturing on blood agar we found that the all of plant extracts decreased hemolysin production in tested bacteria in different ratio, also on the bases of gene expression we found that plant extracts down regulated of hemolysin gene in both bacteria significantly after grown the bacteria in the medium contain sub inhibitory concentration of plant extracts. Ginger, Red pepper and Mint play a role in downregulation hemolysin genes, it means we can use natural products to decrease pathogenicity in pathogenic bacteria.

Keyword: Ginger; Red pepper; mint; Pseudomonas aeroginose; Staphylococcus aureus.

Comparison of aqueous and alcoholic extracts of several compounds isolated from the leaves of Myrtus communis L.

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ABSTRACT

For the purpose of making a comparison of several compounds isolated from plant leaves, different extraction methods were used, between aqueous, alcoholic, ethanolic, and ethyl acetate, which were collected in the period from March to May. The results showed a difference in the extracted compounds depending on the extraction method, where the compound Rutin was the most apparent in the aqueous extraction by an amount 60.29 While the compounds Rutin and Galic acide appeared when using the ethanolic extract in proportions of 3.72, 2.82 and the methanol extract in proportions of 30.34, 57.69, and the compounds Rutin, Kampferol, Galic acide and Qurectine, appeared in proportions13.78,398.61,1.73,8.28 when using as ethyl acetate an extraction method. The results show that aqueous method was better foe obtaining the amount of rutin complexes ,while the ethyl acetate method was highly efficient for extracted the other four compounds . So we recommend using the ethyl acetate to isolate several separate compounds for studying the extraction efficiency, while it is better to use the water extraction to study the biological effects of the isolated compounds according to plant species and active part

Keyword: Myrtus communis, chemical compounds , HPLC Flavonoids.

Enhancing Well Stimulation Efficiency through Evaluation and Improvement of Matrix Acidizing Design in Upper Cretaceous carbonate reservoir formation

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ABSTRACT

Matrix acidizing is a well stimulation technique used in carbonate rocks to enhance reservoir productivity. The SRA (The silt particular and removable acid) design is a specific approach employed during matrix acidizing, and involves the injection of acid into the formation to dissolve the carbonate minerals and create channels for improved fluid flow. The SRA system utilizes a combination of acid and a retarder to control and measure the reaction and solubility rate and prevent excessive acid penetration in three wellbores in Cretaceous carbonate reservoir formation. This helps to selectively dissolve the carbonate matrix while minimizing damage to the formation. The main target using SRA system is to increase the solubility of a litho-complex variation in carbonate rocks and enhance hydrocarbon recovery in Cretaceous carbonate reservoirs. During performing the SRA system in carbonate rocks, different concentrations of hydrochloric acid (HCl) were utilized. The concentration of HCl is a crucial parameter that affects the effectiveness of the acidizing process. By adjusting the concentration, the reaction rate and extent of dissolution can be controlled in a heterogenous subsurface core rocks. This work is employed to selectively dissolve the carbonate matrix while minimizing the risk of excessive dissolution and formation damage. Different concentrations of HCl, ranging from 15%, 20%, to 28%-SRA were employed in three wellbore samples. The lower concentration is used to mild acidizing treatment, while stronger acid concentrations are capable of dissolving a greater amount of carbonate minerals, thereby enhancing the permeability of the reservoir. In summary, the selection of HCl concentration should be based on deep understanding of the reservoir properties and characteristics, including rock composition, porosity, and permeability. Proper evaluation and analysis are essential to determine the optimal concentration of HCl for effective matrix acidizing using the SRA system in carbonate intervene with silicates-forming rocks.

Keyword: Enhancing well stimulation; matrix acidizing treatment; proper acid job; lithological composition; Upper Cretaceous carbonate reservoir.

Protective Impact of Scutellaria pinnatifida Extract on Some Biochemical, Haematological and Oxidative Stress Parameters in Rats Exposed to glyphosate

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ABSTRACT

In recent years, herbicide (glyphosate) has been widely used against grasses, also medicinal plant also used to treat disease and prevention because their lower cost and fewer adverse effects in the body. The genus Scutellaria is a diverse and widespread genus within the family of the Lamiaceae, therefore, the present study was conducted to investigate the impact of Scutellaria pinnatifida against glyphosate toxicity in female albino rats, Thirty-two female rats randomized into 4 groups of 8 rats per group as following; group I (control) fed basal diet and tap water ad libitium, group II (glyphosate) fed basal diet and tap water ad libitium with 0.5 ml/rat of glayphosate orally by gavage. Group III (glyphosate+ Scutellaria sp) fed basal diet and tap water ad libitium and 0.5ml/rat glayphosate and 0.1ml/rat of Scutellaria extract daily orally by gavage. Group IV (Scutellaria sp) fed basal diet and tap water ad libitium and 0.1ml/rat of Scutellaria extract daily orally by gavage. The treatment was continued for two weeks, glyphosate produced significant ($P<0.05$) decrease in food intake, and increased weight of liver, heart and spleen non-significantly while increased kidney weight and WBC (significantly), the other haematological parameters were decreased also with glyphosate treatment, on the other hand, the cholesterol, Triglyceride (TG), low density lipoprotein (LDL), urea, uric acid (UA) , creatinine also increased Glutamic oxaloacetic transaminase (GOT) and malondyaldehyde (MDA), in contrast, Scutellaria sp recovered food intake, kidney weight, WBC, besides that it decreased the elevated lipid profile, liver, MDA, and kidney function test. The present study concluded that the Scutellaria sp extract showed a strong protection against glyphosate, and neutralized the severe toxicity of it.

Keyword: Glyphosate, Scutellaria, malondyaldehyde, low density lipoprotein, creatinine.

On the Hahn seuence space h^(2)

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ABSTRACT

This paper investigates the properties and structural characteristics of the new Hahn sequence space defined through the second-order forward differences. First, we introduce the new Hahn sequence space h (2) = $\{x = (xk) \in \omega : \sum(k + 1)| \Delta\ 2\ xk\ | < \infty$, $limk\to\infty\ xk = 0 \infty\ k$=1 $\}$ of order two. Then, we show some topological properties of this new sequence space h (2) , and calculate our new Hahn sequence space's alpha-dual, beta-dual, and gamma-dual. Finally, we calculate some matrix transformations from the new Hahn sequence space h (2) into the space α = $\{\ell 1, \ell\infty, c, c0, \ell r , h\}$ and from the space β = $\{\ell 1, \ell\infty, c, c0, \ell p, h\}$into the new Hahn sequence space h (2) .

Keyword: Hahn sequence space; difference operator; second order difference; dual spaces; matrix transformations.

Association of vitamin D deficiency in pregnant and healthy women: A case-control study

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ABSTRACT

Background and Objective: Vitamin D deficiency is a global health issue. It is significantly associated with both skeletal and non-skeletal problems. Prevention can primarily be maintained through effective sun exposure or supplementation, and to a lesser extent, by dietary intake. This study aimed to determine and compare vitamin D levels between pregnant and non-pregnant women. Methods: In this case-control study, 300 pregnant women were selected using convenience sampling and divided into two groups, pregnant and non-pregnant from October 2023 to April 2024. Data were collected using a demographic information questionnaire and a researcher constructed checklist, after obtaining consent from participants. Subsequently, the chemical instrument analyzer (Cobas e 411) test was used to measure vitamin D levels in participants. Results: According to the findings, of 300 participants, 54 (18%) pregnant and control women had a severe deficiency, 190 (63.3%) had a mild deficiency, and 56 (18.7%) had an appropriate vitamin D level. A significant difference in terms of serum level of vitamin D between the two groups was observed, with the pregnant group having significantly lower levels of vitamin D ($P = 0.01$). The majority of participants in the case (67.3%) and control (59.3%) groups had mild vitamin D deficiency. Conclusion: According to this study and other research results, there is a significant association between serum levels of vitamin D and pregnancy.

Keyword: Vitamin D deficiency, pregnancy health, serum vitamin D levels.

Delineation of Groundwater Potential Zones (GWPZ) Map Using Geoinformatics by Analytic Hierarchy Process (AHP) Techniques in Central Erbil Sub-basin, North â€“Iraq

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ABSTRACT

The most dependable source of fresh water is groundwater. Groundwater supplies are seriously endangered by a number of factors, including urbanization, industry, and population growth. The amount and quality of groundwater supplies are significantly impacted by climate change. Furthermore, the variables affecting groundwater recharge are remarkably impacted by variations in the climate. The fall in groundwater levels is often exacerbated by irregular monsoons and poor-quality surface water supplies. It is important to locate and define the groundwater potential zone (GWP). The Erbil sub-basin is the subject of the study, where groundwater rather than surface water is the primary supply for agricultural and residential purposes. To determine the possible groundwater zones, many parameters such as rainfall, elevation, slope, drainage density, land use and cover, and lineament density are created as separate layers using GIS techniques and then put through a weighted overlay analysis. The analytical hierarchy process was utilized to assign the weights for the different layers. In addition, the three categories of high, moderate, and low zones have been stated to the GWP final map. Based on the data, the "High GWRPZ" covers approximately 575.44 km2 (21.24%), the "Moderate GWRPZ" covers 1836.40 km2 (67.80%), and the "Poor GWRPZ" covers 296.81 km2 (10.96%). Furthermore, the study's findings showed that the rainfall factor had the zone with the most substantial and adequate groundwater potential. The effect of rainfall served as the primary groundwater storage source. Thus, groundwater recharge rises conversely with increasing precipitation intensity. In addition, a strong connection was seen between the results and the well static water level data that were used to validate the results. As dependable findings were produced with the proposed technique, future management plans incorporating natural and artificial recharge practices may be created in these locations with effectiveness.

Keyword: Groundwater Potentiality, Central-Erbil, GWPZ, AHP, Kurdistan Region.

Molecular Cytogenetic Study of Chronic Lymphocytic Leukemia Patients Diagnosed in Erbil City Using Fluorescence in Situ Hybridization (FISH) Technique.

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ABSTRACT

This Chromosome abnormalities were examined in a cytogenetics and molecular cytogenetics tests using the FISH technique on blood samples from patients with chronic lymphocytic leukemia. The study involved the selection of 50 patients (32 men and 18 women) for the early diagnosis phase (before treatment) and the treatment phase.. investigation of several characteristics, including, sex, age, occupation, The findings indicated that the majority of patients in the over-70 age group are men. The majority of them did not have family history with this disease. it was observed that patients with chronic lymphocytic leukemia were more likely to have the chromosomal abnormality deletion (13) (q14) (43.8%), followed by deletion (11) (q23) (18.8%). There was also a trisomy 12 change at 12.5% and deletion (17) chromosomal change present at 12.5%. Tetraploidy was less common (6.2%) despite the presence of chromosomal abnormalities deletion (6) (q25-q27). According to the current study, structural chromosomal alterations were more common than numerical changes in terms of chromosomal aberrations, and both types of aberrations were linked to chronic lymphocytic leukemia.

Keyword: Cytogenetic study, FISH Technique , Chronic Lymphocytic Leukemia, Erbil City.

A Comprehensive Review of Solar-Thermal Water Pumping Mechanisms

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ABSTRACT

There are numerous mechanisms for pumping or lifting water for irrigation. These mechanisms are based on different principles, depending on the type of solar energy utilized (thermal or photovoltaic). Using solar thermal energy, the system based on heat energy collected from the sun can be used by using a solar collector to heat or vaporize the working fluid inside the collector, such as water or any fluid that can be utilize from its internal energy to generate pressure, depending on the design and conditions that surrounding the system. According to thermodynamics, there are two basic mechanisms of conversion. The first is the use of conventionally designed of heat engines and pumps, such as the Rankin cycle. The second one is by using special (non-conventional) designs, whether for heat engines, turbines, or even pumps. In this paper, we will survey the mechanisms and methods for both types of conversion, design, and modifications that have been applied to improve a certain part of the system.

Keyword: Solar water pumping; Solar energy.

Noise Pollution from Electrical Power Generators in different Areas of Erbil city and Its Effects on The Health of It Is Workers

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ABSTRACT

This research evaluates the health risks associated with urban noise from public generators in Erbil, focusing on physiological blood parameters, hearing systems, liver and kidney functions, and oxidative stress among workers who operate these generators. We used a sound level meter to quantify noise levels at 25 generator sites in Erbil City, ranging from 0, 10, 20, 30, 40, 50, and 60 meters. The study had 25 professionals running diesel electrical power generators and 25 healthy individuals serving as a control group. The investigation shows that the generator's noise intensity exceeds the allowed limit, with the northern industrial area reaching maximum values of 92 dB and Bnberz reaching minimum values of 72 dB, causing hearing impairment among workers. The study shows that exposure to chemicals and noise from electricity generators negatively impacts workers' health, causing heightened heart rate, systolic blood pressure, and hearing loss, emphasizing the need for enhanced safety protocols. Workers frequently suffer from sleep disorders due to prolonged exposure to noise and fatigue, affecting 75% of them, which can lead to increased wakefulness and stage 1 sleep. The study found no significant difference in serum creatinine or urea levels between electrical generator workers and the control group but found lower levels of glutathione (GSH) and higher levels of malondialdehyde (MDA). In conclusion, generators' noise levels exceed permissible limits, causing hearing loss, affecting blood pressure, liver, kidney function, and physiological activities among workers. This pollution also exposes individuals near generating sites to harmful effects.

Keyword: Noise pollution, Electric generators, Worker health, Blood pressure, MDA, Physiological parameters.

Spectroscopic and Radiation Shielding Properties of Er2O3 Nanoparticles Doped Silica Borotellurite Glasses

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ABSTRACT

Er_2O_3 NPs doped $SiO_2 – B_2O_3 – TeO_2$ glasses were synthesized using pure, B_2O_3 (Alfar Aeser, 99.9%), Er_2O_3 NPs (Alfar Aeser, 99.9%), TeO_2 (Alfar Aeser, 99.9%), and rice husk sourced silica (98.548%) via melt quenching technique. The purity of the extracted silica was assessed by XRF analysis. A variety of measurements and characterizations were performed on the synthesised glasses, including XRD, TEM, UV-Vis spectroscopy, density, and molar volume. High densities (4.1900 to 4.6004 g/cm3) for the glasses were noted. The glasses' XRD pattern showed no signs of crystallisation, and their UV-Vis spectra proved that they were amorphous materials. The shape of the nanoparticles in the TEM image indicated that they had aggregated into larger particle sizes. Absorption coefficient, skin/penetration depth, and extinction coefficient spectra from the UV-Vis spectrum were shown and discussed. Additionally, the real and hypothetical components of optical conductivity and dielectric constant were presented and debated. The range of real part dielectric constant values, from 6.8 to 7.18, indicated that the glasses are semiconducting by nature and are suitable for use as substrate materials for microelectronic devices. The effective atomic number (ZEff) and other radiation shielding parameters of the examined glasses, such as the mass attenuation coefficient (MAC), linear attenuation coefficient (LAC), half value layer (HVL), tenth value layer (TVL), and others, were researched and reported using Phy-X/PSD software.

Keyword: Er_2O_3 Nanoparticles, Tellurite Glasses, Spectroscopic Properties, Radiation Shielding, Microelectronic Substrates.

The Effect of Hard Work and Environment of Work Place on Blood Pressure and Heart Rate

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ABSTRACT

Background: Hypertension is a were known disease in a recent time and the only way for detecting it is by measurement of the blood pressure. Allot of factors may effect such measurement and in our study we evaluate the effect of hard work and stress on blood pressure measurement. Objective: Hard work has been associated with an increased risk for heart and cardiovascular disease. Methods: In this study we take (100) participants male with no any disease, age ranging from (20 until 50) year and put them under observation and checking their blood pressure and heart rate and heart rate variability two days a week after doing hard work and one non work day every week for four weeks . Chronic hard work stress was defined on the base of Synergist model, as: (1) high imbalance, a combination of high effort and low reward at work, or (2) high over commitment, an exhaustive work â€“related coping style indexing the inability to unwind.Result: Hard work as it exert its effect on heart rate and blood pressure it means that indirectly work on more of one risk factors of heart diseases, and this hard work will make plaques inside the blood vessels more vulnerable for rupture and that person who do hard work more prone to develop heart disease. Conclusion: All the participants in this study show more elevation in blood pressure and as a consequence increased prevalence of heart and cardiovascular disease. The results from this study suggests that the detrimental effects of hard work are partly mediated by increased heart rate reactivity to a stressful work day, an increase in systolic blood pressure level.

Keyword: Heart rate, Blood pressure, Stress, Hard work.

Evaluating Electron Radiation - Stopping Power in some Organic of Human Tissues

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ABSTRACT

This research investigates the radiation-stopping power of electrons in various human tissues, including adipose tissue, blood, dense bone, brain, eye lens, lung, skin, breast, and muscle, within the energy range of 1 MeV to 1000 MeV. Understanding the energy loss of charged particles as they pass through matter is crucial in medical physics. The data has been collected from the International Committee for Radiological Units (ICRU) and calculated total radiation stopping powers using Berger-Seltzer's famous equation. Then, the total stopping power value in human tissues has been compared with the Universal program code called (E-star). Furthermore, the outcomes of the stopping power vs energy have been presented graphically. Good agreement is found between the gained and the E-star results and varies almost linearly with energy up to 600 MeV.

Keyword: Evaluating Electron Radiation, Stopping power, Hman tissues.

Chebyshev-Based Methods for Solution of Nonlinear Differential Equations

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ABSTRACT

Solution of nonlinear differential equations (NDEs) is a central topic in mathematical modeling, having wide applications in physics, engineering, and applied sciences. This paper investigates the application of Chebyshev polynomials as an efficient and accurate method for solving NDEs. Chebyshev polynomials are orthogonal and computationally stable; thus, they are used for the approximation of solutions NDEs. The nonlinear terms are treated by iterative schemes such as Newton's method or by decomposition techniques. The numerical results show that the Chebyshev-based methods have very high accuracy, with fewer computational efforts than the classic finite difference or Runge-Kutta technique.

Keyword: Nonlinear Differential Equation, Chebyshev polynomials, Numerical Aproximation Method, and L_2 norm.

Assessment and Comparison of Meteorological Drought Indices Using the Reconnaissance Drought Index (RDI) and Standardized Precipitation Index (SPI) in Duhok City, Northern Iraq

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ABSTRACT

Drought is a natural disaster characterized by a deficiency of water resources in a designated territory during a particular period of time. The effects of drought are profound and affect several critical facets of life, including environmental, economic, and social activities. Forecasting drought episodes is a crucial component for disaster preparation, mitigating its impact and enhancing efforts to respond. The three defining parameters frequency, severity, and time period are essential for the prediction and evaluation of droughts. Two drought indicators, the Reconnaissance Drought Index (RDI) and the Standardized Precipitation Index (SPI), were employed to predict potential drought conditions in Duhok city, Iraq. Forty-three years of climate information (average monthly precipitation and temperature) were utilized over the period from 1980 to 2023, obtained from the Duhok meteorological station. The indices were computed at 3, 6, and 12-month intervals, incorporating the estimation of potential evapotranspiration using the Thornthwaite technique via DrinC tools. The temporal severity and frequency of drought were computed and studied for each drought indicator. The result depending on SPI indices represented that the moderately drought was shown in years (1999 to 2000, 2007 to 2008, 2008 to 2009, and 2017 to 2018) in 4-years frequency with 9.30% probability events happened. Also, from RDI indices the moderately drought was shown in years (1999 to 2000, 2001 to 2002, 2007 to 2008, 2008 to 2009, and 2017 to 2018) in 5-years frequency with 11.63% probability events happened. However, from both indices the sever draught were shown in years (2010 to 2011 and 2022 to 2023) in 2-years frequency with 4.65% probability events occurred. Moreover, the extremely drought was shown in years (2021 to 2022) in a year frequency with 1% probability from each indices. The findings of this study indicate that the RDI is more responsive than the SPI to climatic circumstances, thereby emphasizing the importance of evapotranspiration in drought evaluations. The T-test results indicated that both indices exhibit identical behavior depending on P-value is > 0.05; however, the RDI, mainly to its incorporation of potential evapotranspiration under comparable climatic situations, demonstrates more sensitivity. This research recommends utilizing the RDI index as the appropriate drought index to evaluate drought conditions in water supply management and planning within the study region.

Keyword: Drought Indices, Evapotranspiration, SPI, RDI, DrinC, Iraq.

Drought Analysis in Kurdistan Governorates (Duhok, Erbil and Sulaimaniyah) By Using Standardized Precipitation Indices

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ABSTRACT

Drought indices are frequently utilized in the identification, observing, and assessment of drought occurrences. The Standardized Precipitation Index (SPI) represents one of among the most commonly utilized drought measures. This article analyzes drought occurrences for three chosen meteorological stations in the Kurdistan region, including Duhok, Erbil, and Sulaimaniyah governorates, and analyzes the impact of theoretical distribution choices on SPI values. The annual time-scale SPI formula calculated for the period (1980-2023) in Governorates. Analysis with SPI method results showed that the extremely wet represents only in Erbil governorate in frequency 2-years with probability events (4.55%). Drought representing from mildly drought to sever drought in each governorate. Mildly drought show in Erbil governorate in 16-years frequency with (36.36%) probability events. Also, in Sulaimaniyah governorate in 13-years frequency with (30.23%) probability events. However, in Duhok governorate in 15-years frequency with (34.09%) probability events. The moderate drought shows in governorates such as 7-years frequency with (15.91%) probability events, 4-years frequency with (90.30%) probability events, and 6-years frequency with (13.64) probability events, respectively. The severely drought also show in governorates such as 1-year frequency with (2.27%) probability events, 3-years frequency with (6.98%) probability events, and 2-years frequency with (4.55%) probability events, respectively

Keyword: Drought indices, Duhok, Erbil and Sulaimaniyah Meteorological Stations, SPI.

High-Power Detection Solutions using Laser Fabry-Perot Interferometers

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ABSTRACT

This study addresses the challenges of thermal effects, sensitivity, and stability in high-power laser detection using Fabry-PÃ©rot interferometers (FPIs). By optimizing system parameters such as mirror reflectivity, cavity length, and finesse, this research develops practical solutions for reducing signal distortion and improving measurement precision. Advanced cooling techniques and adaptive stabilization systems are proposed to mitigate thermal distortions and enhance environmental resilience. Experimental setups validate these techniques, demonstrating significant improvements in detecting high-power signals with minimal degradation. Recommendations for future research include further material development and miniaturization of Fabry-Perot systems for broader applications.

Keyword:Fabry-Perot Interferometer, High-Power Laser Detection, Spectral Resolution, Finesse, Thermal Management, Signal-to-Noise Ratio , Optical Filters, Optical Interference.

THE INFLUENCE OF HUMIDITY ON SHEEP PERFORMANCE AND ECTOPARASITE FAUNA DENSITY DURING WINTER IN THE ERBIL PLAINS

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ABSTRACT

Abstract: This study investigates the impact of environmental factors, particularly humidity and temperature, on the density of ectoparasites and the overall health of sheep during winter in the Erbil Plains, Iraq. The research was conducted over three months, focusing on the correlation between ectoparasite density, sheep hemoglobin levels, and climatic conditions such as relative humidity, temperature, and precipitation. Ectoparasites such as Damalinia ovis, lice, and Linognathus africanus spp. were identified and counted, while sheep health was assessed using physical examination and hemoglobin analysis. Results indicated that increased humidity and precipitation significantly supported ectoparasite proliferation, leading to weakened sheep health, reduced hemoglobin levels, and increased skin damage. The highest infestation rates were recorded when humidity levels exceeded 80% and temperatures dropped below 10Â°C. Statistical analysis confirmed a strong negative relationship between ectoparasite density and sheep health status. This study highlights the importance of monitoring environmental conditions and implementing humidity control measures to reduce the risk of ectoparasite infestations and improve sheep productivity in the region. Future research should explore long-term management strategies under varying climatic conditions to ensure sustainable livestock production.

Keyword: (Sheep health; Ectoparasites; Humidity; Temperature; Hemoglobin levels; Winter performance).

Image Deblurring: Journals and Articles Survey and Statistical Analysis

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ABSTRACT

Image degradation is one of the most important problems in image processing, in addition, blurring images in one that has significant impact on image quality. This research focuses on one of the important topics, which is Image Deblurring, in which this survey focuses on the published papers on deblurring images field. This survey was prepared on 7/22/2024 and applied to the Direct Science database. The years 2004 to 2024 were selected to conduct research. The survey concentrated on two main issues type of articles and publication titles. The total number of publications related to blurring images were 2765 and we found that most of them were related to research articles 2289. In addition, 280 articles are focusing on signal processing journal field, that means the highest number of publications. It became clear through the survey that there are many scientific journals that publish about Image Deblurring, and that the largest percentage has gone towards signal processing journals because they are at the heart of the research topic. The survey showed us that there are many scientific journal specializations that are published on the topic of noise removal, and that the largest percentage went towards signal processing journals (280) because they are at the heart of the research topic. Then came the specializations of Neurocomputational (194), Image Representation (152), Computational (152), and Pattern Recognition (126), then came the rest of the specializations in smaller percentages.

Keyword: Image Deblurring, Image Blurring, Image Noise Reduction, Deep Learning, Signal Processing, Statistical Analysis.

Prevalence, Molecular identification, and Genetic relationships of oral and nasal Candidiasis in COVID-19 patients

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ABSTRACT

Objectives: When COVID-19 emerged as a global pandemic, invasive yeast infections (IYIs) also presented a risk of developing super-infections as another cause of mortality. Our research is to identify the most common Candida species among COVID-19 patients in the Duhok City/Kurdistan region of Iraq. Methods: All confirmed COVID-19 cases were tested by real-time RT-PCR on nasal and oral samples. Culture-based techniques and DNA sequencing of ITS region were used to identify and analyze Candida species. Results: As a result of culture-based techniques, 45 positive Candida isolates were identified out of 100 samples grown on chromogenic Candida agar. The highest percentage belongs to Candida albicans 37.77 Preprint not peer reviewed %, followed by C. krusei 28.88 %, C. glabrata 20 %, and C. tropicalis 13.33 %. A DNA study revealed new species of Candida africana, C. dublinensis, Kluyveromyces marxianus, Cyberlindnera fabianii, Rhodotorula mucilaginosa, and Purpureocillium lilacinum. Conclusion: To better diagnose, manage, and prescribe the correct antifungal to COVID-19 patients, DNA- based techniques should be used.

Keyword: COVID-19, Candida, Molecular method, DNA sequencing; Yeast.

Artificial Intelligence in Ovarian Cancer: Advancing in Diagnosis, Prognosis, and Therapeutic Strategies

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ABSTRACT

Ovarian Cancer is one of the most lethal gynecological cancers referred as a “silent killer” due to its late diagnosis as a result of lack of effective screening tools. Advanced stage of ovarian cancer associated with poor survival and limited therapeutic response, while due to the inconspicuous symptoms, its detection in the early tumorigenic stages is quite challenges. To overcome this issue, scientist focus on developing more sensitive and specific screening method for early cancer detection. In this review, we provide a detailed evaluating of the recent advancement in AI applications that can be used in screening and management of OC mainly in tumorigenic, prognosis and therapeutic optimization. According to our review, AI demonstrate an effective approach for OC screening and predicting patient-specific treatment outcome by extracting valuable data from images, genomic, transcriptomic and clinical data. Moreover, AI technology, particularly machine learning and deep learning models, have shown major enhancement in precise diagnosis by radiomics and prediction survival progress by integration of multi-omics data. Furthermore, in clinical oncology, AI-driven platforms can be valuable for decision making and real-time monitoring. However, clinical justification, algorithm generalizability and data standardization remain challenges that needs to be addressed to facilitate universal acceptance. Thus, recent advancement in using AI in OC emphasize its important role in early cancer detection, prognosis and therapy.

Keyword: Keywords: Artificial Intelligence (AI), Deep learning (DL), Diagnosis, Machine learning (ML), Ovarian cancer, Prognosis, Radiomics, therapeutic strategies.

Numerical Study of Nonlinear Reaction-Diffusion Equation in Catalytic Pellet Model Using Finite Element Method

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ABSTRACT

This study explores numerical solutions to nonlinear reaction-diffusion equations, with a focus on modeling concentration profiles in catalytic pellets, crucial for many chemical engineering applications. The problem is discretised and investigated in both the temporal and spatial domains using finite element Method (FEM). A weak formulation is developed, and the existence and uniqueness of the FEM solution are established. Stability and convergence of the numerical schemes are rigorously analyzed, and Crank–Nicolson-based discretization is implemented for enhanced accuracy. Numerical results illustrate the effectiveness of FEM and FDM, with close agreement between the methods. This comparison highlights FEM's potential advantages in catalytic process modeling, showcasing its effectiveness in solving nonlinear reaction-diffusion PDEs.

Keyword: Catalytic Pellet Modeling, Numerical Analysis,Finite Element Method, Stability and Convergence.

Classification Of Some Onion (Allium cepa L.) Cultivars By Using Molecular Markers

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ABSTRACT

A polymerase chain reaction (PCR) based or random amplified polymorphic DNA (RAPD) analysis was applied to (9) cultivars of onion (Allium cepa L.) in order to assess the degree of polymorphism within the genes and to investage if this approach was suitable for genetic studies of onion using a set of 4 random primers which were (OPL-07-K , OPL-18-K , OPA-10 and ope-06). All the primers detected polymorphism among the cultivars in total (243) bands were produced (140) bands were polymorphic, primer OPL-18-K produced highest the bands (53), while primer OPA-10 produced the lowest number of bands (18). The average number of polymorphic bands produced was (35) .The percentage of polymorphic bands ranged from 60% to 100%. The results of the cluster analysis (dendogram) of the cultivars depending on genetic dimension separated them into three major groups . The results of propose that RAPD and spectral markers was useful tool for classification among differences onion cultivars

Keyword: Onion , DNA , molecular marker , PCR , genetic distance.

Exploring the Adoption of AI in Governmental Work: Pathways to Sustainable Development

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ABSTRACT

This research Analyzes the Knowledge and possibility apply of Artificial Intelligence (AI) among government Staff members in Mosul, Iraq. In advance of the study, the majority of government staff member had limited or no knowledge of AI and had not utilized AI technologies in their day-to-day activities. The study began by assessing how these employees performed their duties without AI, revealing a reliance on traditional methods that were often time-consuming and prone to errors. To address this gap, aimed training program was developed and presented to 34 government employees, centering on foundational AI concepts, its applications, and its potential benefits for enhancing Proficiency in government operations. Moreover, by linking AI adoption to the SDGs, this study shows how government focused AI training can support institutional efficiency (SDG16), decent work (SDG 8), and innovation in public services (SDG 9). The training Offered real-world practice. with AI tools, particularly in areas Including data analysis, process automation, and decision-making. After the training, participants completed a survey to assess the programâ€™s impact, evaluating their understanding of AI, recognized advantages, and certainty in combining AI into their work.

Keyword: Artificial Intelligence, SDGs, Improving Governmental Performance, GPT.

Examining the Relationship Between Area and Perimeter in Galilean Geometry for Similar Quadrilaterals

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ABSTRACT

Similarity occurs when two or more objects have the same shape but differ in size. In everyday life, we employ the notion of similarity when resizing photographs, building scales such as architectural models, or navigating maps with distances proportionate to real-world distances. In this work, we aim to approach the concept of similarity, which is addressed in Euclidean geometry and taught in school curricula, via the lens of Galilean geometry, one of the non-Euclidean geometries in the plane. In Euclidean geometry, similarity is primarily examined through the segment concept and triangles, with various properties presented. This research investigates the connection between the perimeter and areas of similar quadrilaterals in Galilean geometry. We employed a theoretical and comparative analysis methodology in this work. Additionally, this study aims to integrate Galilean geometry, one of the most easily understood Euclidean geometry high school students, into the school curriculum. Furthermore, it contributes to the literature by filling the gap regarding the similarity of quadrilaterals in non-Euclidean geometries.

Keyword: Area, Euclidean geometry, Galilean geometry, Homologous sides, non-Euclidean geometry, Quadrilaterals, Perimeter, Similarity, Special line.

Analyzing and Classifying Data Format Strategies for Efficient Communication in Federated Learning

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ABSTRACT

Federated learning (FL) is one of the most important technologies in the field of big data and artificial intelligence. It has the ability to balance the privacy of data preservation and enable collaborative training of a shared model. Although effective, Federated Learning presents critical challenges of high communication and computation overheads. This paper reviews recent approaches systemically to classify these two aspects and categorize data format strategies into four types based on the descriptiveness of data, level details and abstraction; gradients, parameter weights, knowledge distillation (KD), and federated feature learning (FFL). In addition, this paper evaluates these approaches regarding three criteria; communication reduction, computational cost, and accuracy. As the survey confirms, gradient and parameter weight methods are quite simple and have only a small computational price increase but, in return, offer relatively small communication reduction. In comparison, KD and FFL achieve the highest efficient communication at the expense of increased computational complexity. Remarkably, from the point of view of losses in accuracy, the data compression and reduction in communication can be balanced. An analysis, that underlines the commitment for a standardized benchmark to be utilized in comparing these strategies and summarizes that all three criteria have to be taken into consideration. This depends on choosing an adequate strategy for the data format in FL applications.

Keyword: Federated learning, Communication overhead, Knowledge distillation, Federated feature learning, Transmitting gradients, Transmitting parameter weights.

Source Rock Evaluation through Well Logging Data and Pyrolysis Analysis: A Study of the Kurra Chine Formation in Well-6, Peshkhabir Oil Field, Kurdistan, Iraq

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ABSTRACT

The volume of hydrocarbon exist at the reservoir is directly related to the quantity of the hydrocarbon generated and expelled from the source rock. Accurate evaluation of source rock is important for hydrocarbon production planning and subsurface resource prediction. This study evaluating the source rocks of the shale zones within the Kurra Chine Formation using well- logging data and Rock- Eval pyrolysis analysis for Well-6 in the Peshkhabir Oil Field, located at Zakho Northern Iraq. Comprehensive well logging data of the Well-6 in the Peshkhabir Oil Field and sixteen cutting samples were selected for this study. The total organic carbon wt.% of the Well-6 is ranges from 0.39 - 1.62 %, classifying the Kurra Chine is a good source rock in the shale zones. The Generation potential ranges from 1.02 – 6.562, additional confirming the source rock potentiality. The S1 value for most samples ranged between 2.68 – 3.16, indicating favorable hydrocarbon presence and suggested a good quality source rock. The level maturity, representing by thermal maturity, ranges between 400 °C – 420 °C for most samples, indicating them as immature to marginally mature. Furthermore, the kerogen types predominately fall under type III, based on the relationship between hydrogen index and thermal maturity.

Keyword: Well Logging data, Rock-Eval Pyrolysis, Source Rock Evaluation, Peshkhabir Oil Field, Kurra Chine Formation; Northern Iraq

A review on fitness dependent optimizer: past, present, and future

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ABSTRACT

Metaheuristic algorithms are optimization methods that are inspired by real phenomena in nature or the behavior of living beings, e.g., animals, to be used for solving complex problems, as in engineering, energy optimization, health care, etc. One of them was the creation of the Fitness Dependent Optimizer (FDO) in 2019, which is based on bee-inspired swarm intelligence and provides efficient optimization. This paper aims to introduce a comprehensive review of FDO, including its basic concepts, main variations, and applications from the beginning. It systematically gathers and examines every relevant paper, providing significant insights into the algorithm's pros and cons. The objective is to assess FDO's performance in several dimensions and to identify its strengths and weaknesses. This study uses a comparative analysis to show how well FDO and its variations work at solving real-world optimization problems, which helps us understand what they can do. Finally, this paper proposes future research directions that can help researchers further enhance the performance of FDO.

Keyword: Fitness Dependent Optimizer, Optimization, metaheuristic algorithm, swarm algorithm.

Exploring oral colonization of Candida species in Diabetic individuals: A case-control study

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ABSTRACT

Oral candidiasis is a prevalent opportunistic infection of the oral cavity, primarily caused by the overgrowth of Candida species, with Candida albicans being the most common. Diabetic patients are specifically more susceptible due to factors like elevated salivary glucose, reduced saliva production, impaired chemotaxis, and compromised phagocytosis resulting from polymorphonuclear leukocyte deficiencies. Studies show that diabetic patients have a 30-40% higher risk of developing oral fungal infections. This study aimed to compare Candida species and counts in the oral cavities of diabetic versus non-diabetic individuals. Of the 50 samples, 44 (88%) yielded positive cultures for Candida. The total Candida carriage rate was similar in both the diabetic and control groups (88%) but multiple Candida species were identified, with Candida albicans and Candida krusei being the most common. Diabetic patients had significantly higher colony-forming units (CFU/ml) compared to controls, indicating a greater fungal load despite similar carriage rates between groups.

Keyword: Candida albicans; Diabetes; Oral candidiasis.

MORPHOLOGY AND MEDICINAL USES OF PUNICA GRANATUM IN KURDISTAN REGION

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ABSTRACT

Pomegranate (Punica granatum) is an internationally renowned fruit appreciated for its delicious flavor, cultural importance, and diverse range of potential health advantages, thus making it a valuable dietary option. Currently, there is a lack of information regarding the geomorphology and medicinal properties of pomegranates in this region. Additionally, there is a challenge in preserving pomegranates without the use of refrigeration methods. The aim of this study is to document data on the ethnomedicinal value, morphological structure, and traditional storage methods of pomegranates in Halabja, Kurdistan. To achieve this, samples of different pomegranate varieties present in Halabja were collected through visits to local experts and farmers. The collected data was analyzed using Excel to determine the mean value, also we used twenty different morphological characteristics of pomegranate leaf to differentiate between different varieties of the plant. The results of this study reveal the presence of four major pomegranate varieties in Halabja, namely Amerîkî, Salexanî, sûrî, and Sazan. Additionally, four different traditional storage methods were identified. Furthermore, the medicinal uses of pomegranate were found to be extensive, with more than 20 diseases being treatable using different parts of the plant. This research provides valuable insights into the morphology, traditional storage practices, and medicinal applications of pomegranate in the Kurdistan region, contributing to the existing knowledge of this versatile fruit. Still Yearly studies needed on pomegranate in Halabja and Kurdistan region, because each new year farmers are planting a new variety of pomegranate and every day new diseases are finding to be treated with pomegranate plant and its parts.

Keyword: Keywords: Kurdistan, Pomegranate, Ethnomedicinal, Storage, Morphology.

Winter Cold Stress and Ectoparasite Adaptation in the Erbil Plains: Sustainable Strategies Amid Climate Change

Runj Alnakishbandi

Runj Mazher Alnakishbandi

ABSTRACT

Winter cold stress and ectoparasite infestations significantly impact sheep health and productivity, particularly in regions like the Erbil Plains, where climatic conditions are variable and increasingly influenced by climate change. This study investigates the relationship between winter climate factors—such as temperature, humidity, and wind chill—and the dynamics of ectoparasite populations in sheep. By assessing cold stress indicators, ectoparasite density, and sheep performance metrics, the research highlights the compounded challenges faced by farmers in this region. Findings reveal that colder temperatures and higher humidity during winter months exacerbate cold stress and create conditions favorable for the survival and proliferation of ectoparasites, such as lice, ticks, and mites. The study proposes sustainable strategies, including improved shelter, nutritional supplementation, and eco-friendly ectoparasite management, to mitigate these impacts. These approaches not only enhance sheep welfare and productivity but also contribute to the long-term sustainability of livestock farming in regions experiencing climate variability. The insights gained provide a foundation for adaptive management practices that address the dual challenges of cold stress and ectoparasite infestations in sheep farming systems worldwide.

Keyword: Winter cold stress, Ectoparasite adaptation, Climate change, Sheep farming, Sustainable livestock management.

Radiological assessment of radon concentration in meal plates available in Erbil city, Kurdistan Region of Iraq

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ABSTRACT

The radioactivity levels in meal cooking plates are crucial to evaluate the radon concentration and the associated radiological health parameters, especially considering that radon gas is considered the second leading cause of lung cancer. For this purpose, 65 meal dish samples were collected in Erbil city. The radon activity concentration, surface exhalation rate, mass exhalation rate, effective radon content, as well as the annual effective dose and excess lifetime cancer risk were evaluated by utilizing radon monitoring system connected to an electronic RAD-7 detector. The result demonstrates that the range of radon concentration, surface and mass exhalation rates, effective radon content, annual effective dose and excess lifetime cancer risk in the studied samples are 14.2- 80.1 Bq/m³, 0.027 -0.151 Bq/m².h, 0.86-3.83 Bq/kg .h, ,0.114-0.508 Bq/kg, 0.356 -2.021 mSv/y, and (1.25 -7.07) $\times 10^3$ respectively. Radon concentrations in all samples fell below the ICRP's recommended activity range of 200-600 Bq/m^3. The results showed that the rate of radon release was less than the global average of 57.600 Bq/m^2. h. Additionally, the annual effective dose for minority of the samples (15 out of 65, or 23%) exceeded the global average value of 1.2 mSv/y. The study found a strong correlation between radon activity concentration, surface exhalation rate, and mass exhalation rate. The study indicates that certain ceramic dishes in kitchens increase radon pollution levels, potentially causing further health risks. Therefore, it recommends avoiding certain types of ceramic dishes.

Keyword: Radon, Meal dishes, RAD-7, Annual effective dose, Excess Lifetime Cancer Risk.

Restoration of The Surface by Conditional External Curvature

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ABSTRACT

One of the main problems of global differential geometry is the problem of surface reconstruction by geometric characteristics. In this paper, the properties of surfaces isometric by sections are investigated. In particular, an invariant of a convex polyhedron is found, and an invariant of surfaces isometric by sections is obtained using a limit transition. It is proved that this invariant is equal to the area of a cylindrical image. Then, the problem of surface reconstruction by a given conditional external curvature is solved.

Keyword: Defect, conditional full angle, singular supporting plane, polyhedral angle with one singularity (with two singularities), conditional external curvature, cylindrical image.

COOT- Optimized Feature Selection Combined with Multiwavelet Transform and Neural Networks for Liver Tumor Classification.

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ABSTRACT

Early diagnosis of liver cancer is essential concerning therapy and patients' prognosis. This paper proposes a new criterion for distinguishing liver cancers, which employs feature selection based on the COOT optimization method, Multi Wavelet Transform (MWT), and Forward Neural Networks (ANN). The Kaggle liver tumor dataset was used to determine the usefulness of the suggested method. The major steps in the methodology are as follows: Preprocessing of raw image data includes resizing images into subsets, normalization of pixel intensity, and data augmentation; Multiwavelet transform to extract multi-scale features; Appliance of COOT-based method to select the discriminating features; Training of ensemble of the neural network on the selected features. The results indicate that the accuracy of classification is higher than applying other methods that are already employed and therefore the suggested method is recommended Also, the dimensionality of the feature space was effectively reduced through the use of the COOT-based feature selection strategy, thereby enhancing the efficiency of the model and its ease of Interpretation.

Keywords: liver tumors, CT scans, feature selection techniques, the Cuckoo Optimization Algorithm (COOT), (MWT), and (ANN).

A Novel Hybrid Approach Combining Autoencoders and Ensemble Learning for Heart Disease Classification

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ABSTRACT

Heart disease remains one of the most life-taking diseases across the world, and thus enormous research work is geared toward the establishment of strong models for early-stage detection and risk prediction. This paper presents a new hybrid machine learning framework, including deep features obtained via autoencoders, self-adaptive feature recalibration, and ensemble learning to develop an efficient heart disease classification system. It considered a dataset from five established heart disease datasets. The autoencoder captures high-level representations of the data, while the recalibration mechanism is employed to dynamically adjust the importance of the features for the optimization of performance by the proposed model. Multiple classifiers are integrated using ensemble learning-based RF, Extra Trees, and XGBoost (eXtreme Gradient Boosting) aggregators to make the system robust and generalize the results. The proposed hybrid model achieved an accuracy rate of 92.45%, significantly higher than the rates achieved by traditional models and the ensemble techniques of previous studies. Moreover, it yielded very high sensitivity of 93.2% and specificity of 91.4%, hence its effectiveness in identifying high-risk patients while keeping false positives at a minimum. It has much potential for early diagnosis and decision-making in heart disease management. Future research will involve the validation of this model across different populations and optimization for real-time clinical use.

Keyword: Heart disease classification, machine learning, autoencoders, self-adaptive feature recalibration, ensemble learning.

Grafting Azobenzoic Compounds with Paracetamol Units and Biological Activity Evaluation (A Comparative Study)

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ABSTRACT

Three distinct novel methods were used to grafted azo benzoic compound by two units of P-N-acetyl phenol at a 2:1 molar ratio, bis-(4-aminophenyl) 4,4'-(diazene-1,2-diyl) dibenzoate [A] was synthesized by reacting the azo compound with p-amino phenol in the first stage, and bis-(4-acetamidophenyl) 4,4'-(diazene-1,2-diyl) dibenzoate [B] was synthesized by reacting it with acetyl chloride in the second stage. Compound [B´] was prepared by reacting the azo compound directly with the paracetamol molecule in one step, while the third step reaction directed in basic media, and the main three compounds were compared, compound [B], compound [B´] and compound [i] were shown to be identical by spectroscopic diagnostic measures of the melting point, FTIR, 1H-NMR, and Mass spectra. A paracetamol derivative were prepared by reacted main compound with potassium cyanat and potassium thiocyanat respectively, gave bis-(4-ureidophenyl) 4,4'-(diazene-1,2-diyl)dibenzoate [Bi] and bis-(4- thioureidophenyl) 4,4'-(diazene-1,2-diyl)dibenzoate [Bii]. All compounds were examined biological activity against two types of bacteria (G +ve) and (G -ve), and at different concentrated, regarding biological applications directed at two categorie of comparing the derivatives to paracetamol itself, show a wide range from good to excellent.

Keyword: p,p´-di-azobenzoic acid, acetaminophen, KOCN, KSCN and antimicrobial study.

Nano-Zirconium Oxide Reinforcement in Aluminum 7075: A Study of Thermal, Electrical, and Physical Enhancements

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ABSTRACT

The research deals with improving the thermal, electrical, and physical properties of 7075 aluminum alloy using nano zirconium oxide (ZrO_2) as reinforcement. The composite materials were prepared using the powder metallurgy technique to achieve a homogeneous distribution of the reinforcement particles. The effect of different percentages of ZrO_2(0.5%, 1%, 1.5%, and 2%) on the alloy was studied. The study included physical tests (density, porosity), structural analyses (XRD, SEM), as well as thermal and electrical properties. The results showed clear improvements in density, decreased porosity, and increased structural stability, while the thermal and electrical conductivity decreased with increasing ZrO_2content.

Keyword: Keywords: Al7075 alloy, Nano ZrO_2, Powder metallurgy, Thermal properties, Electrical conductivity, Porosity, density.

Personalized Book Recommendation Based on MBTI (Myers Briggs Type Indicator)

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ABSTRACT

This study presents an unconventional approach to personalized book recommendations by integrating MBTI personality analysis with machine learning algorithms and ChatGPT. Leveraging a dataset of Amazon book reviews and user feedback, the study predicts users' MBTI types based on their written content, enhancing recommendation accuracy. this method includes fine-tuning several machine learning models (e.g., Logistic Regression, XGBoost, and SGD) to classify MBTI personality traits, which are incorporated as features in a hybrid recommendation system. Experimental results using Amazon book reviews available at Kaggle indicate improved precision (80%), recall (100%), and F1-score (88.89%) over standard recommendation systems, demonstrating the potential of personality-driven recommendations for enhancing user satisfaction and engagement.

Keyword: MBTI, logistic regression, random forest, recommendation system, machine learning.

Optimizing Nutrition and Dietetics: Sustainable Approaches for Health and Environmental Impact

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ABSTRACT

The interplay between dietary choices and their ramifications for individual health and environmental sustainability is increasingly recognized as pivotal in contemporary discourse. This analysis encapsulates the essential components influencing consumer behavior in food selection, emphasizing the necessity for informed decision-making approaches. A critical examination of the educational frameworks required to equip food and nutrition professionals, alongside healthcare practitioners, to navigate this complexity adeptly is warranted. Emphasis is placed on the imperative for organizations dedicated to the training of these professionals to spearhead the creation and implementation of curricula that encompass principles of sustainable and health-promoting dietary practices. As the landscape of nutritional science evolves, driven by ongoing research, the discourse surrounding sustainable diets will remain dynamic, reflecting the shifting paradigms of knowledge. Consequently, the interconnections among education, policy formulation, and practical applications will perpetually require reassessment until a global food system emerges that concurrently fosters ecological integrity and optimizes human health. In this transformative journey, it is paramount that the insights gleaned from emerging professionals are integrated, as society confronts escalating environmental challenges. The forthcoming generation of innovators in sustainable nutrition will undoubtedly propel our understanding and practices forward through their pioneering research endeavors.

Keyword: dietary choices, environmental sustainability, consumer behavior, food and nutrition professionals, sustainable diets, curricula development, health promotion, ecological integrity, nutritional science, food systems, research advancement.

Kinetic process assessment of H2 purification over highly porous carbon sorbents under multicomponent feed conditions

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ABSTRACT

As a universal energy carrier, the need for pure H2 is ever increasing due to its ubiquitous role in petrochemical refining, metal reduction, and the up-and-coming fuel cell market. Hydrogen produced from steam methane reforming (SMR) is typically laden with impurities such as CO_2, CO, and CH_4 and a full efficiency screening for potential H_2 purification sorbents requires evaluating the thermodynamic and kinetic behaviors associated with multicomponent pressure swing adsorption (PSA). As such, in this study we assessed three commercially available activated carbons with high surface area and pore volume for the PSA upgrading of H_2 from simulated SMR off-gas stream consisting of H_2/CO/CH_4/CO_2 (75/5/5/15 vol%). In addition to high-pressure adsorption isotherms for pure gases, H2 purity and recovery, and H_2 productivity were estimated from cyclic PSA experi ments, while actual (CO + CH_4 + CO_2)/H_2 selectivity values were estimated from breakthrough experiments. For the best performing material, the results demonstrated H_2 purity and recovery of 99.6 and 55.3 %, respectively with a productivity of 18.3 molH_2/kg. h and multicomponent (CO + CH_4 + CO_2)/H_2 selectivity of 59.86 %. Moreover, the affinity of the different adsorbates toward the activated carbons presented from the most adsorbed to the least adsorbed gas was in the order of CO_2 > CH_4 > CO ≫ H_2. The H_2 purification over these carbon-based adsorbents was found to be an equilibrium-controlled process

Keyword: H_2 purification, Activated carbon, Multicomponent adsorption, PSA.

Adapting CNN to work with homomorphic algorithms for secure prediction

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ABSTRACT

One of the requirements that strengthens information technology applications and helps them succeed is maintaining the privacy of sensitive customer data while dealing with them and ensuring that the results of operations and services provided to the customer are not viewed. This is one of the factors that can enhance trust and security in the services other parties provide to customers. In the research, the mechanism for classifying encrypted data with the BFV algorithm of type FHE using CNN networks was studied without the need to decrypt the data, with the challenges facing the neural network to make it compatible with linear BFV starting from the activation function with the operations adopted by the neural network in its calculations. This was done by proposing the design of a CBFVN neural network that works with the MNIST dataset, with modifications to its proposed nonlinear network layers and making it linear, and modifying the proposed CBFVN mechanism of action and making it behave like BFV in calculation and operations. The network was trained on explicit data to obtain weights to predict encrypted images. The proposed CBFVN network demonstrated good accuracy, achieving 98.17% with a loss of 0.0693%.

Keyword: Fully Homomorphic Encryption, BFV, CNN.

The Effect of Household Storage Tanks and User Practices on the Physical, Chemical, and Microbiological Quality of Water in Erbil City.

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ABSTRACT

This study examines the effects of domestic storage tanks and user practices on the physical, chemical, and microbiological quality of water in Erbil City, emphasizing the consequences of extended intervals without cleaning. Research was conducted on fifty families and twelve public places located in different neighborhoods of Erbil. Water samples were collected from the storage tanks and supply sources of these households for the purpose of investigation. Water samples were obtained from tanks that had remained uncleaned for periods spanning 3 months to 15 years and were analyzed for physical parameters (e.g., turbidity, temperature), chemical composition (e.g., pH, dissolved oxygen, chlorine residuals, electrical conductivity (EC), and total dissolved solids (TDS)), and microbiological contamination (e.g., total coliforms and Escherichia coli). The results indicate that extended cleaning intervals lead to substantial alterations in EC and TDS levels, resulting in compromised water quality due to microbial growth. The study emphasizes that user activities, such infrequent tank maintenance and inadequate water management, worsen water quality deterioration.Recommendations encompass regular cleaning practices, robust storage system designs, and public awareness initiatives to alleviate these detrimental impacts. This research highlights the essential need of appropriate storage and management strategies in preserving water quality, public health, and sustainability in urban environments.

Keyword: Keywords: Domestic storage tanks, Physical parameters, Microbiological, Electrical conductivity (EC), ph,Total dissolved solids (TDS)and Turbidity.

Exploring Co-0,1-Neighborhood Captive Domination in Graphs

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ABSTRACT

This study initiates a fresh perspective on graph domination by proposing a novel definition. Exploring the introduced definition's properties, the research conducts a comprehensive analysis on various graph types including cycles, paths, wheels, stars, and complete bipartite, null, and complete graphs. The investigation uniquely determines the domination numbers for each graph category, enhancing our understanding of dominating sets in diverse graph structures. By introducing and analyzing this innovative definition, the study contributes valuable insights to the theoretical framework of graph theory, offering a nuanced exploration of domination concepts across different graph topologies.

Keyword: Co-0,1- neighborhood captive dominating set and Co- 0,1- neighborhood captive domination number.

Synergistic effect of Ni(OH)2 and MXene nanosheets in 3D framework on the improvement of dielectric, energy storage, mechanical and thermal characteristics of polyvinylidene fluoride(PVDF) polymeric composites

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ABSTRACT

This work introduces a novel method for incorporating meticulously designed nanohybrids to improve the dielectric characteristics of polymer composites. Conventional ceramic fillers have problems with dispersion even if they are good at increasing permittivity. Here, we overcome this constraint by creating nanohybrids made of MXene, polyvinylidene fluoride (PVDF), and single-layered and three-dimensional Ni(OH)2. An essential coupling agent, polyethyleneimine (PEI), fosters a robust electrostatic connection between Ni(OH)2 and superior adhesion with MXene. Using only 9.5 wt percent filler loading, we are able to achieve a low loss tangent (tan δ=0.4) at 1 kHz with a considerable permittivity improvement (ε=1000) thanks to this creative design. The nanohybrid structure's ability to promote longer interfacial contact is crucial to this enhancement. Moreover, the integrated Ni(OH)2 layer functions as a semiconductor, obstructing the passage of current through the MXene flakes and lowering conductivity overall. At a low Ni(OH)2/MXene loading of 1.5 wt%, our threephase com posites also show higher dielectric strength (248.68 MV/m). Specifically, the synergistic coupling of MXene with Ni(OH)2 provides notable increases in mechanical and thermal properties. The tensile strength and Young's modulus of these films are much higher than those of virgin PVDF and Ni(OH)2-modified composites.

Keyword: Synergistic effect, MXene ,Nanosheets , 3D framework ,Energy storage ,Polyvinylidene ,Polymeric composites.

Reservoir Characterization Through Comprehensive Interpretation of Well Log Data

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ABSTRACT

Accurate reservoir characterization is required for the optimization of hydrocarbon pro-duction and economic feasibility. Well logs provide the opportunity for high-resolution development of a reservoir model and complement traditional approaches in reservoir characterization, such as core analysis, seismic surveys, and geochemical evaluations. This work utilizes a robust dataset from a field in the Kurdistan Region of Iraq, including gam-ma ray, neutron porosity, resistivity, and density log parameters. The dataset was pro-cessed in Techlog software through a step-by-step workflow that included calculation of formation temperature, determination of shale volume, and estimation of porosity, fluid saturation, and water resistivity. A few critical hydrocarbon-bearing zones have been identified, such as the pay zone with low water saturation of 0.177, moderate porosity of 0.100, and very high shale volume of 0.204. The information improves the understanding of the geological architecture of the reservoir and the fluid flow dynamics, thus assisting in an informed decision regarding the placement and production strategy of the well. This study documents the development of a well log-integrated reservoir model and shows sig-nificant improvement in the delineation of productive intervals for better recovery of hy-drocarbons. This work emphasizes that modern log analysis techniques are primary in re-cent times in modern reservoir management and will continue to make new frontiers in hydrocarbon exploration and production.

Keyword: Shale Volume (Vsh) Neutron Porosity Resistivity Net to Gross Ratio Spontaneous Potential (SP).

A Reconfigurable Reflectarray Structure based on Metamaterial Unit Cells for 5G Applications

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ABSTRACT

In this article, the design and analysis of the Reconfigurable Reflectarray Structure based on Metamaterials for sub-6 GHz 5G applications is presented. The proposed Reflectarray Structure is printed on 1mm thick of FR4 dielectric substrate (εr=4.4 and tanδ=0.02) with totally size of 180×180 mm2 . The Reflectarray consists of 144 unit-cells. The unit cell is designed to achieve a negative of one of the constitutive parameters ($\varepsilon r/\mu r$) in the sub-6 frequency bands to improve the functioning of the reflective surface. The unit cell dimensions are 15×15×1 mm3 that consisting of a conductive layer (13.2 x 13.2 mm2) printed on the top face of substrate with two PIN-diodes that inserted in each unit-cell for reconfigurable behavior achievement. In this work, the complete analysis in terms of S-parameters, constitutive parameters, and refractive index was evaluated using full wave analysis. The CST Microware Studio software package is used to design and analyze the proposed unit cell. Finally, a good agreement was observed between the measurement results and those from the simulation

Keyword: Metamaterials, Vivaldi antenna, Single negative, constitutive parameters, and Reflectarray.

A Holistic Natural approach:Potential Therapeutic Interventions in Ovarian Cancer

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ABSTRACT

Ovarian Cancer (OC) is a highly prevalent cause of death and it is the seventh common cancer diagnosed in females. Conventional treatment has many drawbacks including efficacy, pain and coast. The use of natural medicinal plant has been rise in treating many diseases including cancer. Plants are now considered as an alternative source of medicines that can be used to treat a range of cancers, including OC. This study aims to explore the use of medicinal plants in treating OC. Databases include PubMed, Google Scholar, and Scopus were searched using the keywords; OC, epidemiology, etiology, risk factor, diagnosis, treatment, and plant parts extraction such as roots, stem barks, seeds, and plant leaves in treating OC. The results showed that plant components have potent properties in treating OC, via different mechanisms including antiproliferative, anti-neoplastic, angiogenesis antioxidant, anti-α-glucosidase, and antiinflammatory pathways. The plant's roots have been reported as antiangiogenic, cytotoxic, antiproliferative, and capable of breaking DNA damage of OC cells. The stem part has efficient anticancer, antiproliferative, and cytotoxic properties against OC. The seeds exhibited cytotoxicity effects, and anti-inflammatory, antioxidant, anticancer, which reduced the growth of ovarian cancer cells by inducing apoptosis through a p53-dependent intrinsic mechanism. While the leaves showed an antiproliferative impact on ovarian cancer cells and efficacy against OC cells by inducing death through both intrinsic and extrinsic routes. Each part demonstrates potential activity on OC, slowing the proliferation of malignant cells and encouraging apoptosis. The results reported the presence of flavonoids, phenolic compounds, phytochemicals, alkaloids, and antioxidants that could be behind their efficacy. However, the efficacy of these plant parts and their substances varies based on the dosage, bioavailability, and synergistic effect with other substances. Thus, investigating the potential of plant-derived compounds in treating OC is a crucial avenue of research. The translation of these findings into clinical practice is imperative for the advancement of therapies aimed at addressing ovarian cancer.

Keyword: Ovarian Cancer, Medicinal plants, natural products, therapeutic.

Attendance Management System for the Students in College of Information Technology using IoT and QR Code

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ABSTRACT

In spite of the world quarantine because of the Covid-19 and Covid-20 pandemic, the educational institution presents and takes its role in education and teaching the students. In normal situation it is usually the attendance taken by calling the names of students by their teachers. This method is a time consuming and mistakes may occur. There is a need to take the attendance of students in their classrooms with a simple and efficient method. This research aims to design and implement the appropriate attendance system using IoT and attendance system management that can be implement based on cloud computing. The system has three techniques that can be used to register the attendance of students: the first technique is using IoT with RFID card, the second using IoT with fingerprint and the third using QR code generator. All these techniques are connected to attendance management system that exists on the cloud. The research tries to overwhelmed the difficulties in manual registration scheme and discuss the best scheme from these techniques. From the implementation result the QR code is the best system because it doesnâ€™t need to more expensive devices and the error ratio is very low compared to the other techniques.

Keyword: Attendance management system, Cloud computing, Finger print, IoT, QR code, RFID.

Exploring Lattice-based Key Exchange protocols

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ABSTRACT

The evolution of quantum computing has rendered conventional public-key cryptography obsolete, and hence, it calls for secure and efficient post-quantum cryptographic systems. Because of their strong security based on the hardness of lattice problems and due to the fact that they are easy to implement in practice, lattice-based key-exchange protocols have been highly attractive. This review provides an in-depth look into lattice-based key-exchange protocols, covering mathematical foundations, methodologies of construction, and performance metrics. We review some protocols and their evolution, emphasizing several key innovations in the way the challenges of optimization of efficiency, and resistance to quantum adversaries are addressed. The manuscript also discusses these protocols from the perspective of computational overhead, communication cost, and suitability for various application domains.

Keyword: post-quantum cryptography, lattice-based, key exchange.

An Approach to Solving Transcendental Equations for High School Students Using Technology: A Case for Curriculum Integration

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ABSTRACT

This article focuses on assisting students who face challenges in transcendental equations, opening new horizons for them, and enhancing their perspective on mathematics through the positive influence of technology. Our research was conducted with 24 diverse students from Stirling Girls' High School in Kirkuk. Data collected through a mixed-method approach were analyzed and interpreted. Feedback from students revealed the joy of discovering a highly beneficial pathway. By providing effective guidance on utilizing technology, students expanded their horizons and realized that challenging topics in mathematics, especially various systems of equations, could be solved easily. It was noted that students' confidence in mathematics increased, and they started to approach other challenging topics with a mindset of "there must be a solution." In this context, this article presents an approach to addressing challenging mathematical concepts with the help of math apps such as Desmos. In this way, students can enhance their understanding by visualizing solutions that would be difficult to grasp algebraically and broaden their perspectives on challenging questions. Simultaneously, interactive and didactic materials can promote students' and teachers' enthusiasm for using digital technology in the educational process. Through this study, we offer valuable insights into how common mathematical difficulties can be effectively addressed with technology, thereby making a meaningful contribution to mathematics education.

Keyword: Graphical methods; Desmos; mathematics education; technology; Transcendental Equations Approach (TEA).

Introducing High School Students to the Mystery of Lobachevsky Geometry

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ABSTRACT

This article primarily aims to introduce high school students to the mystery of Lobachevsky geometry, one of the cornerstones of non-Euclidean geometries. Lobachevsky geometry, often known as hyperbolic geometry, differs from Euclidean geometry in several basic ways. The concepts and figures of Lobachevsky geometry can appear in different plane models, such as the Klein and Poincaré disk models. It further examines students' general attitudes and behaviors toward non-Euclidean geometries. Lobachevsky's geometry has helped expand students' horizons and enriched their critical thinking skills by challenging traditional Euclidean paradigms. This study is supported by a mixed-method approach utilizing quantitative and qualitative data. The mock exam results obtained from students during the educational process were compared, and the study was further supported by the positive feedback received from the participating students. The intriguing lessons on Lobachevsky geometry were conducted over 4 weeks, with weekly 2-hour geometry classes involving 12th-grade students at Stirling Schools in Erbil. Throughout the study, we observed significant improvements in students' ability to adopt, understand, and apply advanced geometric concepts. This article also discusses findings and implications that address gaps in the literature and considers the potential for curriculum updates to enhance the future of geometry education.

Keyword: Escher, GeoGebra, Hands-On Learning, Holonomy, Hyperbolic geometry, Lobachevsky geometry, mathematics education, non-Euclidean geometry, student engagement, WebSketchpad.

Advancing Oil Recovery: Systematic Evaluation of EOR Techniques from Primary to Tertiary Stages

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ABSTRACT

To enhance oil production efficiency, particularly in mature fields, the implementation of Enhanced Oil Recovery (EOR) techniques is crucial. These methods are designed to retrieve additional crude oil that cannot be extracted using conventional recovery processes. The study conducted at an oil field in Iraq provides a comprehensive evaluation of EOR techniques, leveraging advanced simulation models to optimize the transition from primary to tertiary recovery stages. Utilizing Eclipse software to analyze a portion of an oil reservoir through 7500 grid blocks with one producer and four injectors configured in a 5-spot pattern, the research demonstrates the effectiveness of systematic EOR application. During primary recovery, modest oil production levels necessitated the initiation of gas injection, which achieved a cumulative recovery of 3.6% by day 171. In the secondary phase, the re-injection of produced gas enhanced recovery further by an additional 6.5%. For tertiary recovery, the TOPSIS method was employed to systematically screen and identify the most effective EOR strategies through a Python-based automation process. The study identified miscible CO2 flooding, immiscible methane flooding, and a combined surfactant-polymer flooding as the most effective techniques, with the latter achieving the highest increase in oil recovery at 32.34% over five years. This highlights the critical importance of integrating technological advancements and systematic methodologies in maximizing the extraction and sustainability of oil reservoirs.

Keyword: Enhanced Oil Recovery (EOR) , Miscible CO2 Flooding, Surfactant Pol- ymer Flooding, Gas In- jection, TOPSIS Method, Reservoir Simulation, Python Automation, Oil Recovery Efficiency and Volatile Oil Reservoir.

Therapeutic pathways mechanism of Angiogenesis

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ABSTRACT

Angiogenesis, the formation of new blood vessels is an essential process for growth, healing, and development, but the mechanism can contribute to diseases such as cancer, diabetic retinopathy, and ischemic diseases upon dysregulation. In this review, we look at the mechanism of angiogenesis with a focus on the function of vascular endothelial growth factor (VEGF), hypoxia, and endothelial cells in vessel generation. Pro-angiogenic strategies promote new vessel formation to salvage ischemic tissues, whereas anti-angiogenic strategies target the vascularization of cancerous tissues to decelerate the progression of the disease. Progresses in comprehension of the equilibrium of angiogenic modulators as well as their molecular signalling transduction have improved therapeutic approaches. New modulators are being investigated through ongoing clinical trials or preclinical studies and have great potential to improve clinical outcomes of many angiogenesis diseases.

Keyword: Keywords: therapeutic angiogenesis, anti-angiogenic therapy, ischemic diseases, cancer, hypoxia, pro-angiogenic factors, molecular signalingism, angiogenesis, VEGF, endothelium.

Personalized Nutrition Plans: A Strategy for Preventing Overweight and Related Health Conditions using Machine Learning

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ABSTRACT

The rising prevalence of being overweight and obesity is among the biggest public health challenges, and prevention and management require truly innovative and personalized approaches. The current paper focuses on the application of machine learning to develop personalized nutrition plans to deal with conditions of overweight and obesity. Using a dataset of 6,509 samples of patient data including, among others, BMI, LBM, PBF, in addition to their pre-determined dietary schedule, obtained from DIET NUTRITION in Erbil, the Random Forest is applied to the prediction of personalized weight-loss schedules.The model attained an accuracy of 96% from the first round of training without dietary schedules. This is an indication of the strength of the model in analyzing core patient data. With the addition of schedules, the accuracy reached 99%, but it took an overfitting problem that needed refinement. This paper increased the data samples from 1,099 to 6,509 and considerably improved the generalization ability of the model. The last training using the increased dataset with dietary schedules has achieved an accuracy of 100%.These findings provide a serious reminder that machine learning has the potential to revolutionize personalized nutrition planning, a credible, evidence-based intervention strategy in obesity management. This work demonstrates that integration of patient data and dietary schedules, considering issues on overfitting and limitations within the datasets, is effective. This research provides a very good foundational framework for further investigation in personalized healthcare technologies and indicates the need for much larger datasets and an improvement in machine learning methodologies to attain higher accuracy and reliability in health intervention.

Keyword: Personalized Nutrition, Machine Learning, Overweight and Obesity, Random Forest, Dietary Schedules, Patient Data, Obesity Management, Health Intervention.

Computation of Some Topological Indices of Certain Chemical Structure

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ABSTRACT

Topological indices, or numerical description of graph structures, are highly critical in deciding the physical, chemical, and biological properties of chemical compounds. The paper presents a study on a few important IndicesWiener index, Zagreb indices, and Randić index-on certain dendrimers, which are highly branched, tree-like molecules of great utility in nanotechnology, drug delivery, and polymer science. Dendrimers represent symmetric and recursive architecture and hence an ideal framework for topological analysis. The branching pattern and node distribution specify the generation rules and structural parameters that define the families. Graph-theoretical methods are used to develop closed-form expressions for these indices, considering the regular structure and self-similarity of dendrimers. Computational simulations confirm these formulae for smaller generations of the dendrimers and further demonstrate that the various indices are strongly correlated with key structural features of the dendrimers, including size, symmetry, and degree distribution. These findings improve the understanding of the properties of the graph of dendrimers and their relevance to chemical and material sciences, with graph theory acting as a bridge between abstract mathematics and practical chemical applications.

Keyword: Topological indices, Graph structures, Dendrimers, Wiener index, Zagreb indices, Rancid index, Chemical graph theory and Molecular structure analysis.

Temperature variations effect on physical behaviors of Ti50Ni39Zr10Nb1 low temperature shape memory alloy (LTSMA)

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ABSTRACT

In this study, a Ti_{50}-Ni_{39}-Zr_{10}-Nb_1 (at. %) alloy was subjected to three different heat treatment temperatures (873 K, 1073 K, and 1273 K), followed by quenching in an ice-water medium. Differential Scanning Calorimetry (DSC) was employed to examine the thermal properties of the treated samples and to evaluate the effect of heat treatment on various thermal parameters. To assess the impact of heat treatment on the crystal structure, X-ray Diffraction (XRD) analysis was performed at room temperature. Additionally, the Vickers hardness method was used to study the hardness properties of the treated alloy. The DSC results indicated that Ti_{50}-Ni_{39}-Zr_{10}-Nb_1 functions as a low-temperature shape memory alloy, with all thermal parameters such as enthalpy change, entropy change, elastic energy, and Gibbs free energy being influenced by heat treatment. XRD analysis showed a reduction in grain size across all treated samples and an enhancement in the degree of crystallinity. Finally, the treated samples exhibited higher hardness compared to the as-cast sample.

Keyword: Keywords: Ti-Ni-Zr-Nb SMA; Heat Treatment; Microhardness; DSC; XRD.

Let me pass: Development of a Car Parking Communication System for Enhancing Urban Traffic Management in Erbil, Kurdistan

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ABSTRACT

In the rapidly urbanizing city of Erbil, Kurdistan, parking congestion has become a prevalent issue, often leading to blocked vehicles and unnecessary delays for drivers. This research project aims to develop an innovative application designed to streamline communication between drivers when vehicles are obstructing one another in parking lots. The proposed application will enable drivers to quickly notify the owners of blocking vehicles through an integrated alert system, prompting them to move their vehicles and allow others to pass. The application will feature a comprehensive database storing vital information, including driver details, vehicle information, license plate numbers, and contact information. This solution is expected to enhance parking efficiency and reduce driver frustration, ultimately contributing to better traffic management in the region. The research will focus on the design, development, and implementation of this application, considering local user needs and technological infrastructure in Erbil.

Keyword: Parking Management, AI, Mobile Application, KRG, Plate Recognition.

The effects of temperature, dust and cement-coal particles on PV panel performance: a case study in Iraq

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ABSTRACT

In this work, experimental test are conducted on the traditional panels and the wide-ranging cooling performance using pulsed water spray cooling systems and the Efficiency performance of panels are explored. Over a period of two months, experiments were performed in the Al-Kitab University building in Kirkuk/Iraq, under normal weather conditions for the city of Kirkuk, northern Iraq. The average outdoor temperature and solar radiation at the time of the study were 39 °C and 920W/m2, respectively. The experimental results indicate that those average temperatures of PV panel with dust, cement-coal particles, and water-cooled system are 57.5°C, 64.1°C, and 36.5°C respectively. The maximum temperatures of PV panel, on which dust settled with different amounts of 200 gr., 300 gr., 400 gr. and 500 gr., first reached the levels of 57 °C, 57 °C, 60 °C, and 63.4 °C. The electrical performance of PV panel in the presence of cement and coal particulates were 71 °C and 58 °C respectively. Wherein, the impact of the spray water cooling system was investigated, and hence it was determined that it has reduced the panel temperature to as much as 34°C while also increasing the electrical efficiency from 12.2% to 16% in this process. Based on experimental data, the overall efficiency of a typical clean panel is estimated to be 12%. The use of the spray water system helped to enhance the panel efficiency up to 14.5% while maintaining the panels clean and cool.

Keyword: Dust accumulations, cement, coal, power, efficiency, and PV system.

Titanium Dioxide/Manganese Oxide Nanoparticles Modified MWCNTs for Bromothymol Blue Removal from Water

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ABSTRACT

Industrial and environmental communities face a growing problem of water pollution due to the presence of complex organic dyes, including bromothymol blue dye, which is characterized by its stability and difficulty in removing it using traditional methods for water treatment. From this standpoint, the search for effective and highly efficient materials for water purification has become of utmost importance. In this context, multi-walled carbon nanotubes, were used as a basis for developing a composite containing titanium oxide and manganese oxide nanoparticles. These nanotubes act as a support with a large surface area and a highly porous structure, allowing the deposition of nanoparticles of titanium oxide and manganese oxide nanoparticles on their surface using thermal method and TiO_2-MnO_{2s}/MWCNTs were prepared. The synthesized nanocomposites were characterized using XRD, EDX and FESEM techniques. After preparing this compound, its ability to remove bromothymol blue dye from polluted water was tested using the surface adsorption mechanism. The compound is placed in an aqueous solution containing the dye, then the mixture is shaken using an automatic shaker to ensure effective contact between the dye molecules and the active sites on the surface. Doping the carbon nanotubes with titanium oxide and manganese oxide, the adsorption process is fast and efficient, reducing the dye concentration in the water. The results showed that this compound was highly effective in removing the dye as compare with fresh MWCNTs, as the concentration of bromothymol blue decreased within time. These properties make this hybrid compound a promising and low-cost solution for treating dye-contaminated water, and promote the trend towards developing environmentally friendly and sustainable technologies capable of dealing with the challenges of water resource pollution.

Keyword: MWCNTs, TiO_2, MnO_2, nanoparticles, Water treatmen.

Study of Univalent Functions on Quasi Subordination Associated with Hadamard Product

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ABSTRACT

In this study, a novel subclass $\Xi\alpha,\beta,\mu\ k,\gamma,b\ (\delta,\ \theta,\ \varphi)$ of analytic and bi-univalent functions in the open unit disk $\mathfrak{U}$ is presented, which involves convolution between the differential operator $\Im\mu,b$ developed on the basis of quasi-subordination and Srivastava-Attiya operator $\Gamma\alpha,\beta\ k,\gamma$which is defined based on quasi-subordination. For this subclass, estimates of the coefficients $|a2|$ and$|a3|$ for Taylor-Maclaurin series expansions is determined. Furthermore, a new result was found.

Keyword: Subordination, Analytic function, Quasi-subordination, bi-univalent function.

Chaos-Enhanced Image Security: Leveraging Josephus Trajectory and Simultaneous Confusion-Diffusion

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ABSTRACT

The security of image cryptosystem is fundamentally contingent upon the efficacy of the confusion and diffusion methodologies employed by the cryptosystem, as well as the dynamic behavior of chaotic systems. Nonetheless, prevailing chaos-based image cryptosystem are hindered by slow performance, inadequate resistance to a variety of attacks, a lack of correlation between the input image and the encryption key, suboptimal dynamic performance, and limited sensitivity to chaotic systems. In order to mitigate these deficiencies, this paper presents a simultaneous confusion-diffusion structure for image encryption based on a plaintext-related mechanism, which demonstrates a high correlation with the plain image using the U-Quark hash function and Collatz conjecture. Firstly, the plain image is divided into non-overlapping blocks. Secondly, the dynamic Josephus trajectory permutes the image blocks using random indices generated through a 7D hyperchaotic system. Thirdly, a parallel simultaneous confusion-diffusion structure is employed to confuse and diffuse all image pixels. The results of the experimental study imply that the recommended cryptographic approach, in relation to earlier investigations, delivers a variety of benefits concerning MSE, PSNR, entropy and correlation coefficient indicators, accomplishing an encryption time of around 0.024 seconds and a key size greater than about 10266. Furthermore, it exhibits commendable resilience against a spectrum of attacks.

Keyword: Confusion, Diffusion, U-Quark Hash Function, Hyperchaotic System, Collatz Conjecture, Josephus Trajectory.

Chamk: A Crowdsourcing Approach for Increasing Multimedia Data in the Kurdish Language

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ABSTRACT

This paper proposes a crowdsourcing platform for collecting multimedia data in the Kurdish language, specifically focusing on the central Kurdish dialect. The platform, named Chamk, encourages users to generate and publish high-quality content through a point-based reward system and quality control mechanisms. Built using Laravel, Vue.js, and Flutter, the platform supports text, audio, and video content while implementing strict moderation and validation processes to ensure content integrity. The initiative aims to address the scarcity of Kurdish digital resources and support future machine learning applications by creating a comprehensive dataset of academic-quality Kurdish content.

Keyword: Crowdsourcing, Multimedia Data, AI, Machine Learning, Kurdish Language, Reward System.

Augmented Reality: Developing Augmented Reality Technology Based Business Card

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ABSTRACT

This paper examines the applicability of AR in the enhancement of conventional business cards to create a new form of business card that provides interaction and memorable experiences in business interaction. Conventional business cards are, however, rather plain and do not always grab the attention of the person to whom they are being handed over, or provide an adequate representation of a person's work. With the help of AR this research proposal seeks to redesign the business card as an interactive tool that captivates the user and offers additional information than just the contacts. First, the current state of AR applications is discussed to provide background in the use of AR in the context of business tools to further the development of integrating AR into business cards. The research then moves to the design and development of an AR business card system with emphasis on AR technologies such as image recognition, 3D modeling and user interaction. this research concluded that AR business cards are superior to conventional business cards as they enhance user engagement, enhance information retention, and present a fresh avenue to mark and distinguish brands. The research implies that the AR technology can become a new frontier in business networking tools and change the ways people promote themselves and their companies in the digital era.

Keyword: Augmented Reality, Business Cards, User engagement.

Study of the effect of continuous laser (450nm) on the optical and structural properties of a thin film of organic semiconductor (TPD)

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ABSTRACT

Because of their unique properties, Organic semiconductors are considered among the most promising materials in semiconductor applications. Before the irradiation process using laser, the optical properties of a samples of an organic semiconductor material (TPD) were prepared, examined and analyzed using (UV), (FTIR), and (XRD) devices. Then, the optical properties of the above-mentioned sample were again studied after irradiation for different durations utilizing a continuous semiconductor laser with output of (50000 mW) and a wavelength of (450 nm). The significance of this research concentrates on reduce the energy gap value of the organic compound after the irradiation. As a result, the organic compound will reduce the energy consumption required to facilitate the transfer of electrons from low to high levels, as well as the abundance of excited electrons between the two levels. This will lead to an increase in the number of photons emitted in this Kind of organic semiconductor material. This will facilitate the utilization of such organic materials in light-emitting diodes, which will serve as an alternative to conventional light-emitting diodes.

Keyword: Keywords: Organic semiconductors material (TPD), Inorganic semiconductors, Optical proper.

Impacts of Landfill leachate on Soil quality in Kani-Qrzhala landfill area Erbil city and using biochar as remediation agent

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ABSTRACT

The study was carried out to determine impacts of landfill leachate on soil quality and using wood biochar as soil remediation agents . Soil samples from four equal distances and four depths (surface, 30 cm, 60 cm, and 90 cm) were collected along a leachate Chanel at Kani-Qrzhala landfill site, for determination the soil quality by using some common single and integral indices. The results of soil pH, EC and some heavy metals (Pb, Cd and Ni) show a significant variation at significant level ($P \leqslant 0.05$).The concentration of analyzed heavy metals in soil samples were arranged in the following magnitude order: Pb>Ni>Cd. The soil quality index (SoQI) had a high level concern in all studied sites which refer to high pollutant rate in soil samples, the lowest value of SoQI was (40.55) at site 1, that refer to the highest pollutant rate while the highest value of SoQI was (42.18) at site 3 refers to the lowest pollutant site. Potential ecological risk index(RI) of Pb and Ni were not more than the standard limit in all sites exception of Cd. In remediation experiments walnut shell(T_1) and oak tree wood (T_2) biochar %10 using for remediate contaminant soil by leachate. SoQI index improved after using T_1 and T_2 and the potential ecological risk index (RI) significantly reduced after using T_1 and T_2, but T_2 was more effective than T_1 to improve the SoQI and reduce RI rate, may be related to feedstock and mechanism of production biochars that affected on biochars activity and structure.

Keyword: Landfill, Leachate, Heavy metal, Biochar, Remediation.

Health Risk Assessment of Heavy Metals in Selected Culinary and Medicinal Herbs: A Case Study of Rose, Thyme, Turmeric, Chamomile, and Fennel

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Abstract

Plants are a significant source of heavy metals, with humans consuming large quantities of plants daily. Evaluating the levels of certain heavy metals (Pb, Cr, Cd, and Ni) is crucial for determining the potential risks associated with commonly used medicinal plants. This study aimed to estimate the concentrations of heavy metals in Curcuma longa, Rose rubiginosa, Thymus vulgaris, Foeniculum vulgare, and Matricaria chamomilla, utilizing Atomic Absorption Spectrophotometer. The results revealed that the concentrations of the studied heavy metals varied across the plant species. The concentrations of Pb, Cd, Cr, and Ni in the studied plants ranged between 2.5*10-5 - 0.44, 0.24 – 0.43, 0.40 – 0.84, and 4.83 – 4.82 respectively. While the Pb and Cr concentrations remained under the permissible limits set by WHO/FAO (Pb = 10 and Cr = 2 mg.kg-1) in all studied herbs, Cd and Ni showed exceedance in concentration in all herbs except Cd in Chamomile was below the addressed limit. Furthermore, the relationship between the studied heavy metals among the herbs in soil was mainly determined by the origin (natural or anthropogenic) and other factors such as environmental factors, genetic makeup as well as plant uptake mechanism and affinity for certain heavy metals. Moreover, the Tue key analysis at the p-value ≤ 0.05 showed no significant differences among the studied herbs for the studied heavy metals. On the other hand, the Health Risk Index has shown that HQ and HI for all studied metals were < 1, which means pose no risk to human health. Additionally, the carcinogenic risks were all under acceptable limits.

Keywords: Curcurma longa, Rose rubiginosa, Thymus vulgaris, Foeniculum vulgare, Matricaria chamomilla, Medicinal plant, Heavy Metal, Lead, Chrome, Cadmium, Nickle, risk assessment.

FLOOD RISK AND IMPACT ASSESSMENT IN THE KURDISTAN REGION OF IRAQ: A COMPREHENSIVE LITERATURE REVIEW

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Abstract

This study investigates the impact of climate change on flooding in the Kurdistan region of Iraq, highlighting recent trends and their implications for flood management. Our research identifies a marked increase in the frequency and severity of flooding events, largely attributed to shifts in precipitation patterns and intensities over the past decade. The data reveals a significant rise in annual rainfall, aligning with global climatic changes but exhibiting unique local characteristics. This increase in rainfall has led to more frequent and intense flooding, particularly affecting urban areas with high impervious surface densities. The studyâ€™s findings confirm and extend existing literature on the global impacts of climate change on flooding by providing a localized perspective on the Kurdistan region's specific challenges. The interaction between increased rainfall and the regionâ€™s mountainous terrain produces complex flood dynamics, underscoring the need for targeted flood management strategies. Our analysis also reveals that local land use changes, such as deforestation and urbanization, exacerbate flood risks. Despite the absence of specific flood risk models for the Kurdistan region, our research highlights the necessity of developing vulnerability assessment models to predict and manage future flood scenarios. The study emphasizes the importance of incorporating both global and local factors into flood management and adaptation strategies. Additionally, it points out the need for more comprehensive assessments of environmental and public health impacts, particularly regarding water quality and its effects on rural communities. Proactive measures and risk planning are essential to address the challenges posed by increased flood risks due to climate change.

Notes:

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