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INSTITUTE OF SCIENCE & TECHNOLOGY
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SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
FACULTY OF SCIENCE AND HUMANITIES
KATTANKULATHUR CAMPUS

THIRD INTERNATIONAL CONFERENCE 2025

COMPUTATIONAL INTELLIGENCE & MATHEMATICAL APPLICATIONS

6TH & 7TH FEBRUARY, 2025

in association with



RIYADH ELM UNIVERSITY
SAUDI ARABIA



COMPUTER SOCIETY OF INDIA
HYDERABAD

CONFERENCE PROCEEDINGS

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COMPUTATIONAL INTELLIGENCE & MATHEMATICAL APPLICATIONS 6TH & 7TH FEBRUARY, 2025

Designed & Compiled by
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SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

SRM Institute of Science and Technology is one of the top ranking university in India with over 52,000 full time students and more than 3200 faculty across all the campuses – Kattankulathur, Ramapuram, Vadapalani Campus – all in and around Chennai, Tiruchirappalli (in TN), Modinagar (in UP) & Sonapat (in Haryana) – both of which are located near Delhi NCR, Amaravati (in AP), Gangtok (in Sikkim) – offering a wide range of undergraduate, postgraduate and doctoral programs in six disciplines, including Engineering & Technology, Management, Medicine & Health sciences, Science & Humanities, Law and Agricultural Sciences. The University is committed to be a leading player in the academic world through excellence in teaching and research, while placing utmost value on the freedom to conduct academic activities and subject to the highest standards of academic integrity.

FACULTY OF SCIENCE AND HUMANITIES

The Faculty of Science and Humanities (FSH) at SRMIST, Kattankulathur. Since its inception in 2005, FSH has blossomed into a vibrant bastion of erudition and scholarly pursuit, epitomizing an unwavering dedication to excellence and ingenuity with a formidable array of 24 departments, a flourishing student body of 7000 plus, a cadre of 200 plus devoted faculty members, and 180 esteemed research scholars, FSH stands as a monument to our collective quest for knowledge and scholarly rigor. These ventures underscore our steadfast commitment to confronting global exigencies and advancing the frontiers of knowledge in these pivotal domains. With our particular pride of distinctive programs.

DEPARTMENT OF COMPUTER APPLICATIONS

The Department of Computer Applications College of Science, FSH at SRMIST has always been on the top as the paradigm of quality with the most modern curriculum and syllabus ever since its inception in 2005. The Department has proven its academic prowess and success with an extensive range of courses offered both at the Undergraduate and Postgraduate levels. The Department offers BCA, BCA Data Science, BCA Generative AI at the UG level, and MCA, MCA Generative AI and M.Sc Applied Data Science at the PG level.

DEPARTMENT OF COMPUTER SCIENCE

The Department of Computer Science, College of Sciences, FSH at SRMIST aspires to develop outstanding computer professionals with values. The Department provides a diverse range of undergraduate and post graduate programs. The undergraduate programs offered are B.Sc in Computer, B.Sc Cybersecurity Programs offered in PG levels are M.Sc Computer Science, M.Sc Information technology. These programs are designed to provide students with a solid foundation in Technology. The internships, Projects and research opportunities allow students to gain practical experience while building professional networks.

DEPARTMENT OF MATHEMATICS AND STATISTICS

The Department of Mathematics and Statistics offers B.Sc. Statistics, Ph.D degree program, value-added courses and various applied Mathematics and Statistics courses to different streams. In 2005, the Department was established. The Department focuses on pure, applied, and applicable Mathematics, catering to students of various backgrounds to help them understand their potential and enrich their careers.



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ABOUT THE CONFERENCE

International Conference on Computational Intelligence and Mathematical Applications -[CIMA 2025] is hosted by SRM Institute of Science and Technology , Kattankulathur during February 2025 . The objective of the CIMA 2025 is to bring together researchers, practitioners, and industry experts from around the world to foster the exchange of ideas, advances, and innovations in the field of Computer Science and Mathematics. By promoting collaboration and knowledge sharing. CIMA 2025 drives the development and adoption of intelligent systems and mathematical applications. The aim of the conference is addressing the emerging challenges and opportunities in various related domains in the form of research papers, case studies, and industry presentations, covering a wide range of topics.

Dr. P. Muthulakshmi,
Professor and Head,
Computer Sciences.

Dr. R. Jayashree,
Associate Professor and Head,
Computer Applications.

Dr. S. Lakshmi Priya,
Assistant Professor and Head,
Mathematics and Statistics.



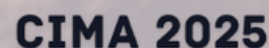
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The Department of Computer Sciences, College of Science, FSH at SRMIST aspires to develop outstanding computer professionals with values. The Department provides a diverse range of undergraduate and post graduate programs. In UG programs offered are B.Sc Computer Science, B.Sc Cybersecurity.. Programs offered in PG levels are M.Sc Computer Science, M.Sc Information technology. These programs are designed to provide students with a solid foundation in Technology. The internships, Projects and research opportunities allow students to gain practical experience while building professional networks.

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THIRD INTERNATIONAL CONFERENCE ON COMPUTATIONAL INTELLIGENCE AND MATHEMATICAL APPLICATIONS

Dates : 06.02.2025
07.02.2025

Venue: Hippocrates Audi,
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Kattankulathur

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Mr. Venkata Subramanian J	Dr. Aarthi E
Dr. Kanmani K	Mrs. Ramia M
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Last Date of Abstract Submission (Extended)	20.1.2025
Acceptance Notification Deadline	24.1.2025
Conference Registration Deadline & Payment	25.1.2025
Camera Ready Paper Submission Deadline	31.1.2025

	INDIA(₹)	OTHERS(\$)
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FACULTY OF SCIENCE AND HUMANITIES**

Department of Computer Applications,
Department of Computer Science &
Department of Mathematics and Statistics

Organizes

Third International Conference on Computational Intelligence and Mathematical Applications - CIMA 2025

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Mr. Raju Kanchibhotla,
Honorary Secretary , Computer Society of India.



Mr. Ganesh Nagarajan

Specialist in Cloud and Data Architecture at the
Department of Treasury,
US Government.



Prof. SSN Perera

Department of Mathematics,
University of Colombo,
Sri Lanka.



Prof. Joan Lu

Department of Computer Science,
School of Computing and Engineering,
University of Huddersfield - UK.



Dr. Sultan Ali Alasmari

Dean, College of Technology and Business,
Riyadh ELM University, Riyadh,
Kingdom of Saudi Arabia



Prof. Saravanan Venkataraman

College of Technology and Business,
Riyadh ELM University, Riyadh,
Kingdom of Saudi Arabia

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DATE : 6.2.2025 & 7.2.2025

**VENUE : Hippocrates Auditorium,
SRM IST, Kattankulathur.**



RIYADH ELM UNIVERSITY,
Saudi Arabia.



**COMPUTER SOCIETY
OF INDIA, Hyderabad.**





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FOREWORD



It is time to look at mathematical models and its role in the new Digital world keeping in view the impact of the existing curriculum and the teaching methodologies.

The Practical's and the assessment to be oriented for the changed scenario to make the output of the academic institutions ready for absorption by the industry.

The disruptions that took place in the industry with the digital revolution should be considered to make the students focus on learning.

Computational Intelligence promotes critical thinking by introducing ambiguous problems that necessitate mathematical modeling for their resolution, thereby enhancing analytical skills essential for addressing complex situations.

I hope that the Conference CIMA 2025 (Computational Intelligence and Mathematical Applications) by SRM Institute of Science and Technology will meet the needs and be a guiding factor for all.

These conferences equips attendees with the skills to analyze and interpret data using statistical modeling, a critical competency for making data-driven decisions in today's technology-driven landscape

I wish the team of CIMA 2025 all the best and wish many more to follow their foot steps.

Mr Raju L Kanchbhotla
Honorary(National) Secretary of India
Computer Society of India , Hyderabad Chapter



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FOREWORD



The evolution of computational intelligence is a story of remarkable transformation. What began as simple rule-based systems has now advanced into sophisticated, self-learning algorithms that continually refine and enhance themselves. Early AI relied on predefined logic to simulate human decision-making, but the advent of machine learning and neural networks revolutionized the field. These breakthroughs allowed systems to learn from data, adapt dynamically, and grow more intelligent over time. With deep learning and reinforcement learning pushing the boundaries even further, AI can now recognize complex patterns and behaviors with extraordinary precision. As computational power and data accessibility continue to expand, the future of computational intelligence holds boundless potential—poised to reshape industries and redefine the world around us.

Against this backdrop of rapid innovation, the CIMA 2025 Conference (Computational Intelligence and Mathematical Applications)—hosted by SRM Institute of Science and Technology—promises to be an invaluable forum for knowledge exchange and inspiration. Events like these equip participants with the expertise needed to leverage computational intelligence for data-driven problem-solving, an indispensable skill in today's technology-driven era.

I extend my warmest wishes to the CIMA 2025 team for a successful and impactful event. May their efforts set new standards and inspire many more pioneering initiatives in the years to come.

Mr. Ganesh Nagarajan
Specialist in Cloud and Data Architecture
Leading Cloud Architecture for the US



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FOREWORD



It is both an honor and a privilege to address you as a keynote speaker at the Computational Intelligence and Mathematical Applications (CIMA 2025) conference, hosted by SRM Institute of Science and Technology. As we gather to explore the exciting and transformative intersection of computational intelligence and mathematics, it is clear that these fields are more relevant and critical than ever before. The challenges we face today, whether in healthcare, artificial intelligence, climate science, or cybersecurity, require not only innovation but also the ability to harness the power of complex mathematical models and intelligent algorithms. Computational intelligence provides us with the tools to understand, predict, and optimize systems that were once considered too intricate or unpredictable. The marriage of these disciplines opens up a world of possibilities for solving some of the most pressing problems of our time

I encourage all attendees to engage actively, ask questions, and build connections that extend beyond the walls of this conference. The future of computational intelligence and mathematical applications will not be defined by any single individual or group, but by the collective contributions we all make. Thank you for the opportunity to participate in this exciting event. I look forward to our discussions and the great work that will emerge from CIMA 2025.

With the very best for every success of event.

Professor Joan Lu

Computer Science, Chair of Research Forum of AI-Tech 2025,

Member of International exchanging committee, Royal Society UK

Recognized Research Supervisor approved by UK Council of Graduate Education



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This conference continues its tradition of providing a premier international forum for disseminating cutting-edge research and fostering collaboration among experts in computational intelligence and applied mathematics.

Advancements in Transfer Learning for Real-World Applications: This track explores the latest advancements in transfer learning methodologies and their practical applications. Contributions address challenges and opportunities in leveraging pre-trained models to solve complex real-world problems across diverse domains.

Integrating DevOps, IoT, and Computing Innovations: This track examines the convergence of DevOps principles, the Internet of Things (IoT), and innovative computing paradigms. The papers presented highlight novel approaches to building, deploying, and managing intelligent and interconnected systems.

Innovations in Digital Transformations: This track focuses on the profound impact of digital technologies on various sectors. The contributions explore transformative applications and methodologies that are driving digital innovation and reshaping industries.

We extend our sincere appreciation to the authors for their valuable contributions, the distinguished keynote speakers for sharing their expertise, the diligent reviewers for their meticulous evaluations, and the dedicated organizing committee for their tireless efforts in ensuring the success of this conference. We also gratefully acknowledge the support and commitment of SRM Institute of Science and Technology in hosting this prestigious event.

We look forward to welcoming you to future ICCIMA conferences.

Dr Sultan Al Alasmari
Dean-College of Technology and Business
Riyadh ELM University
Kingdom of Saudi Arabia



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It is with immense pleasure and a deep sense of honour that I present the proceedings of the Third International Conference on Computational Intelligence and Mathematical Applications. This esteemed conference has steadily established itself as a crucial platform for researchers, scholars, and industry professionals from around the world to engage in meaningful discussions, share their pioneering research, and develop innovative approaches to addressing complex challenges. Each year, the conference grows in scope and significance, and this year is no exception. We are delighted to offer a comprehensive program that showcases a diverse range of topics, reflecting the ever evolving and dynamic nature of computational intelligence and mathematical applications.

As we embark on this enriching journey over the course of the conference, I am confident that the discussions, presentations, and networking opportunities will inspire fresh perspectives, facilitate new research directions, and cultivate long-lasting professional relationships. This gathering is more than just an academic event—it is a catalyst for innovation, an incubator for new ideas, and a bridge connecting researchers and practitioners worldwide.

Let us seize this opportunity to engage in thought-provoking conversations, exchange knowledge, and collectively shape the future of computational intelligence and mathematical applications. I sincerely hope that this conference will be a source of inspiration, intellectual growth, and productive collaboration for each of you.

Thank you for being a part of this significant endeavor. I wish you all a stimulating, fruitful, and memorable conference experience.

Professor Sanjeewa Perera
Professor of Mathematics
Director, centre for Mathematical Modeling
Department of Mathematics
University of Colombo



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We are delighted to present the proceedings of the Third International Conference on Computational Intelligence and Mathematical Applications, organized by SRM Institute of Science and Technology, Chennai, India. This conference serves as a prominent platform for researchers, academics, and industry professionals to exchange cutting-edge ideas and advancements in the rapidly evolving fields of computational intelligence and mathematical applications.

The conference has attracted a significant number of high-quality submissions from around the globe, showcasing the latest research and development across a broad spectrum of topics. The contributions included in these proceedings reflect the rigorous peer-review process, ensuring the publication of impactful and innovative work.

We extend our sincere gratitude to the authors for their valuable contributions, the esteemed keynote speakers for sharing their insights, the dedicated reviewers for their meticulous evaluations, and the organizing committee for their tireless efforts in making the conference a resounding success. We also acknowledge the support of SRM Institute of Science and Technology for hosting this prestigious event.

We believe that these proceedings will serve as a valuable resource for researchers, practitioners, and anyone interested in the latest developments in computational intelligence and mathematical applications. We hope that the readers will find the presented work inspiring and beneficial in their future endeavors.

We look forward to welcoming you to future conferences.

Prof. Saravanan Venkataraman
College of Technology and Business
Riyadh ELM University
Kingdom of Saudi Arabia



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As we navigate ever-evolving digital landscape, it is essential to understand the role of mathematical modelling in shaping the future. The growing need for industries to integrate digital advancements necessitates a shift in how academic institutions align their outputs with market demands. The digital revolution reshaping industries calls for strong emphasis on equipping students with the ability to solve complex problems. Computational Intelligence fosters critical thinking by presenting, challenging, and often ambiguous problems that demand precise mathematical modelling addressed through rigorous analysis.

This prominent event the Third International Conference on Computational Intelligence and Mathematical Applications (CIMA 2025), organized by our three departments - Computer Applications, Computer Science , Mathematics and Statistics of Faculty of Science and Humanities , SRM Institute of Science and Technology serves as a global platform for scholars and industry experts to exchange knowledge, foster collaboration, and explore innovative approaches in the domains of computational intelligence and mathematical applications. The computational intelligence continues to evolve and transforming industries, from artificial intelligence and data science to engineering and healthcare.

CIMA 2025 brings together leading minds in the field, offering a unique opportunity to deliberate on cutting-edge research, emerging trends, and real-world challenges. This conference, through insightful keynote addresses, technical sessions, and paper presentations, aims to ignite discussions that will shape the future of these fields. I commend the organizers, advisory committees, and participants for their dedication to advancing knowledge and fostering meaningful academic discourse. Wishing you a successful and enriching conference experience!

Dr A Vinay Kumar
Pro Vice Chancellor - SBL
SRM Institute of Science and Technology.



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It is with great pleasure that I extend a warm welcome to all participants of the Third International Conference on Computational Intelligence and Mathematical Applications. This prestigious event brings together researchers, scholars, and practitioners from around the globe to share insights, innovations, and advancements in the fields of computational intelligence and mathematical applications.

The rapid evolution of technology and the increasing complexity of real-world challenges make interdisciplinary collaboration more important than ever. This conference serves as a vital platform for exchanging ideas, fostering partnerships, and exploring novel approaches to solving complex problems. I am confident that the diverse perspectives and expertise gathered here will inspire new research directions and contribute to the growth of these dynamic fields.

I commend the organizers, speakers, and participants for their dedication and enthusiasm in making this event a success. May this conference be a fruitful and enriching experience for all, paving the way for future discoveries and collaboration. Wishing you all a productive and inspiring conference.

Dr A Duraisamy
Professor & Dean
Faculty of Science and Humanities



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In an era defined by rapid technological advancement and complex problem-solving, the convergence of computational intelligence and mathematical rigor has become indispensable. This conference serves as a dynamic platform for researchers, practitioners, and students to explore the synergistic relationship between these two critical fields. We aim to foster a vibrant exchange of ideas, methodologies, and applications that span diverse domains, from data science and engineering to finance and healthcare.

In an epoch where artificial intelligence, machine learning, and advanced mathematical frameworks are transforming industries, our conference aims to foster collaboration, inspire breakthroughs, and pave the way for future advancements. Let us embrace this opportunity to engage in meaningful discussions, challenge existing paradigms, and drive impactful research that shapes the technological landscape.

This international conference is dedicated to showcasing the power of computational intelligence techniques, underpinned by robust mathematical frameworks, in tackling real-world challenges. We are witnessing a revolution driven by intelligent algorithms and sophisticated mathematical models, enabling us to analyze vast datasets, optimize complex systems, and develop groundbreaking solutions. This conference will highlight cutting-edge research and innovative applications, providing a forum for collaboration and inspiration.

We look forward to insightful deliberations, groundbreaking discoveries, and valuable networking opportunities. Wishing you all a successful and enriching conference.

Dr.S.Albert Antony Raj
Professor and Deputy Dean
College of Sciences
Faculty of Science and Humanities



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As disruptive technologies continue to evolve at an unprecedented pace, staying ahead demands substantial investments in real-world applications, IoT, and the transformative power of mathematical modeling. Digital transformation is revolutionizing science, engineering, medicine, healthcare, finance, business, and society as a whole.

Building on past and present advancements, this working conference aims to explore the challenges and opportunities in real-world applications, IoT, and digital transformation. CIMA'25 will serve as a premier platform for disseminating groundbreaking research in Computational Intelligence and Mathematical Applications.

Hosted by the Department of Computer Applications, the Department of Computer Science, and the Department of Mathematics and Statistics, Faculty of Science and Humanities, SRM IST, this Third International Conference on Computational Intelligence and Mathematical Applications underscores our unwavering commitment to research and innovation. This global forum will foster the exchange of pioneering ideas and cutting-edge research, shaping the future of real-world applications, IoT, and digital transformation.

Join us as we push the boundaries of knowledge and innovation. Together, let's drive impactful change!

Dr. Jayashree R
Associate Professor and Head
Department of Computer Applications,
Faculty of Science and Humanities



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It is a mark of good beginning that the Conference stays as a platform for the researchers to discuss and get to know what is happening in the real time application systems and the preparation that the academia should do towards the requirements. The world has become the best place of sophistication as everything is just away from the tap of finger, right from quick commerce, mobile games, cloud kitchen, edutech, fintech and much more. These are the luxuries of the evolutions of Computational Intelligence and it is obvious that these applications are backed by Mathematics. I wish the conference to happen every year and become a place for potential things.

Dr. P. Muthulakshmi,
Professor and Head,
Computer Sciences.



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SRM Institute of Science and Technology stands as the premier private institution in the country, setting benchmarks in experiential learning and knowledge creation across diverse fields. With a commitment to international standards of education, state-of-the-art infrastructure, and an industry-aligned curriculum, SRM continues to inspire students. Its focus on modern teaching methodologies, global research collaborations, student exchange programs, and industry-academic partnerships has consistently placed it at the forefront of higher education. Accredited with an 'A++' grade by NAAC in 2024, the institution offers exceptional facilities across disciplines such as Dental Sciences, Health Sciences, Engineering & Technology, and Science & Humanities.

We are delighted to announce that the Department of Computer Applications, the Department of Computer Science, and the Department of Mathematics and Statistics are jointly organizing The International Conference on Computational Intelligence and Mathematical Applications. This conference aims to strengthen collaboration between academia and industry, fostering innovation in both spheres. It serves as a distinguished platform for discussing emerging ideas, addressing complex challenges, and advancing scientific and technological developments. Industry professionals are encouraged to present real-world problems, enabling mathematicians to provide valuable insights and novel solutions. By bringing together eminent academic scholars, industry experts, and budding researchers, the conference promotes the application of computational intelligence and mathematical techniques in industrial contexts. Through engaging discussions and knowledge-sharing sessions, it seeks to bridge the gap between mathematics, computation, and industry, ultimately contributing to technological progress and societal development. The event will also feature keynote addresses by esteemed experts and research paper presentations.

I would like to take this opportunity to extend my sincere gratitude to our Vice Chancellor, Registrar, Pro Vice Chancellor, Dean, Deputy Dean, Heads of Departments, and faculty members for their invaluable guidance and support in ensuring the smooth execution of this conference. My heartfelt appreciation also goes to the Advisory and Technical Committees for their significant contributions. I am deeply grateful to our esteemed speakers, distinguished delegates, and enthusiastic participants from various institutions and universities for their interest in presenting their research. Lastly, I extend my thanks to the organizing committee members, colleagues, and students for their dedicated efforts in every stage of this conference.

Dr. S. Lakshmi Priya,
Assistant Professor and Head,
Department of Mathematics and Statistics



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**MITIGATING THE EVOLVING THREAT OF DOS AND DDOS ATTACKS:
TECHNIQUES, CASE STUDIES, AND DEFENCE STRATEGIES**

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Abstract: Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks pose significant threats to the availability and reliability of online services. These attacks aim to overwhelm a target system, server, or network with excessive traffic, rendering it inaccessible to legitimate users. While DoS attacks originate from a single source, DDoS attacks involve multiple compromised systems, amplifying the scale and impact. This paper explores the underlying mechanisms of DoS and DDoS attacks, including common techniques such as TCP SYN flooding, UDP amplification, and application layer attacks. We analyze the challenges posed by modern botnets, which exploit large networks of compromised devices (IoT, personal computers) to orchestrate massive DDoS campaigns. Additionally, this paper examines real-world case studies to highlight the catastrophic effects these attacks can have on critical infrastructures, e-commerce platforms, and cloud services.

Keywords: DoS, DDoS, TCP SYN flooding, UDP Amplification, Application layer attacks, Mitigation strategies, Anomaly based detection, rate limiting.

SKIN CANCER PREDICTION USING MACHINE LEARNING

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Abstract: Skin cancer is the most prevalent forms and most common cancer worldwide. Early detection was essential for effective treatment and better outcomes for patients. This study leverages the deep learning techniques especially pre-trained models such as VGG16, ResNet50, and MobileNetV2, to classify the skin lesions as “benign” or “malignant” categories. Using transfer learning, these models were fine-tuned on a dataset of dermoscopic images. We trained this model on a dataset of skin lesion images of 9606. This study results demonstrated high accuracy, proving the efficacy of the proposed methods for skin cancer detection. The main goal is to improve the early detection of skin cancer by using computational Machine learning techniques to help healthcare professionals make precise decisions. Which leads to greater patient care and even better results. To make it a complete tool for dermatological diagnostics, future improvements might include multi-class classification to identify different kinds of skin problems, health-related forecasts, integration with electronic medical records, and real-time clinical suggestions. In future we have planned to develop this system into a user friendly mobile application. This app will be useful for both the dermatologists and patients with simple accessible tools for quick and easy skin checks , enhancing it more convenient to use in both clinics and at home.

Keywords: Skin Cancer Detection, MobileNetV3, Deep Learning, TensorFlow Lite, Android Application, Image Classification, Malignant and Benign, Real-Time Prediction,

**COMPARATIVE ANALYSIS OF HIDDEN MARKOV MODELS AND
ARIMA FOR STOCK PRICE PREDICTION: A PERFORMANCE
EVALUATION**

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Abstract: Stock market prediction uses historical data and analytical techniques to forecast future prices, helping investors make informed decisions. Accurate models enhance investment strategies, Optimize returns, and manage risks in volatile markets. In this study, we evaluate the performance of two popular models for stock price prediction: Hidden Markov Models (HMM) and AutoRegressive Integrated Moving Average (ARIMA). Our analysis focuses on three key metrics: Mean Absolute Percentage Error (MAPE), Symmetric Mean Absolute Percentage Error (SMAPE), and the Coefficient of Determination (R^2). The results demonstrate that HMM significantly outperforms ARIMA across all metrics. Specifically, HMM achieves a MAPE of 1.51, a SMAPE of 1.51, and an R^2 of 0.8882, reflecting high accuracy and a strong fit to the data. In contrast, ARIMA exhibits a much higher MAPE of 5.91, a SMAPE of 5.71, and a negative R^2 of -0.3709, indicating poor predictive performance. The findings highlight the effectiveness of HMM in financial time series analysis, particularly in stock price prediction, where accurate and reliable forecasts are crucial for decision-making. This research provides a robust framework for implementing HMM in financial forecasting, offering improved accuracy over traditional models such as ARIMA.

Keywords: Stock Market Prediction, Hidden Markov Models (HMM), AutoRegressive Integrated Moving Average (ARIMA), Mean Absolute Percentage Error (MAPE), Symmetric Mean Absolute Percentage Error (SMAPE), Coefficient of Determination (R^2)

**PENTAPARTITIONED NEUTROSOPHIC FUZZY MATRICES AND
ITS PROPERTIES**

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Abstract : In this paper, we propose a new matrix called Pentapartitioned neutrosophic fuzzy matrix. We shall define the addition and multiplication of two pentapartitioned neutrosophic fuzzy matrix and also prove some of its basic properties.

Keywords: Neutrosophic set, Neutrosophic fuzzy matrix, Pentapartitioned neutrosophic fuzzy matrices

REAL-TIME WEATHER MONITORING SYSTEM USING IOT

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Abstract: A Weather Monitoring System using IOT (Internet of Things) is a cutting-edge technological solution designed to revolutionize how to gather and analyze meteorological data. This system integrates various sensors and devices to collect real-time weather information, including temperature, humidity, pressure, and rainfall, which is then transmitted to a central server or cloud-based platform. With IOT connectivity, this system provides a seamless and automated means of monitoring weather conditions, enabling timely weather forecasting and efficient resource allocation across sectors such as agriculture, transportation, and emergency services. By harnessing the power of IOT, this innovative weather monitoring system enhances the accuracy and accessibility of meteorological data, contributing to better-informed decision-making and ultimately improving public safety and quality of life. The system continuously monitors environmental factors like temperature, humidity, rainfall, and pressure, transmitting this information to a web interface where sensor data is visualized as graphical statistics for easy interpretation.

Keywords: IOT, real-time weather, decision-making, graphical statistics, meteorological data

**BLOCKCHAIN-OPTIMIZED COLD CHAIN: SECURING REAL-TIME MONITORING
OF TEMPERATURE-SENSITIVE LOGISTICS WITH DECENTRALIZED ALGORITHM**

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Abstract: The cold chain logistics industry is responsible for the safe transportation and storage of temperature- sensitive goods, including food, pharmaceuticals, and chemicals. Ensuring the integrity of these products during transit is crucial, as temperature fluctuations can lead to spoilage, contamination, or reduced efficacy, particularly for items such as vaccines and perishable foods. Blockchain technology presents an innovative solution by providing a transparent, secure, and immutable platform to monitor and manage cold chain operations. This paper explores the application of blockchain in cold chain logistics, detailing how it improves transparency, traceability, and security while addressing challenges such as temperature monitoring, compliance with regulatory standards, and real-time data sharing. The study will also examine blockchain's potential to reduce operational costs, enhance accountability, and foster trust among supply chain stakeholders, while identifying the obstacles to widespread adoption and possible solutions to overcome these barriers. This study will also investigate the impact of blockchain on enhancing supplier collaboration and stakeholder communication through shared visibility of data. It will examine case studies where blockchain implementation has successfully mitigated risks associated with temperature deviations and spoilage. The potential for blockchain to facilitate regulatory compliance audits will be explored, highlighting its role in providing verifiable data logs. Additionally, the research will address environmental sustainability by assessing how blockchain can optimize resource usage and minimize waste in cold chain logistics. Finally, a roadmap for future research and development will be proposed to guide industry stakeholders in adopting blockchain technology effectively.

Keywords: cold chain logistics, Blockchain technology, stakeholder communication, temperature deviations and spoilage

CRYPTOGRAPHICALLY SECURED BLOCKCHAIN VOTING INFRASTRUCTURE

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ABSTRACT: The goal of this article is to present a Cryptographically Secured Blockchain Voting Infrastructure as a safe, transparent, and affordable option for today's elections. The solution makes use of a hybrid blockchain paradigm, which combines a public blockchain for transparent result verification with a permissioned blockchain for secure vote recording. Voter privacy is protected by this design, which guarantees that only authorized participants may cast ballots and makes anonymised results publicly available for verification. Utilizing cryptographic methods such as homomorphic encryption and zero- knowledge proofs (ZKPs), the infrastructure guarantees vote integrity while concealing the identities of individual voters. By using these techniques, votes can be tallied without the need for decryption, eliminating unwanted access. In order to guarantee precise voter verification and lower expenses, the system also interfaces with already-existing government identity systems, such as national IDs or biometric authentication.

Authorized organizations in charge of vote gathering and tallying, including election commissions, oversee the permissioned layer. Anonymized results are stored on the public layer for independent verification and transparency. This hybrid strategy increases public confidence in election results while reducing risks like fraud and inefficiencies.

The suggested approach is adaptable, ready to grow from municipal to national elections. This infrastructure offers a tamper-resistant, affordable, and dependable solution for contemporary elections, while also solving major concerns with traditional voting methods, like security, privacy, and transparency. This increases trust in democratic processes.

Keywords: biometric authentication, tamper-resistant, election commissions and zero- knowledge proofs

AIR QUALITY PREDICTION : A DEEP LEARNING APPROACH

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Abstract : Air quality monitoring and improvement are essential components of sustainable development. The rates of pneumonia in Washington city are escalating due to poor air quality. This necessitates an advanced air pollution monitoring and prediction system in order to take some precautionary measures to avoid being exposed to such pollutants or take some measures to reduce the strength of the pollutants in air. This study introduces a deep learning model designed to predict levels of various air pollutants in Washington. Historical data of air quality is analyzed and the study identifies PM_{2.5} as the predominant pollutant that contributes to the deteriorating air quality in the region since January 2024. The dataset is taken from the website of United States Environmental Protection Agency (EPA). This website provides the air quality summary statistics for the pollutants by monitor. The predictive model developed in this research empowers public health officials and policy makers to implement timely measures to mitigate health risks associated with air pollution.

Keywords : Air quality, Washington, PM_{2.5}, PM₁₀, pollutant, Predictive modelling, EPA.

**TRANSFORMING LIVES THROUGH THE ACCESSIBLE
IMPLEMENTATION OF CONTINUOUS GLUCOSE MONITORING
TECHNOLOGY**

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Abstract : People in both developed and developing nations are greatly impacted by type 1 diabetes, a condition that is becoming a global concern. Tools like Continuous Glucose Monitoring (CGM) have been developed over time to help solve these problems. CGM is a non-invasive tool that lets users check their blood sugar levels in real time, which helps diabetes patients detect spikes and determine when they need insulin. Although several Western nations have accepted cutting-edge technology like CGM, India has not yet fully embraced these advancements. In India, a lot of low-income families find it difficult to pay for their everyday necessities and ongoing diabetes care. The purpose of this research is to examine the application of CGM technology in India, with a particular emphasis on Tamil Nadu. It will evaluate the accessibility of CGM systems within the local healthcare system and investigate their uptake and efficacy in the treatment of Type 1 diabetes. Additionally, this draws attention to how difficult it is for lower-income populations to obtain resources and offers an AI-powered solution based on CGM. Through the identification of areas for improvement and the creation of more accessible technology, the aim is to assist the wider adoption of CGM in Tamil Nadu.

Keywords: Continuous Glucose Monitoring (CGM), Type 1 Diabetes, Accessibility, AI-driven solutions, Low-income populations, Diabetes management, Healthcare system, Tamil Nadu.

TAMIL WORD SENTIMENT ANALYSIS WEB APP USING FLASK

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Abstract: The Tamil Word Sentiment Analysis project is a web-based application designed to evaluate the sentiment of Tamil text inputs. Leveraging the Flask framework, this application provides users with a straightforward interface to enter Tamil words or phrases and receive immediate feedback on their emotional tone—classified as positive, negative, or neutral. By utilizing a predefined list of Tamil words associated with specific sentiments, the application employs a simple algorithm that facilitates efficient analysis without requiring complex machine learning techniques. This tool aims to empower users, including businesses, educators, and social media analysts, by offering insights into public sentiment and emotional dynamics in Tamil language communications. In addition to fostering better engagement with the Tamil language, the project highlights the significance of developing accessible tools for regional languages, promoting inclusivity in technology. Future enhancements may incorporate advanced features such as machine learning models to improve sentiment analysis accuracy, thereby extending the application's capabilities and usability. Overall, this project represents a meaningful step towards bridging the gap in language processing tools for Tamil speakers, making sentiment analysis more accessible and relevant.

Keywords: Sentiment Analysis, Flask framework, emotional tone,

**AN OPEN-TYPE GENERALIZED QUADRATURE RULE USING THE ANTI-GAUSSIAN
APPROACH FOR NUMERICAL INTEGRATION**

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Abstract: We propose an open-type Generalized Quadrature Rule by combining the Anti-Gauss 3-point rule with Simpson's $3/8$ rule. The convergence properties of the new rule are rigorously analyzed, and error estimates confirm its superior accuracy compared to the individual base rules. To validate these findings, we apply the rule to a range of test integrals. The results highlight the Generalized Quadrature Rules improved performance and dominance over its constituents, particularly in handling indefinite integrals, making it a valuable tool for practical applications.

Keywords: Generalised quadrature rule, Anti-Gauss 3-point rule, Simpson $3/8$ rule, AMS Subject Classification: 65D30, 65D32, 41A55

HYBRID METHODOLOGIES FOR ADVANCING TAMIL LANGUAGE QA SYSTEMS

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Abstract: This research focuses on building a hybrid Question Answering (QA) system for Tamil that combines rule-based methods with data-driven approaches to enhance accuracy and minimize grammatical errors. As a morphologically rich and agglutinative language, Tamil poses significant challenges in natural language processing (NLP), including handling complex sentence structures, case markers, and word inflections. The proposed system leverages a rule-based framework for preprocessing tasks such as tokenization, syntactic parsing, and grammatical error correction, ensuring linguistic accuracy. A neural network-based data-driven approach is integrated for contextual understanding, reasoning, and answer generation. The hybrid architecture allows the system to harness the robustness of rule-based algorithms for language-specific challenges and the flexibility of neural methods for handling ambiguity and complex reasoning. By incorporating a feedback loop for error correction and leveraging domain-specific datasets, the system ensures high accuracy in answering questions across multiple domains. This study highlights the potential of combining traditional linguistic methods with modern AI techniques to advance QA systems for low-resource languages like Tamil.

Keywords: Hybrid Question Answering, Tamil NLP, Rule-Based Methods, Data-Driven Approaches, Morphologically Rich Languages, Neural Networks.

OPTORICE ENSEMBLE NETWORK MODEL: REVOLUTIONIZING AI PREDICTIONS FOR SMARTER AGRICULTURE

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Abstract- The growing demand for sustainable and efficient agricultural practices has driven the development of advanced machine learning models to predict rice yield and manage crop diseases effectively. Rice, a staple food for over half of the world's population, faces significant challenges such as unpredictable yield outcomes, vulnerability to diseases, and inefficient use of resources like water and fertilizers. Despite the advantages of precision agriculture, the integration of various data sources, noisy environmental variables, and the complexity of disease prediction remain significant challenges. Traditional methods often fail to account for the interplay of multiple factors, resulting in inaccurate yield predictions and delayed disease detection. The OptoRice Ensemble Network Model addresses these issues by leveraging multi-source data, robust preprocessing techniques, and advanced optimization to enhance the reliability and accuracy of predictions, enabling farmers to make timely, data-driven decisions. Here initially the Data for this model were sourced from real time datasets, providing a rich foundation of environmental and crop-related variables. In the data preprocessing phase, a Rinse Mean Error Filter was applied to clean the data, removing noise and improving the reliability of the input variables. Feature extraction was performed using Density Agglomerative Attribute Clustering, which identified key patterns and relationships in the data, enhancing the model's ability to predict yield and detect potential disease outbreaks. Then the OptoRice Ensemble Network, was hypertuned using Water Ridge Butterfly Optimization, an advanced optimization algorithm, to refine the ensemble of machine learning models for improved accuracy and robustness. The model predicts rice yield based on various environmental factors, while simultaneously forecasting disease risks and offering actionable recommendations for water management, pest control, and optimal crop care. The whole experiment was carried out under python environment. From the result obtained it was revealed that the suggested methodology can revolutionize rice farming by providing accurate, real-time predictions of yield and disease risk, thus enabling farmers to make data-driven decisions that enhance productivity, sustainability, and resource efficiency.

Keywords: Rice Yield Prediction, Disease Forecasting, Precision Agriculture, Artificial Intelligence, OptoRice Ensemble Network, Water Ridge Butterfly Optimization.

DIGITAL WATERMARKING FOR MEDICAL IMAGE AUTHENTICATION: A REVIEW

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ABSTRACT

Medical images are essential for diagnosing and treating patients. These images include representations of the specific body parts, captured using medical imaging technologies such as CT, X-Ray, PET, MRI, and ultrasound. Technological innovations have led to the development of E-Healthcare systems, Telemedicine, and Electronic Health Information Systems (EHIS), allowing medical images to be transmitted over public networks for remote healthcare services. However, the tampering or substitution of these images can be life-threatening. This demands the need for robust protection methods such as watermarking. Watermarking is a data security technique designed to safeguard medical images from unauthorized access by ensuring confidentiality, authentication, and integrity. Given the evolving nature and critical importance of medical image watermarking, continuous updates in literature are necessary to stay informed about current trends, issues, and challenges. This review aims to spotlight emerging application areas in medical image watermarking and assess recent methodologies adopted by researchers in the field. Additionally, it discusses future research opportunities in the field of medical image watermarking.

Keywords: Medical imaging, watermarking, data security, E-Healthcare, Telemedicine, image integrity, confidentiality, authentication.

**AI – DRIVEN PERSONALIZED LEARNING: OPTIMIZING STUDY
SCHEDULES FOR DIVERSE LEARNERS**

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Abstract: Traditional classroom instruction often fails to account for individual students diverse learning needs and abilities. This research presents smart learn an innovative AI – driven adaptive learning system designed to optimize student learning outcomes. By analysing students historical performance data, learning behaviours, and knowledge gaps, smart learn generates personalized study plans, recommending tailored learning pathways , resources, and assessments. Results from a pilot study demonstrate significant improvements in student engagement, motivation, and academic achievement, highlighting the potential of AI powered adaptive learning to revolutionize education.

Keywords: Artificial intelligence, Adaptive learning, Personalized education, Learning analytics, Student outcome optimization.

EVALUATING THE IMPACT OF USER DEMOGRAPHICS ON PRODUCT RECOMMENDATIONS USING NODE2VEC EMBEDDINGS

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Abstract: This paper presents a novel approach to product recommendation that leverages network analysis and machine learning techniques. By constructing a weighted heterogeneous graph representing user-product interactions and incorporating semantic information from product reviews, we aim to improve the accuracy and personalization of recommendations. We employ the Node2Vec algorithm to learn low-dimensional embeddings for users and products, capturing their relationships within the network. These embeddings enable us to identify similar users and products, leading to more effective recommendations. Our evaluation results demonstrate the effectiveness of our approach in improving recommendation accuracy, particularly for users with limited interaction history. Future work will explore the integration of additional features, such as user demographics and product attributes, to further enhance the recommendation system's performance.

Keywords: Recommendation Systems, network analysis, node2vec, graph embeddings, user-product interactions, semantic analysis, personalized recommendations, cold-start problem

HYBRID INTELLIGENT SYSTEM

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Abstract: A Hybrid Intelligent System is a proceed that combines various types of Artificial Intelligence techniques to generate a more powerful and effectual system. The amalgamation of different learning and prevail over individual restraints and achieve synergetic effects through hybridization of these methods. This system is applicable for a wide range of operations, such as decision-making, forecasting, improvisation and pattern-recognition. This paper provides an overview of Hybrid Intelligent System's architecture, calling attention to it's types: Stand Alone, Transformational, Hierarchical and Integrated. We also analyse different hybridization techniques such as Expert Systems, Neural Networks, Fuzzy systems, Genetic Algorithms and Case-based reasoning. Furthermore, it outlines the core components of Hybrid Intelligent System, emphasizing their ability to amalgamate various AI techniques to solve various complex problems in fields like Healthcare,

Financial risk management, Manufacturing, Climate prediction and Agriculture. The emerging applications of Hybrid Intelligent System in these fields highlights the prominence in developing systems that can effectively overcome any dynamic, real-world challenges by improving learning, versatility and decision-making competencies.

Keywords: Hybrid Intelligent System, Financial risk management, Intelligent System's architecture, Neural Networks, Fuzzy systems, Genetic Algorithms

JIGSAW PUZZLE GAME

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Abstract: The Jigsaw Puzzle Game presents a groundbreaking puzzle experience accessible via browsers, catering to individuals of all ages. It enables players to upload their own images, creating customized 6x6 grid puzzles. The game features an easy-to-use drag-and-drop interface for seamless interaction. Users can shuffle puzzle pieces at any time, enhancing the difficulty and replay value. This game blends imaginative elements with logical reasoning, offering an engaging way to enjoy puzzles. The customizable features add a personal flair, ensuring that each session is distinct. The design prioritizes user-friendliness, making it suitable for players of varying skill levels. Overall, it provides an enjoyable and creative means to challenge problem-solving abilities.

Keywords: Customizable Puzzles, Browser Game, Drag-and-Drop Interface, Puzzle Challenge, Image Upload, Replay Value, Problem-Solving

TERRA VERDE

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Abstract: This paper presents an automated irrigation system designed to optimize crop growth in hydroponic systems. The system utilizes sensors to monitor temperature, and humidity levels, and adjusts water circulation and nutrient delivery accordingly.[1]A microcontroller (Arduino) processes sensor data and controls solenoid valves, pumps, and UV lights to maintain ideal growing conditions. The system ensures precise water and nutrient delivery, reducing waste and optimizing crop yields.[1]This automated irrigation system enhances the efficiency and productivity of hydroponic farming, making it an attractive solution for sustainable and controlled environment agriculture.[2]By automating these processes, the system ensures precise and consistent delivery of water, nutrients, and light, minimizing the risks of overwatering, under-watering, or nutrient imbalance.[3] This automation not only reduces waste but also enhances crop yields, making it a highly efficient solution for sustainable agriculture.[4]The system's ability to operate autonomously reduces the need for constant human intervention, lowering labor costs and allowing for more reliable crop production.

Keywords:automated irrigation system, microcontroller, controlled environment agriculture, nutrient imbalance

EMOTION-DRIVEN GAME RECOMMENDATION

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Abstract: The mix of feeling disclosure headways into gaming has recently opened new streets for tweaked player experiences. This paper presents a sharp strategy that gets persistent inclination affirmation and 2D stage games to effectively propose game levels custom-fitted to the players continuous perspective. Utilizing facial inclination affirmation methodologies, the structure analyzes players very own states and changes intelligence parts similarly, significance to update responsibility and satisfaction. We analyze the arrangement and execution of this flexible gaming stage, including the improvement of computations for feeling distinguishing proof and the actions for game level assurance considering up close and personal data. Central evaluations show that mentality-based game recommendations can provoke a more clear and more charming gaming experience, highlighting the capacity of profound enrollment in blueprint.

Keywords: 2D stage games, charming gaming experience, affirmation methodologies

**DESIGN OF A DUAL-BAND IMPLANTABLE MIMO ANTENNA FOR
BIOMEDICAL APPLICATIONS**

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Abstract: This paper aims at the design and implementation of an innovative dual-band two-port multiple-input multiple- output implantable MIMO antenna for deep tissue applications. The new MIMO antenna comprises a compact dimension of $10.8 \times 5.6 \times 0.254 \text{ mm}^3$, with the operating frequency of 915 MHz and 2450 MHz industrial, scientific and medical (ISM) band. Measured bandwidths for port 1 amounted to 82.5 MHz and 148.5 MHz, while 130 MHz and 89 MHz were obtained for port 2. The antenna achieves peak realized gain at the respective bands of -32.15 dBi and -22.2 dBi . Using meandered resonators, high port isolation is achieved at over 20 dB and 30 dB at 915 MHz and 2450 MHz, respectively, ensuring great mutual coupling between ports is maintained at low levels. The SAR value is within the safe limits indicating biocompatibility of the antenna. Key MIMO performance metrics of envelope correlation coefficient (ECC) and diversity gain were also tested and found satisfactory for biomedical applications. This is indeed one of the first dual-band implantable MIMO antennas making its design with emphasis on deep tissue biomedical applications. Simulation measurement results proved this antenna is possible for enabling efficient and reliable wireless communication into the human body and can be undeniably realized for further innovation in biomedical devices and healthcare technologies.

Keywords: dual-band two-port multiple-input multiple- output, biomedical applications, envelope correlation coefficient

**PARAMETER ESTIMATION IN FACTOR ANALYSIS MODELS USING BAYESIAN
METHODS WITH DIFFERENT PRIORS**

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Abstract: To investigate and demonstrate the application of Bayesian estimation techniques in factor analysis models, focusing on the estimation of factor loadings, latent factor scores, and residual variances using robust priors. Purpose: To provide a comparative analysis of the effectiveness of different priors, Normal, Cauchy-Log Normal, and Multivariate Normal- Inverse Wishart in Bayesian estimation. To emphasize the role of Bayesian methods in addressing challenges such as small sample sizes, heavy-tailed distributions, and complex data structures, especially in health-related research. To establish Bayesian methods as a flexible alternative to classical approaches like Maximum Likelihood Estimation (MLE).

Keywords: Cauchy and Log-Normal, Diagnostic checks, Factor analysis models, Markov Chain Monte Carlo (MCMC) methods, Metropolis-Hastings within Gibbs Sampling,

**THE SURVIVAL OF COVID-19 PATIENTS WITH DIABETES MELLITUS
AND CARDIOVASCULAR DISEASE – SUSCEPTIBILITY MEASUREMENT
OF RISK FACTORS USING MACHINE LEARNING MODELS**

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Abstract : The most prevalent comorbidity among COVID-19 participants was type 2 diabetes. In order to determine the relevance of variables as protective or risk factors for COVID-19, this study employed machine learning approaches, given that numerous metabolic characteristics interact to promote vulnerability to the virus. This study focused on a population with type 2 diabetes and employed a retrospective cohort at a single site. India collected laboratory and clinical data three months before the COVID-19 pandemic. 64 of the individuals had COVID-19, while the remaining 64 did not. PCA, or Principal Component Analysis, was performed to examine the data. The most important elements were selected using a "sequential feature selector," and scores were assigned using a linear discriminant analysis model. PCA loadings were then multiplied by the PCs' scores to determine the importance of the initial elements in acquiring COVID-19. HDL-C and the likelihood of contracting the virus were significantly correlated negatively, with eGFR coming in second. Higher HDL-C and eGFR levels protect the T2 DM population from COVID-19. The BUN to creatinine ratio did not, however, appear to be related. Conversely, the AIP, TyG index, and TG showed the largest positive correlation with COVID-19 susceptibility, indicating that higher levels of these factors increase the risk of contracting the virus. Accordingly, the risk of COVID-19 was positively correlated with diastolic BP, the TyG-Body Mass Index(BMI) index, MAP, BMI, weight, TC, FPG, HbA1C, Cr, systolic blood pressure, BUN, and LDL-C. Triglyceride levels, triglyceride glucose index, and the atherogenic index of plasma are the most important risk factors for infection in people with T₂DM. In the meanwhile, the most protective factor is high-density lipoprotein cholesterol.

Keywords: COVID-19, Machine learning (ML), Diabetes Mellitus (T2DM), Insulin resistance, Atherogenic dyslipidemia, Survival probability.

**UNSTEADY MHD CONVECTION OF A RADIATING FLUID PAST A MOVING
VERTICAL PLATE WITH CONCENTRATION IN A POROUS MEDIUM**

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Abstract: In the present paper, we have considered the unsteady magnetohydrodynamics fluid in a porous medium with viscously incompressible characteristics moving in a vertical plate. The governing equations are taken with appropriate boundary conditions and solved using the Laplace transform technique. Here we have included the concentration profile to expand the existing study and the results are published. MATLAB is used to generate graphs that predict fluid velocity, temperature, and concentration profiles interact with other parameters.

Keywords: Laplace transform, MHD, Concentration, Porous medium

**MODELING HAZARD RATES WITH A POWER TREND IN RAYLEIGH
DISTRIBUTION USING SEQUENTIAL ORDER STATISTICS: AN APPLICATION
TO AIRCRAFT DATA ANALYSIS**

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Abstract: The lifetimes of components are frequently assumed to be independent and identically distributed (iid). However, when one component fails, the resulting increased load on the remaining components alters their lifetime distributions. This type of system behaviour can be modelled using the framework of sequential order statistics. By assuming Rayleigh distributed component lifetimes and employing the conditionally proportional hazard rates model as a specific case of SOS theory, maximum likelihood estimation methods are used to determine the unknown parameters. A model referred to as PTCPHM, is introduced as a generalization of the iid assumption. Statistical methods for inference, including point and interval estimation and hypothesis testing, are developed under this model. Finally, the failure time data of aircraft components, originally presented by Mann and Fertig (1973), are analyzed to demonstrate the proposed model and inferential techniques.

Keywords: Censored data; estimation; hazard function; reliability; sequential order statistics.

**A STUDY ON HOMOMORPHISM AND CARTESIAN PRODUCT
OF P-REGULAR IN NR**

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Abstract: This paper explores the concept of homomorphism in P-regular near-rings (NR), extending the idea of homomorphism from traditional ring theory to near-rings. Homomorphism on NR shares foundational similarities with those on rings but adapts to the structural nuances of near-rings. The study delves into essential operations on P-regular NR, including the union, intersection, and inverse under homomorphism mappings. Furthermore, the paper introduces the Cartesian product of P-regular NR, providing new insights into their algebraic properties and interrelationships. These investigations contribute to a deeper understanding of the structure and behavior of P-regular NRs under homomorphism, paving the way for further research in the broader context of algebraic systems. The results here provide theoretical progress. The mathematical framework around near-rings is improved by this paper by addressing operations and products of P-regular NR, laying the groundwork for future research in algebraic systems and related areas.

Keywords: Near-ring[NR], Homomorphism, Cartesian Product, P-regular NR.

**ASSESSING THE FACTORS ASSOCIATED WITH TOBACCO USE
AMONG INDIAN MEN: FINDINGS FROM THE NATIONAL FAMILY HEALTH
SURVEY -5 (2019-2021)**

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Abstract: This paper explores the concept of homomorphism in P-regular near-rings (NR), extending the idea of homomorphism from traditional ring theory to near-rings. Homomorphism on NR shares foundational similarities with those on rings but adapts to the structural nuances of near-rings. The study delves into essential operations on P-regular NR, including the union, intersection, and inverse under homomorphism mappings. Furthermore, the paper introduces the Cartesian product of P-regular NR, providing new insights into their algebraic properties and interrelationships. These investigations contribute to a deeper understanding of the structure and behavior of P-regular NRs under homomorphism, paving the way for further research in the broader context of algebraic systems. The results here provide theoretical progress. The mathematical framework around near-rings is improved by this paper by addressing operations and products of P-regular NR, laying the groundwork for future research in algebraic systems and related areas.

Keywords: Near-ring[NR], Homomorphism, Cartesian Product, P-regular NR.

**HEAT AND MASS TRANSFER IN NON-COAXIAL ROTATION OF RADIATIVE MHD
CASSON CARBON NANOFLUID FLOW PAST A POROUS MEDIUM IN THE
PRESENCE OF CHEMICAL REACTION**

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Abstract: In this study, the heat and mass transfer in a non-coaxial rotating frame of a radiative Casson nanofluid with single-wall and multi-wall carbon nanotubes is discussed. The impacts of magnetic field, thermal radiation, Chemical reaction and porosity are taken into account. The governing equations associated with initial boundary conditions are converted into dimensionless form by applying suitable dimensionless parameters. Using the laplace transform method, the dimensionless governing partial differential equations are solved and the results were obtained. The variation of the skin friction, Nusselt number, and Sherwood number for various values of the fixed parameters are provided in tables. The impacts of fixed parameters on the velocity, temperature and concentration variables are demonstrated in graphs. Results are presented graphically using MATLAB software to highlight the significant changes introduced by the added parameters.

Keywords: Heat and mass transfer, Magnetohydrodynamic flow, non-coaxial rotation, radiative MHD, Casson carbon nanofluid, porous medium, Laplace Transform Method.

**IDENTIFYING BARRIERS TO CERVICAL CANCER SCREENING UPTAKE THROUGH
CLUSTER ANALYSIS**

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Abstract:

Background: Cervical cancer continues to pose a significant health challenge, especially in low-resource regions where barriers to screening and early detection are prevalent. This study uses cluster analysis, an unsupervised machine learning technique, to group individuals based on shared characteristics and identify patterns in the obstacles to cervical cancer screening. This approach offers valuable insights into diverse health-seeking behaviours, knowledge, attitudes, and practices within the population. **Methodology:** To determine the optimal number of clusters, the Elbow Method and Silhouette Score were applied. The clusters were identified through k-mode clustering. The Elbow Method demonstrated that a two-cluster solution captured the most meaningful variance, while the Silhouette Score confirmed higher intra-cluster consistency for this configuration. **Results:** The analysis identified two distinct clusters. Cluster 1 includes primarily middle aged, married women with 1-2 children, lower education levels, and limited access to health insurance. Although this group is generally aware of cervical cancer, logistical challenges like cost, distance, and time, combined with fears about screening, limit their participation. Their preference for government healthcare facilities highlights the need for targeted public health measures. Cluster 2 consists of a younger, more educated, and economically diverse population with better healthcare access. While this group exhibits greater awareness of cervical cancer and screening procedures, psychological barriers, such as fear of the results and discomfort with the screening process, remain significant obstacles. Their reliance on private healthcare facilities and inconsistent follow-through on medical advice suggest the need for tailored strategies to encourage regular screening.

Keywords: cancer, cluster, k-mode, screening

**FAULT-TOLERANT METRIC AND FAULT-TOLERANT STRONG METRIC
DIMENSIONS OF GENERALIZED EDGE CORONA PRODUCT OF GRAPHS****Jomesh Jose, Sathish Krishnan**

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Abstract: This paper investigates the fault-tolerant metric and fault-tolerant strong metric dimensions of generalized edge corona product of graphs. The metric dimension of a graph G is the minimum number of vertices in a resolving set, which uniquely identifies all other vertices by their distances. A resolving set is said to be fault-tolerant if it remains a resolving set even after the removal of any single vertex from the resolving set and the minimum number of such vertices is called fault-tolerant metric dimension of G . A vertex strongly resolves two other vertices if there is a shortest path between them that includes either of the two vertices. The minimum number of such vertices is the strong metric dimension of G . A strong resolving set is said to be fault-tolerant if it remains a strong resolving set even after the removal of any single vertex from the strong resolving set and the minimum number of such vertices is called the fault-tolerant strong metric dimension of G . We explore the properties of these dimensions in the context of generalized edge corona products, a graph operation that extends the classical corona product by incorporating additional edges. Specifically, we derive bounds and exact values for the fault-tolerant metric and fault-tolerant

strong metric dimensions of this graph product, and we present new results that contribute to the understanding of these parameters in more complex graph structures.

Keywords: Graphs, fault-tolerant strong metric dimension, edge corona product of graphs.

**INTEGRATED VENDOR MANAGED CONSIGNMENT INVENTORY SUPPLY CHAIN
MODEL OF ASYNCHRONOUS AND SYNCHRONOUS REWORK PROCESS WITH
DIFFERENT CARBON**

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Abstract: Environmental sustainability focused on energy consumption, greenhouse gas (GHG) emissions and electronic waste generation. Cap and trade is a powerful approach to reducing pollution in our atmosphere, related to environmentally and economically for curbing emission that drive global warming. In this paper describes different carbon policies for reducing carbon emission is to optimize firms under Vendor managed consignment inventory (VMCI) partnership. The objective is to minimize the total supply chain cost to determine vendor's production lot size and the quantity to be shipped to the buyer. Carbon cap and trade and carbon tax are the two main policies used worldwide for carbon emissions reduction with synchronous and asynchronous rework process. In this study consider three models, in model I tax on carbon emission, in model II on strict carbon cap and in model III trading price of carbon included in the cost function. Also this paper considers Greenhouse gas emission from production and transportation in a single vendor-buyer system. A numerical example is given to illustrate the model.

Keywords: Vendor managed inventory, consignment stock, carbon tax, strict carbon cap, cap and trade policy, transportation emission.

**AN ANALYSIS OF NON-NEWTONIAN MHD FLUID FLOW IN THE
INCLINED CHANNEL ALONG WITH PERMEABILITY, PRESSURE AND
MAGNETIC FIELD**

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Abstract: An analysis of the unsteady non-Newtonian MHD fluid flow with a uniform magnetic field in an inclined channel (constant pressure and permeability) is studied. The problem evaluates the effect of inclination, the Casson parameter of the fluid flow between parallel plates. The governing equations involved in the present analysis are solved using the Laplace transform techniques. The velocity distribution and temperature profile are analyzed and results are discussed with the help of MATLAB.

Keywords: MHD, Inclined Channel, Laplace-Transform technique, Casson parameter.

**THERMO-DIFFUSION AND DIFFUSION-THERMO EFFECT IN AN
UNSTEADY MHD FLOW THROUGH AN INFINITE OSCILLATING
VERTICAL POROUS MEDIUM**

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Abstract: Analytical solution of an unsteady MHD Flow with heat and mass transfer in an incompressible viscous electrically conducting over a vertical oscillating plate in a porous medium in the presence of Soret and Dufor effects are studied in this paper. The fluid considered as a immiscible. At time $t > 0$, the plate temperature and concentration near the plate are raised linearly with time t . The dimensionless governing coupled unsteady boundary layer partial differential equations are solved by the Laplace transform technique and the expression for the velocity, temperature and concentration are obtained. The effect of various parameters like Schmidt number, thermal Grashof number, solutal Grashof number on the velocity, temperature and concentration are graphically presented are shown.

Key words: Thermo-Diffusion, Diffusion-Thermo, MHD, Porous medium.

**SOMBOR INDICES AND THEIR ENTROPY MEASURES FOR THE MOLECULAR
GRAPH OF POLYPHENYLENE SUPER HONEYCOMB NETWORKS**

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Abstract: The Sombor index is a degree-based topological index in chemical graph theory, used to model the entropy measures of chemical graphs. It has also found applications in network science, particularly in modeling dynamical effects in biological, social, and technological complex systems. In this paper, we compute exact analytical expressions for the Sombor indices and their entropy measures for the molecular graph of polyphenylene superhoneycomb networks.

Key words: Sombor index, Topological indices, degree, molecular graphs.

**EFFECT OF SORRET IN UNSTEADY MHD CASSON FLUID PAST A VERTICAL
SURFACE USING LAPLACE TRANSFORMATION**

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Abstract: This paper presents an analytical investigation of unsteady magneto hydrodynamic (MHD) flow of a Casson fluid streaming along an exponentially infinite vertical plate, incorporating the effects of sorret. In this study, we extend the existing Laplace transform solution methodology to account for the flow model with chemical reaction. The dynamics are governed by coupled partial differential equations representing the momentum, energy, and concentration fields. The Casson fluid behaviour, magnetic field effects, and chemical reaction parameter are incorporated into the governing equations, and a solution is obtained using the Laplace transform technique. The results illustrates the consequential influence of the chemical reaction parameter on the velocity, temperature, and concentration profiles. And some variables like magnetic field M , Casson fluid parameter β , Grashof number Gr , Prandtl number Pr , Thermal radiation R_d and Schmidt number Sc are being analysed. The findings provide insights into optimizing industrial processes where sorret effect, chemical reactions and magnetic fields interact with non-Newtonian fluids. This study accords to a more comprehensive interpretation of the MHD flow of Casson fluids, with implications for heat and mass transfer applications.

Key words: MHD, Sorret effect, Thermal radiation, Chemical reaction, Casson fluid

**INFLUENCE OF HEAT SOURCE IN AN UNSTEADY MHD FREE CONVECTIVE FLOW
THROUGH A HORIZONTAL POROUS MEDIUM USING FINITE DIFFERENCE
METHOD.**

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Abstract: The study analyses the effect of heat sources along with the influence of chemical reactions in a free-convective flow for an unsteady MHD through a horizontal porous medium, considering the influence of thermal sources and heat radiation. The governing equations are discretised into the numerical equations using the non-dimensional quantities. The finite-difference technique is used to find the solutions for the resulting velocity, temperature and concentration profile with appropriate slip boundary conditions. Various parameters like the Grashof heat and mass transfer numbers, Schmidt number, Sherwood number and Nusselt number are examined. The obtained results are graphically represented in MATLAB to analyse the solutions. Future work can focus on studying the effects of Soret and Dufour.

Keywords:

Heat source, Horizontal Porous medium, finite difference method, chemical reaction, Magneto hydrodynamic (MHD), Free Convective flow.

ENERGY SUMS ON THE WEST INDIA GRAPH'S DOMINATING SET

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Abstract: Let $\hat{G} = (X, Y)$ represent a simple network with order n , wherein $Y = \{y_1, \dots, y_n\}$ and $X = \{x_1, \dots, x_n\}$ are its edge sets. Since A of $\hat{G}$ is an applicable symmetrical matrix, its spectrum, or collection of eigen values, is likewise real. Assume $\{\eta_1 \geq \dots \geq \eta_n\}$ represents G 's spectra. The sum of G 's absolute eigen values (i.e. $\sum_{i=1}^n \eta_i$) is known as the energy $E(G)$. This study investigates the spectral features of dominant sets of a map / graph depicting West Indian states. It focuses on finding various energy sums using the eigen values of adjacency matrices and total minimum dominant matrices. In optimizing networks, resource administration, and regional planning, dominant sets, or groups of nodes, are critical because they ensure that all nodes in a network are either members of or linked to the group. The findings help us understand the system's resilience, interconnectivity, and effectiveness potential, while also providing useful data for regional strategy and construction of infrastructure in Western India. This study gives a versatile framework for future research in related topics and demonstrates how to evaluate map-based networks using the spectral graph theory as the basis.

Keywords: Dominating set, Adjacency matrix, Total minimum Dominating set, Energy sum, Western India graph.

**BAYESIAN ESTIMATION OF RELIABILITY CHARACTERISTICS FOR SYSTEM
USING DOUBLE TRUNCATED EXPONENTIAL DISTRIBUTION**

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Abstract

The objective of this paper is to estimate the reliability function and mean time to system failure of a system which consists of independent and identically distributed components with life time following double truncated exponential model. The system is working until at least of its n components are functional. The Reliability characteristics are obtained using truncated failure observations by Bayesian methods. The Bayes estimates are obtained with non-informative and informative priors under squared error loss function. A simulation study is carried out for comparing the performances of the estimation with respect to their mean squared errors. Analysis of a real data set is also given.

Keywords: Bayesian estimation, Reliability function, mean time to failure, truncated distribution and redundancy.

AI-POWERED PRECISION AGRICULTURE: LEVERAGING DEEP LEARNING AND IOT FOR SUSTAINABLE FARMING PRACTICES

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ABSTRACT: Let G be a connected graph and S a geodetic set of G . A geodetic set S in a connected graph G is called a *paired geodetic set* if $S = V$ or the each component of $G[S]$ has perfect matching. The minimum cardinality of a paired geodetic set of G is the *paired geodetic number* of G and is denoted by $g_p(G)$. If S is a paired geodetic set in G then a subset $T \subseteq S$ is called a *forcing paired geodetic subset* of S if S is the unique paired geodetic set containing T . A forcing subset for S of minimum cardinality is a *minimum forcing paired geodetic subset* of S . The *forcing paired geodetic number* of S , denoted by $f_{gp}(S)$ is the cardinality of a minimum forcing paired geodetic subset of S . The *forcing paired geodetic number* of G , $f_{gp}(G) = \min \{f_{gp}(S)\}$, where the minimum is taken over all minimum paired g_p -sets S in G . Some general properties satisfied by this concept are studied. The forcing paired geodetic number of some standard graphs are calculated. It is also shown that for every pair of positive integers a and b with $2 \leq a \leq b$, there exists a connected graph G such that $f_{gp}(G) = a$ and $g_p(G) = 2a$.

Keywords: Graphs, minimum cardinality, geodetic number.

ADVANCED IOT SYSTEM FOR SECURE FATAL MONITORING AND DEVICE CONTROL IN HIGH-RISK PREGNANCIES

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Abstract: Continuous monitoring of high-risk pregnancy patients is essential for ensuring maternal and fetal health. This paper proposes a 24-hour home-based monitoring system using smart watches, designed to enhance care for at-risk pregnant individuals. The smart watches are equipped with sensors to track vital parameters and fetal activity. These real-time health data are synchronized with a mobile application and a cloud-based platform, enabling seamless communication with healthcare providers. Advanced wearable technology and Internet of Things (IOT) integration enable remote data transmission, while Artificial Intelligence (AI) algorithms analyze patterns and detect anomalies. In case of irregularities, the system generates alerts and notifications, facilitating timely medical interventions. This approach ensure continuous care, reduces hospital visits, and enhances patient convenience while prioritizing safety. By combining wearable technology, IOT, and AI, this system demonstrates the potential to improve outcomes for high-risk pregnancies, offering personalized, real-time healthcare solutions for both patients and healthcare providers.

Keywords: Internet of Things (IOT), Wearable Sensors, Artificial Intelligence (AI), Remote Health Monitoring, Maternal and Fetal Health.

DESIGN OF SMART HYDROPONICS FARM MONITORING SYSTEM

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Abstract: Hydroponic farming is a method of growing plants without soil, using a nutrient-rich water solution. It's becoming more popular because it saves space and water, and can be done in urban or limited-resource environments. However, keeping track of all the factors that affect plant growth, like water quality, temperature, pH levels, and nutrient concentration, can be challenging. This system solves that problem by using sensors to monitor these important factors in real-time. The Hydroponic Farm Monitoring System collects data from various sensors placed in the farm, which measure things like the temperature, humidity, light intensity, pH, and nutrient levels in the water. All of this data is sent to a central unit, which then analyzes the information and adjusts the farm settings automatically to maintain the ideal environment for plant growth. This means farmers don't need to constantly check the farm or make manual adjustments, making the process more efficient and reducing the chance of human error. Additionally, the system comes with a user-friendly interface, such as a Blynk IoT. The system provides to an alert to remote user through Blynk IoT application that is connecting with Wi-Fi module. If there is network issue in Wi-Fi module that is connecting with Blynk IoT application so in this user can't get hydroponics parameters on application, so to avoid this problem, additionally we used LCD display nearby hydroponics farm so user can see this key that allows farmers to monitor their farm remotely. If something is wrong, the system sends alerts, so the farmer can take action before it becomes a bigger issue. The system also tracks data over time, providing useful insights and helping farmers make better decisions to improve crop production. In summary, the Hydroponic Farm Monitoring System makes it easier to manage a hydroponic farm, using technology to monitor and adjust growing conditions. This leads to healthier plants, better yields, and lower resource waste, making it a powerful tool for the future of agriculture.

Keywords : temperature, humidity , pH, light intensity, nutrient, Wi-Fi, Blynk IoT, LCD

REVOLUTIONIZING URBAN AGRICULTURE: HYDROPONICS MEETS GREYWATER

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Abstract: As urbanization reshapes the world's landscapes, the need for innovative solutions to address food security and resource conservation becomes increasingly urgent. Traditional agricultural practices struggle to meet the demands of growing urban populations, constrained by diminishing arable land, water shortages, and environmental degradation. This project presents a transformative approach to sustainable food production: a Hydroponic-Based Vertical Farming System coupled with Greywater Recycling. By repurposing domestic wastewater through advanced filtration processes and utilizing vertical, soilless farming techniques, this system redefines how urban spaces can be leveraged for agriculture. It is designed to not only optimize water and space usage but also minimize environmental impact, paving the way for a resilient and sustainable urban food ecosystem.

Keyword: Hydroponic Vertical Farming, Greywater Recycling, Urban Agriculture, Sustainable Food Production.

TRANSFORMER FOR EFFICIENT AND PRIVATE FEDERATED LEARNING

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Abstract: Transformer models bring new capabilities to federated learning but face challenges related to efficiency and privacy. This paper introduces Fed Transformer, an optimized transformer architecture tailored for federated learning scenarios. The proposed techniques focus on reducing communication overhead, computational costs, and privacy risks through innovations like lightweight attention mechanisms, sparsity strategies, adaptive compression layers, distillation, and secure aggregation protocols. Experimental evaluations demonstrate significant improvements in communication efficiency, model performance, and privacy preservation. These advancements position FedTransformer as a robust framework for enabling accurate, efficient, and private collaborative model training across decentralized devices and organizations.

Keyword: Transformer models, Federated learning, Privacy preservation, Communication efficiency.

E-COMMERCE: REVOLUTIONIZING DIGITAL MARKETPLACES WITH TECHNOLOGY AND AI

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Abstract: E-commerce has revolutionized the way businesses and consumers interact, fostering a digital marketplace that transcends geographic and temporal boundaries. This paper explores the multifaceted dimensions of modern e-commerce platforms, focusing on their technological frameworks, user experience designs, and the integration of artificial intelligence (AI) to enhance personalization and efficiency. By dissecting key components such as secure payment gateways, scalable cloud infrastructures, and adaptive recommendation systems, the study illuminates the critical factors driving the growth and adoption of online marketplaces. The research highlights the pivotal role of AI-powered analytics in understanding consumer behaviour and optimizing product offerings. Furthermore, it examines the implications of emerging technologies like block chain for secure and transparent transactions, as well as the integration of augmented reality (AR) to bridge the gap between physical and digital shopping experiences. Special emphasis is placed on how e-commerce platforms are adapting to evolving consumer demands, particularly the shift towards mobile-first interfaces and Omni channel strategies. Through a comprehensive analysis of case studies and statistical data, this paper identifies trends such as the rising importance of sustainable practices and ethical sourcing within the e-commerce ecosystem. Additionally, the challenges associated with data privacy, cyber security, and the digital divide are critically assessed to provide a holistic perspective. The findings underscore the necessity for continuous innovation and robust regulatory frameworks to ensure equitable growth in the e-commerce sector. This paper aims to serve as a valuable resource for industry professionals, academics, and policymakers, offering actionable insights and strategic recommendations for navigating the complexities of the digital commerce landscape. By bridging theoretical concepts with practical applications, it contributes to the ongoing discourse on shaping the future of e-commerce in an interconnected world.

Keywords: E-commerce platforms, Artificial intelligence (AI), Consumer behaviour, emerging technologies.

HYBRID QUANTUM-CLASSICAL NEURAL NETWORK FOR RADIO ASTRONOMY DATA PROCESSING

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Abstract: The paper investigates the use of quantum computing in astronomy and radio interferometry, with a particular emphasis on quantum image processing techniques and data encodings. Although there are potential computational benefits to quantum algorithms, their practical utility is hindered by hardware constraints such as gate faults and limited qubit size. The authors suggest innovative approaches, such as hybrid quantum-classical algorithms, to overcome these problems. These algorithms integrate quantum and classical resources to enhance performance and lessen hardware constraints. We explore state-of-the-art error mitigation strategies to improve the quantum computing reliability for radio astronomy applications. Prior to being implemented on real quantum processors, algorithms are optimized, and performance is evaluated using quantum hardware simulation. We also suggest directions to pursue in the future to identify and fix defects in quantum circuits using quantum error correction techniques. In order to improve the viability and usefulness of applying quantum computing capabilities to radio astronomy imaging and processing, these creative hybrid approaches that combine classical computing integration, error mitigation, simulation, and error correction offer viable solutions. These approaches also enable more robust quantum solutions despite existing hardware limitations. All things considered, the work demonstrates intriguing uses of quantum computing in this field while highlighting major obstacles and potential solutions involving improved hardware and algorithm development.

Keywords : Quantum Computing, Radio Interferometry, Hybrid Quantum-Classical Algorithms, Error Mitigation

CONSUMER PERCEPTION AND BEHAVIOR TOWARDS BLOCK CHAIN-BASED E-COUPONS: INSIGHTS AND IMPLICATIONS

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Abstract:

This study explores consumer perception and behavior regarding block chain-based e-coupons, focusing on the factors that influence acceptance and usage. As block chain technology promises enhanced transparency, security, and traceability, understanding how these attributes resonate with consumers is crucial for successful implementation. The research identifies key determinants such as perceived ease of use, trust, and perceived value that shape consumer attitudes towards blockchain-enabled coupon systems. Furthermore, it examines the psychological aspects of consumer behavior, including the impact of perceived risk and reward on the intention to redeem e-coupons. The findings suggest that consumers are increasingly aware of the benefits associated with block chain technology, particularly concerning product authenticity and safety. However, concerns regarding privacy and the complexity of block chain systems may hinder widespread adoption. By integrating insights from various sectors, this research aims to provide a comprehensive understanding of consumer preferences and behaviors in the context of block chain-based e-coupons. The implications of these findings are significant for marketers and businesses, as they highlight the importance of addressing consumer concerns and preferences to foster greater acceptance and utilization of block chain solutions in the e-coupon landscape. Ultimately, this study contributes to the block chain technology role in enhancing consumer trust and engagement in digital marketing strategies.

Keywords: E –coupons, Consumer perception, Consumer behavior, Digital marketing, Transparency Security.

A REVIEW ON EQUITY SENTIMENT ANALYSIS USING AI

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Abstract: Investor sentiment plays a critical role in shaping equity market performance, with recent research uncovering significant insights into its impact, measurement, and behavioral dynamics. Studies reveal that investor sentiment exerts a pronounced short-term influence on market returns, particularly in emerging markets, though this effect diminishes over time. High sentiment disrupts the predictive accuracy of fundamental economic indicators while favoring nonfundamental predictors, whereas low sentiment strengthens fundamental predictors. Innovative methodologies, including sentiment indices derived from Principal Component Analysis and belief-based models, as well as quintile regression and wavelet analysis, have advanced the measurement of sentiment and its relationship with equity indices. Behavioral analyses suggest that cognitive biases, such as diagnostic expectations and the representativeness heuristic, contribute to sentiment-driven return predictability, with high sentiment linked to lower future returns and stock underperformance. Globally, high-sentiment markets exhibit temporary overpricing before eventual corrections. With significant ramifications for investing strategies and policymakers, these findings highlight the significance of investor mood as a critical component determining equities market dynamics.

Keywords: Equity, Sentiment analysis, belief based model, Quintile regression, wavelet analysis.

A SURVEY OF WEED DETECTION USING MACHINE LEARNING TECHNIQUES

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Abstract:

Weed detection is a crucial aspect of modern agriculture, impacting crop yield, quality, and sustainability. Traditional methods often involve extensive manual labor or herbicide application, leading to environmental pollution and increased production costs. Machine learning techniques have emerged as promising tools for automating weed detection and implementing targeted weed control strategies. This paper reviews various machine learning approaches employed for weed detection in agricultural settings, including traditional classifiers like Support Vector Machines (SVM) and Random Forests, as well as more advanced deep learning architectures like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs). The strengths and limitations of each approach are discussed, along with their performance in real-world scenarios. The paper also highlights the importance of dataset collection and annotation in training robust weed detection models, addressing challenges related to model generalization across different locations, crops, and weed species. Future research directions include integrating multiple sensor modalities, developing real-time detection systems, and incorporating robotic platforms for autonomous weed management.

Keywords: Weed detection, SVM, RGB, Machine learning, datasets, and weed species.

A QUANTITATIVE EVALUATION OF PREPROCESSING TECHNIQUES FOR LUNG CANCER CLASSIFICATION USING CT AND HISTOPATHOLOGY DATA

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Abstract: Preprocessing plays a significant role in enhancing the quality and interpretability of medical images, and therefore it has a great impact on the effectiveness of automated lung cancer classification systems. This paper discusses the effectiveness of five different preprocessing techniques-Gaussian filtering, Contrast Limited Adaptive Histogram Equalization (CLAHE), Median filtering, Laplacian filtering, and Max Pooling- applied on two critical imaging modalities lung CT scans and histopathology slides. The methods were assessed for their efficacy by different quality metrics of images namely Peak Signal-to- Noise Ratio (PSNR), Structural Similarity Index Measure (SSIM), and Mean Squared Error (MSE). The results show that both Gaussian and Median filters are capable of consistently maintaining the quality of the image by producing higher PSNR and SSIM values while largely reducing noise. In contrast, the Laplacian filter, which has the potential to improve edge definition, generates severe anomalies, particularly in histopathological images. CLAHE successfully enhances contrast; although it can increase noise levels, whereas Max Pooling reduces dimensionality while compromising finer details in the image. These findings give a comparative analysis of preprocessing approaches used in both modalities, providing important insights for optimizing image preprocessing techniques in algorithms aimed for lung cancer classification.

Keywords: Lung Cancer Classification, Deep Learning, computed Tomography, Histopathology Image, and Preprocessing.

THE ONGOING CHALLENGE OF CYBER SECURITY THREATS IN THE E-COMMERCE DOMAIN AND REINFORCING CYBER DEFENSE FOR CUSTOMERS

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Abstract: Nowadays E-commerce websites face a range of cyber threats that can compromise the security of customer data, disrupt business operations, and damage reputation. Here are some common cyber threats that e-commerce websites need to guard against Payment card fraud that steal the credit card details during transactions, DDoS Attack like overwhelm the website with traffic, Phishing to revealing the sensitive information of the customer, SQL injection to manipulate sensitive customer data stored in the database, and one of the methods to steal customer information is Session Hijacking. Session hijacking is a method used to take switch of another user's session and getting unauthorized access to data or resources, in this case the attacker can steal the session token from the user's browser in a different way such as cross-site scripting (XSS), session prediction techniques, or packet sniffing. If once the attacker obtains the session token, they can easily gain access of the user's privilege on the restricted area of the website. This review paper discusses the most effective mitigation and prevention approaches for session key vulnerabilities based on existing research. This review encapsulates all recent algorithms suitable for session key prevention mitigation approaches. The algorithms examined in the existing research study enable readers to identify the most accurate algorithm for session key security. The effective ways for authenticating user entities to limit the vulnerability of the session key are explained in detail. This page discusses the various methods, outcomes, and preventive techniques established over the years for the early prevention of session stealing.

Keywords: Web, Authentication, Session Hijacking, Session token, TCP/IP, User Information, WAP, PDA, HTTP.

**ENHANCING PREDICTIVE ACCURACY IN PERSONALIZED NUTRITION:
A FOCUS ON BMI AND HEALTH METRICS**

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Abstract: This research seeks to advance personalized nutrition systems by addressing two critical challenges: improving long-term prediction accuracy for key health metrics such as BMI, and identifying the most relevant predictive features for tailored nutritional guidance. To achieve these goals, the study employs a comprehensive approach that integrates advanced time series forecasting techniques, specifically Autoregressive Integrated Moving Average (ARIMA Vector Auto regression (VAR), and Temporal Convolutional Networks (TCN), to enhance the accuracy of long-term health predictions. Additionally, the research implements a sophisticated hybrid feature selection strategy that combines filter methods with LASSO regression, enabling the identification of the most significant predictive features from a potentially vast array of variables. This dual focus on improved forecasting and refined feature selection aims to significantly enhance the efficacy of personalized nutrition systems. By providing more accurate long-term predictions and identifying the most relevant factors influencing individual health outcomes, this research strives to enable the development of more effective, personalized dietary recommendations. Ultimately, the goal is to optimize individual health outcomes through precisely tailored nutrition strategies, potentially revolutionizing the field of Personalized nutrition and contributing to improved public health on a broader scale.

Keywords: Personalized Nutrition, Time Series Forecasting, Feature Selection, Health Prediction Models.

EVALUATING INVESTMENT TRENDS IN INDIAN STARTUPS: A WRAPPER METHOD APPROACH USING BOOSTING ALGORITHMS

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Abstract: The Indian startup ecosystem has emerged as a dynamic and rapidly growing sector, attracting significant investments globally. Analyzing and evaluating investment trends in this domain is crucial for investors, policymakers, and entrepreneurs to make informed decisions. This study introduces an innovative hybrid approach by combining a wrapper method with boosting algorithms and an adaptive ensemble learning framework. The wrapper method optimizes feature selection, ensuring the most relevant variables are utilized for robust analysis. Additionally, this study incorporates sentiment analysis of investment-related news and social media to capture the qualitative aspects influencing investment trends. The findings reveal critical insights into investment patterns, sectorial preferences, funding stages, and the impact of macroeconomic indicators. This novel methodology provides a comprehensive and actionable framework for stakeholders aiming to leverage advanced data-driven strategies in the Indian startup landscape. The proposed methodology incorporates a wrapper method approach, utilizing a boosting algorithm like LightGBM to identify the most significant features for predicting startup success and post-funding valuation. The wrapper method systematically assesses various feature subsets to determine the optimal combination that maximizes the models predictive accuracy. By leveraging boosting algorithms, recognized for their capacity to enhance the performance of weaker models through ensemble learning, this study seeks to pinpoint the key factors influencing startup growth and investment patterns. The insights derived from this analysis will be invaluable for investors, entrepreneurs, and policymakers, facilitating informed decision-making.

Keywords: Startups, Investments, Feature Selection, Predictive Analysis, boosting algorithm.

ENHANCED DETECTION OF AUTISM SPECTRUM DISORDER USING INTEGRATED MACHINE LEARNING MODELS

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Abstract: Autism Spectrum Disorder (ASD) is a complex neurodevelopmental disorder condition which having the behavioral issues including social, verbal and non-verbal communication difficulties and restricted, repetitive patterns of behavior, and making different sounds. Timely detection and accurate classification of ASD are crucial for improving therapeutic outcomes and providing personalized interventions. The external factors like stress, drugs consumption by the mother and complication in delivery also the factors for the ASD in babies. With the increasing occurrences of ASD cases, the need for efficient, reliable, and scalable diagnostic tools is more importance than the previous decades. Integrated machine learning models are playing the powerful role in the detection, classification, and prediction of ASD for the right time intervention to improve the condition of the ASD cases. This research aims for ML algorithms applied to ASD detection, reviewing various methodologies, techniques, datasets, and their effectiveness in clinical and research settings.

Keywords: Autism Spectrum Disorder, Machine Learning, Early Diagnosis, Neurodevelopmental Disorders.

**ANOMALY DETECTION IN AIRCRAFT ENGINES USING
VARIATION AUTOENCODER: A SEMI-SUPERVISED APPROACH**

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Abstract: The safety and trustworthiness of aircraft engines are most importance in the aviation industry. Predictive maintenance, driven by data-centric methods, has become an important approach for achieving the objective. This research work proposes a semi-supervised anomaly detection framework that employs Variation Auto encoder (VAEs) to measure engine health and forecast potential failures. The dataset contains multivariate time-series data that gathers the operational cycles of aircraft engines, with sensor readings representative of various performance metrics. The training dataset reflects normal operating conditions, while the test dataset includes unlabeled instances where failure points remain unidentified. The Ground truth dataset provides the actual remaining cycles for engines, facilitating a thorough evaluation. VAEs, learn from the latent representations, are trained to model the normal operational behaviors of engines. In the testing phase, reconstruction errors are calculated, and significant deviations from expected behavior are identified as anomalies. This methodology enables the model to detect engines at risk of failure well in advance of reaching unsafe operational thresholds. The model's ability to generalize across engines with diverse initial conditions underscores its robustness. This study illustrates the potential of VAEs in predictive maintenance, allowing for timely interventions to avert catastrophic failures and minimize maintenance expenses. The results highlight the significance of machine learning in enhancing safety and efficiency within the aviation industry.

Keywords: Semi-Supervised Learning, Predictive maintenance, Variation Auto encoder, Anomaly Detection, Aviation Safety

A STUDY ON ECO YIELD: AI-DRIVEN MONITORING AND PREDICTION FOR DIG SMART FARMING

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Abstract: This research presents a cutting-edge approach to crop yield prediction using artificial intelligence (AI) and machine learning (ML) technologies. By analyzing diverse datasets, including historical yield records, climate data, soil properties, and pest trends, the proposed model delivers accurate and data-driven forecasts. This AI-driven solution empowers farmers, agribusinesses, and policymakers to enhance decision-making, improve resource management, and boost agricultural productivity. By addressing challenges such as environmental variability, resource scarcity, and risk mitigation, this framework offers a transformative tool for advancing precision agriculture and sustainable farming practices.

Keywords: Crop yield prediction, artificial intelligence, machine learning, agriculture, historical yield records.

**DEMOCRATISED AND DECENTRALIZED ON-DEVICE AI FOR
DECARBONISATION**

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Abstract : As Artificial Intelligence models are being omnipresent and on the way to become omnipotent in almost every domain in the verge of fourth Industrial Revolution which is based on the Cyber Physical Production Systems, in the floors of Industry 4.0 or Smart Factory especially the advancement of robotics technologies and on-device inference is rapidly expanding to our daily life usages in the form of smart-phones, IOT devices, Augmented Reality / Virtual Reality headsets. Exploring the deployment procedure of AI models on the massive number of mobiles and other edge devices which can reduce latency, enhances efficiency, and preserves privacy hold the matter of great importance for attaining decarbonisation which can preserve the 867 terrestrial eco-regions of our planet to extend our survival in our blooming blue planet EARTH.

Keywords : On-Device AI, Key Performance Indicators, IIOT, Decentralized Energy Sources, Decarbonisation, Critical Success factors and benign production units

**ON THE TOTAL CHROMATIC NUMBER OF EVEN LINE GRAPHS OF EVEN
COMPLETE GRAPHS**

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Abstract: Total coloring assigns unique colors to all vertices and edges of a graph $G = (V, E)$, ensuring adjacent vertices and edges have distinct colors, and each edge's color is distinct from its end points. The total chromatic number, $\chi''(G)$, embodies the essence of this harmonious arrangement, representing a concept both intricate in its structure and enlightening in its implications. The prominent inequality $\chi''(G) \leq \Delta(G) + 1$, proposed by Behzad and Vizing, delineates a precise framework for comprehending this concept. In this context, $\Delta(G)$, representing the maximum degree of the graph, serves as a structural constraint and a complexity that enhances the graph's structure. This research posits that even complete graphs of even line graphs $L(G)$, where $\Delta(G) = 2$ and $2 \leq \Delta(G)$ (with $\Delta(G)$ being even), can be enhanced with a total coloring that utilized colors.

Keywords: Total chromatic number; total coloring conjecture; complete graphs; line graphs.

ENSEMBLE-BASED DEEP LEARNING FRAMEWORK FOR ROBUST OBJECT DETECTION IN AUTOMOTIVE ASSEMBLY LINES

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Abstract: This study integrates Vision Transformers (ViT), YOLO, and EfficientNet to propose an ensemble-based deep learning architecture for object detection in automotive assembly lines. Using Weighted Box Fusion (WBF) for increased precision, the system combines the contextual feature extraction of ViT with the real-time capabilities of YOLO and the high-resolution accuracy of EfficientNet. Real-world dataset experiments showed that it outperformed SSD MobileNet with mean Average Precision (mAP) of 96.8% and Intersection over Union (IOU) of 91.5%. The model showed real-time processing at 15 frames per second on edge devices, robustness in varied lighting, and effective overlapping object detection. The automation of Industry 4.0 systems is improved by this scalable and reasonably priced solution.

Keywords: Object Detection, Vision Transformers (ViT), Industry 4.0, Ensemble Deep Learning.

**INTEGRATING EDGE COMPUTING AND BLOCK CHAIN FOR
DECENTRALIZED HIGH-PERFORMANCE COMPUTING PLATFORMS**

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Abstract: This research explores the synergy between edge computing and block chain, two transformative technologies driving advancements in data management, security, and decentralized systems. Block chain ensures data integrity and transparency through cryptographically linked transaction blocks, while edge computing enhances efficiency by processing data closer to its source, minimizing latency, and enabling real-time capabilities. Their integration addresses critical challenges in scalability, privacy, and distributed processing. The study introduces the DEAN protocol, a robust collaborative framework that demonstrates a 25x increase in capacity and 18x resistance to data manipulation in edge environments. Additionally, innovations such as Hedera Hash graph consensus are highlighted for providing scalable, cost-effective, and secure solutions to challenges like interconnectivity and data sustainability. Real-world implementations by organizations like Hut 8, Solana, and Lumen underscore the practical potential of this convergence, paving the way for decentralized platforms tailored to the needs of Web 3.0, AI, and IoT applications.

Keywords: Block chain, Edge Computing, Decentralized Systems, DEAN Protocol, Data Integrity, Real-Time Processing, Web 3.0, IoT Applications, Hash graph Consensus.

EFFECTIVE STABILIZATION IN 3D CINEMATOGRAPHY

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Abstract: Effective stabilization in 3D cinematography is critical for ensuring smooth, immersive visual storytelling without compromising the integrity of the three-dimensional experience. As the demand for high-quality 3D films and virtual reality content grows, maintaining a stable camera during complex shots becomes increasingly important. This paper explores the challenges of stabilization in 3D cinematography, which includes compensating for both interocular distance and the 3Ds depth. It presents an overview of the latest stabilization technologies, including mechanical rigs, gimbal systems, and advanced post-production software solutions. Additionally, this paper explores into the unique challenges presented by motion blur, parallax shifts, and stereo misalignment in 3D environments. By examining case studies of recent 3D productions, highlight best practices for achieving effective stabilization without sacrificing the immersive qualities inherent in 3D storytelling. This paper concludes with a discussion on the future of stabilization technologies, including the potential role of AI in real-time motion correction and the integration of dynamic stabilization systems into handheld and drone-based 3D cinematography.

Keywords: 3D video, video stabilization, cinematography, motion tracking.

KINSHIP VERIFICATION USING SIAMESE NEURAL NETWORK WITH RESNET FEATURES

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Abstract: The goal of Facial Kinship Verification is to automatically determine whether two individuals have a kin relationship or not from their given facial images or videos. This has attracted significant interests among the scientific community due to its potential applications in social media mining, identify family and non-family members and finding missing children. Verification of Kinship by facial pictures is difficult since face images have a lot of intra-class variations due to age, genetic and gender difference. Videos can provide more information as they have additional sources of information as compared to single image verification. In this paper, a novel pattern analysis technique for kinship verification based on a new deep learning-based approach is proposed. More specifically, this study proposed Siamese Deep Convolutional Neural Network model with deep algorithm namely ResNet to extract deep features from video frames. Once the features are extracted from the two images, a Euclidean distance vector is computed from the two feature vectors and then fed to classifiers for kinship classification. Random Forest (RF) and Support Vector Machine (SVM) classifiers are used to classify the decision borderline among kin and non-kin classes. The efficacy of this proposed approach is evaluated on seven kin relationships using a kinship video (KIVI) face dataset of kin pairs. According to experimental results the ResNet_RF model attains 92.31% of accuracy. Moreover, this proposed method outperforms the accuracy of existing approaches on the same dataset.

Keywords: Facial Kinship Verification, Deep Learning, Siamese Network, Kinship Classification

**A BAYESIAN PERSPECTIVE ON ASSESSING THE IMPACT OF ORGANIC SPRAY ON
AMARANTHUS DUBIUS CROP YIELD IN R**

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ABSTRACT: This paper presents a Bayesian analysis of the effect of organic spray treatment on the yield of *Amaranthus dubius*, a leafy vegetable. A randomized controlled trial involving 4 replications were used to compare yields from plots subjected to 6 distinct organic spray treatments against control plots with no treatment. Our analysis utilized the brms package to explore various prior distributions and assess their influence on parameter estimates. Findings revealed a statistically significant increase in yield associated with the organic spray treatment, with credible intervals indicating substantial effect sizes. Model diagnostics, including posterior predictive checks, confirmed the adequacy of the model fit. This study enhances the application of Bayesian methods in agricultural research, showcasing their strengths in interpreting treatment effects and integrating prior knowledge, all the analysis methods implemented through R code.

Keywords: Experimental design, Randomised Block Design, Statistical modelling, Prior distributions, Bayesian ANOVA, R programming, *Amaranthus*.

SMART INVENTORY OPTIMIZATION BALANCING DEMAND WITH USECASE-DRIVEN PREDICTIVE ANALYTICS

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Abstract: The 'Smart Inventory Management' system leverages advanced algorithms and predictive analytics to optimize supply chains, reduce waste, and improve customer satisfaction. By employing models such as ARIMA (Auto-Regressive Integrated Moving Average) and LSTM (Long Short-Term Memory), the system accurately forecasts demand, enabling dynamic stock adjustments that align with market trends. Additionally, clustering algorithms like K-Means and association algorithms help enhance inventory allocation and uncover product relationships, facilitating more efficient operations. The challenge in resource allocation lies in balancing multiple, often conflicting objectives, such as minimizing costs, maximizing output, and maintaining quality standards. Multi-Objective Particle Swarm Optimization (MOPSO) addresses these complexities by advancing traditional Particle Swarm Optimization to identify a set of optimal solutions, rather than just a single solution. The algorithm assesses these configurations based on multiple objectives, ultimately identifying non-dominated solutions that represent the best possible trade-offs among competing goals. Product monitoring plays a critical role in this system, offering real-time tracking of stock levels, shelf life, and product conditions, ensuring timely replenishments and preventing stock outs or overstocking. This, combined with staff management capabilities, allows businesses to effectively allocate human resources for tasks such as stock audits, warehouse organization, and order fulfillment, optimizing workforce efficiency and reducing operational bottlenecks. This data-driven approach, coupled with real-time monitoring, adaptive logistics, and intelligent staff allocation, leads to smarter resource utilization, faster delivery times, and higher profitability. The system is designed to scale seamlessly with business growth, offering an innovative solution to the complexities of modern inventory management.

Keywords: Inventory System, Real-Time Tracking, Predictive Analytics, Machine Learning.

**A SURVEY ON THE STABILITY ANALYSIS OF FRACTIONAL DIFFERENTIAL
EQUATIONS**

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ABSTRACT: In this survey, various type of stability analysis for fractional differential equations (FDEs) have been discussed. Stability plays a vital role in the qualitative behaviors of dynamical systems. Caputo, Riemann- Liouville, Hilfer and other fractional derivatives are used to attain the stability results. A detailed collection stability analysis from the literature have been discussed.

Keywords: stability analysis, qualitative behaviors and fractional derivatives

HUMAN VIOLENCE DETECTION USING DEEP LEARNING TECHNIQUES

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Abstract: Human violence continues to be a significant global challenge, with an estimated annual fatality rate of 79 individuals per 100,000 people. Many violent incidents occur suddenly or in isolated locations, making it challenging to respond promptly. This study introduces an automated detection system that utilizes advanced deep learning techniques to address this challenge. With the widespread deployment of CCTV cameras in urban areas, these devices have become essential tools for monitoring and analyzing public safety. By leveraging deep learning models such as Inception-v3 and YOLO-v8, the system can accurately identify violent actions, estimate the number of individuals involved, and detect the presence of weapons in real-time scenarios. These models form the backbone of an intelligent video analysis framework, which can be implemented as software or an API for real-time applications. The proposed system achieved a detection accuracy of 74%, demonstrating its potential to assist law enforcement agencies in responding quickly to violent situations and enhancing public safety. This research underscores the effectiveness of combining computer vision and artificial intelligence to proactively detect and mitigate violence in real-world environments.

Keywords: Violence Detection, Deep Learning, CCTV Surveillance, Real-Time Analysis

**AI-BASED SYNERGISTIC CONTROL: EYE GAZE AND VOICE
INTEGRATION FOR IMPROVED HCI.**

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Abstract: In the fast-changing field of HCI, the interaction of mixed modalities has come forward as a key research focus. This paper describes a new approach to seamlessly integrating AI into the control framework of seamlessly integrated systems for vision-based control using eye tracking and voice commands. With both eye tracking and voice recognition offering some advantage over each other, our approach seeks to eliminate the limitations imposed by the conventional methods of input so that the users could enjoy an interface more intuitively effective at computers. The proposed work demonstrates the development of a real-time framework designed to support the interconnection of data processing originating from eye-tracking technology and voice recognition devices using artificial intelligence. Sophisticated machine learning algorithms are applied to interpret precise intentions from users. In addition to that, we have described a set of experiments to show the effectiveness of our approach in various areas of application, including assistive technology, games, and work settings. The experiment results show significant improvement in user performance and satisfaction when compared to traditional input methods. The paper discusses the technical advancement, which might be revolutionized by multimodal integration powered by AI. Our research allows the integration of eye tracking and voice commands, thereby enabling more engaging and inclusive computing experiences, creating new opportunities for investigation and innovation within the domain of human-computer interaction. In conclusion, this paper presents an AI-based synergistic control framework that integrates eye gaze and voice commands for enhanced HCI. This research underscores the transformative potential of multimodal integration powered by AI, opening new avenues for innovation in the field of human-computer interaction.

Keywords: HCI(Human-Computer Interaction), AI integration, Eye tracking, Voice commands, Multimodal integration.

**REAL-TIME SIGN LANGUAGE RECOGNITION USING
CONVOLUTIONAL NEURAL NETWORKS AND COMPUTER VISION – A
DEEP LEARNING APPROACH**

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Abstract: Sign language is an essential communication medium for people with hearing and speech disabilities. The recent developments in computer vision and machine learning have made it possible to create systems that can identify sign language gestures, thus overcoming communication barriers. This paper discusses a technique for sign language recognition using Convolutional Neural Networks (CNNs) combined with OpenCV. The process includes training a CNN on the MNIST database, which consists of images corresponding to American Sign Language alphabets. The trained model is then combined with OpenCV to recognize gestures in real-time through webcam input. Experimental results prove the effectiveness of the system in correctly recognizing sign language gestures, indicating its potential to increase communication accessibility among the deaf and hard- of-hearing community.

Keywords: Sign Language Recognition, Convolutional Neural Networks (CNNs), Real-Time Gesture Recognition, OpenCV

**DEVELOPING A FREELANCING NETWORK AND COLLABORATION
PLATFORM: AN EFFICIENT AND SCALABLE SOLUTION FOR
REMOTE WORK**

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Abstract: This paper presents the development of a freelancing network and collaboration platform designed to facilitate seamless communication, project management, and payment workflows between freelancers and clients. The platform leverages modern web development technologies such as React for the front-end and MongoDB for the back-end, ensuring scalability and interactivity. Key features of the platform include user registration, job postings, real-time messaging, secure login systems, and integrated payment solutions. This paper discusses the platform's design, key features, implementation details, and future enhancements, demonstrating how the system aims to meet the growing demand for remote work and enhance the digital economy.

Keywords: Freelancing Platform, Web Development, Project Management, Payment Integration

FACE RECOGNITION BASED ATTENDANCE MANAGEMENT SYSTEM

FACE RECOGNITION BASED ATTENDANCE MANAGEMENT SYSTEM

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Abstract: In today's technology-driven world, face recognition is increasingly used across various sectors, particularly for security, authentication, and identification. This project aims to develop an automated class attendance system using face recognition technology to replace traditional manual attendance methods, which are time-consuming and prone to errors like proxy attendance. Face recognition offers advantages such as being non-invasive, contactless, and easy to use, making it a popular choice despite lower accuracy compared to other biometric methods. The system works in four phases: database creation, face detection, face recognition, and attendance updating. Initially, student images are captured to create a database, which serves as the reference for face recognition. Face detection is performed using the Haar-Cascade classifier, a machine learning algorithm that identifies faces in real-time. Once faces are detected, the system uses the Local Binary Pattern Histogram (LBPH) algorithm to recognize and match the faces with those stored in the database. After recognizing the faces, the system automatically marks attendance for each student. The attendance list is then emailed to the teacher at the end of the class, ensuring accurate and up-to-date records. This system eliminates manual attendance taking, saving time and reducing errors in attendance records. It also ensures that only registered students are marked present, preventing fraudulent practices like proxy attendance. The solution is developed using Python, Raspberry Pi, and an external camera, making it cost-effective and easy to implement. This system not only enhances efficiency but also improves security by providing accurate and reliable attendance tracking. It is ideal for educational institutions and can be extended to other environments like offices or events where attendance is critical. In summary, this automated face recognition attendance system provides a modern, efficient, and secure solution to the challenges of manual attendance tracking, improving both accuracy and convenience.

Keywords: face recognition, attendance system, Haar-Cascade classifier, Local Binary Pattern Histogram (LBPH), Python, Raspberry Pi, automated attendance, security.

**MACHINE LEARNING APPROACHES FOR CLASSIFYING
INFORMATIVE TWEETS DURING DISASTERS****Dr.Aarthi E, Dr.Muthulakshmi P,****Abishek Devapal & Naram Sethu Harsha Vardhan (Student)**Department of Computer Science, Faculty of Science and Humanities,
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Abstract: The computing techniques and models are used for disaster identification, management and relief processes in the current era. The disaster relief activities are based on the collected data and how the same is applied on the selected models. The selection of significant model is one among the challenging process and is observed to be the thrust area of research. Therefore, model selection processes itself need a scientific approach based on the model performance measures. This study attempts to evaluate the machine learning supervised classifiers to identify disaster relevance features from the Online Social Network datasets that are very dynamic. The machine learning supervised classifiers such as Naïve Bayes(NB), Support Vector Machine(SVM), Logistic Regression(LR), Random Forest(RF) and Gradient Boosting(GB). This work is evaluated using Machine Learning performance measures which are accuracy, Precision, Recall and F1-Measure. The dataset is fetched from the tweets of Online Social Network. As per the implementation, both informative, non- informative binary classifier result showed that the gradient boosting performance (accuracy- 93.5%) is significant while comparing with other factors. It is observed that the classifications are done based on the level of related information of the disaster. However, the identification of disaster related features using classifiers need to be enhanced using authenticated tweets with high performance classifier to support rescue operations during crisis.

Keywords: disaster, Machine Learning Classifiers, authenticity of tweets, relevance of tweets, Online Social Network (OSN), rescue operation

AUTOMATIC RAILWAY GATE CLOSED SYSTEM (ARGCS)

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Abstract: The development and execution of an Automatic Railway Gate Control System (ARGCS) for unattended level crossings are specifically designed to decrease the time that gates remain closed while enhancing safety for motorists by reducing the likelihood of accidents. The ARGCS employs a microcontroller-based framework that works in conjunction with sensors to detect the incoming trains and automatically manage the gate's operations. The system is powered by Embedded C programming, which guarantees that the microcontroller effectively and reliably carries out the control logic for consistent gate functionality. This automated system acts as a substitute for conventional gates managed by gatekeepers, which are susceptible to human mistakes, delays, and variability. By eliminating the necessity for manual control, the ARGCS greatly minimizes the likelihood of errors, promoting smoother and safer functioning at railway crossings. Additionally, this automation presents a highly economical option, rendering it especially appropriate for unmanned level crossings where human supervision is not present. One of the main benefits of the ARGCS is its capability to shorten the duration that gates remain closed by as much as 70%. This decrease in gate closure time results in a notable reduction in traffic congestion at level crossings, enhancing the experience for road users who would typically face long delays. Additionally, the quicker operation of the gates leads to heightened safety at these crossings, as the system guarantees that gates open and close in alignment with train schedules, thereby avoiding both premature and delayed gate movements that might result in accidents. To sum up, the ARGCS offers a practical and cost-effective approach for overseeing unmanned level crossings. By automating the operation of gates, it boosts safety, decreases the likelihood of human mistakes, cuts down on traffic delays, and enhances overall operational efficiency, positioning it as a vital asset for contemporary railway systems.

Keywords: Automatic Railway Gate Control, Microcontroller System, Traffic Management, Safety Enhancement

**DEGREE-BASED TOPOLOGICAL INDICES OF NANOTUBES: A
MATHEMATICAL APPROACH**

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Abstract: Topological indices play a crucial role in the mathematical characterization of molecular structures, providing valuable insights into their physicochemical properties. In this study, we focus on the degree-based topological indices of nanotubes, a significant class of nanostructures with diverse applications in nanotechnology, drug delivery, and material science. We derive closed-form expressions for several well-known degree-based indices, including the Randić index, Zagreb indices, harmonic index, atom-bond connectivity (ABC) index, and geometric-arithmetic (GA) index, for specific classes of nanotubes. The results of this research contribute to the theoretical foundation of molecular graph theory and support the development of more efficient computational models for nanomaterials.

Keywords: Topological indices, degree-based indices, nanotubes, molecular graphs, Zagreb index, Randić index, ABC index, nanostructures.

COLLABORATIVE LESSON PLANNING FOR EDUCATORS

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Abstract: The Collaborative Lesson Planning project aims to develop a centralized web application that allows educators to collaboratively design, share, and refine lesson plans. Key features include real-time collaboration, a resource library for multimedia materials, curriculum mapping to align with educational standards, an assessment builder for quizzes and assignments, and version control for tracking changes. This platform enhances teaching quality and fosters collaboration among educators, ultimately improving student learning outcomes.

Keywords: Assessment Builder, Collaborative Learning, Real-Time Collaboration, Resource Library, Version Control.

DEEP LEARNING-BASED WEED DETECTION IN SMART AGRICULTURE USING CONVOLUTIONAL NEURAL NETWORKS

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Abstract: A framework for machine learning that makes use of trained representations is deep learning. Without a map, anybody can learn. Deep Neural Networks(DNN), Deep Belief Networks (DBN), and Recurrent Neural Networks(RNN) are just a few of the many deep learning architectures that are currently in use across a variety of sectors. Visual, audio, video, language processing, social media, medicine, gaming, and other applications all make use of deep learning utilized in related systems. In many systems, deep learning has produced accurate results that are comparable to or occasionally even outperform those of human experts. The most recent developments in expert systems can be useful in the field of smart agriculture. One goal is to eliminate weeds by using fewer herbicides and lowering the danger of agricultural and water pollution. Crop field image is provided as input training examples. Images with weeds are recognized and categorized using the extracted feature. Convolution neural network is utilized to create a deep learning model for weed detection with good accuracy, allowing for quicker weed detection in cucumber crop fields.

Keywords: Deep Learning, Convolutional Neural Network(CNN), Weed Detection, Smart Agriculture

**PREDICTIONS OF EMOTIONS IN HUMANS WITH TEXT AND IMAGE
DATA USING MACHINE AND DEEP LEARNING TECHNIQUES.**

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Abstract: Emotion recognition is essential for improving human-computer interactions and while traditional methods focus on single data types, such as Text or visual inputs, emotions are communicated through various channels. The Research work presents a multimodal framework for emotion recognition that integrates textual and visual data to enhance accuracy and robustness. The architecture features parallel sub-networks: a Bi-LSTM for text analysis, capturing contextual word relationships; a CNN leveraging pre-trained networks to analyse facial expressions and body language from visual inputs. Feature-level fusion combines modality-specific representations, followed by a fully connected layer for emotion classification. The framework was validated using datasets such as RAVDESS and IEMOCAP, achieving superior performance compared to single-modality models. Text-based experiments employed tokenization and neural networks with embedding and dense layers, achieving a validation accuracy of 97.94%. For image-based predictions, Haar Cascade classifiers enabled real-time facial emotion detection. Despite challenges like noisy data and ethical concerns.

Keywords: *Emotional Analysis, Machine Learning, Emotion Prediction, Text Analysis, Visual Feature Extraction, Deep Learning.*

**PROTECHT – IMPLEMENTATION OF AN IOT BASED ADVANCED
WOMEN SAFETY DEVICE**

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Abstract: ProTecht is an innovative IoT-based three-way safety device designed to enhance women's safety by integrating proactive monitoring, real-time communication, and emergency response mechanisms. The device features GPS-based location tracking, motion sensors to detect distress situations, and an automated alert system for real-time communication with emergency contacts. The wearable device also includes an SOS button for immediate assistance and an audible alarm to deter potential threats. Utilizing IoT protocols like MQTT and GSM connectivity, ProTecht ensures seamless data transfer and reliable communication during critical moments. The prototype, developed using microcontrollers, GPS modules, and accelerometers, was tested successfully in simulated emergency scenarios, demonstrating its ability to reduce response times and improve personal security. This project represents a step forward in leveraging IoT for societal safety, offering a compact, cost-effective solution for addressing real-world safety challenges.

Keywords: GPS-based location tracking, GPS modules, and accelerometers, deter potential threats

FOOD FROM AIR - AEROPONICS FARMING INTEGRATED WITH IOT AND AI

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Abstract : Agriculture faces growing challenges due to climate change, resource depletion, and food security concerns. This research introduces an AI-powered, IoT-enabled Aeroponics Farming System that optimizes plant growth through real-time environmental monitoring and automated control. IoT sensors track temperature, humidity, pH, and nutrients, while an AI-driven model adjusts misting cycles and nutrient delivery for maximum efficiency. Blockchain integration ensures transparency in food production, and a smart dashboard enables remote monitoring. Additionally, the system incorporates renewable energy sources to enhance sustainability. This system boosts crop yield by 30% while reducing water usage by 90%, making it ideal for urban farming and climate-resilient agriculture. By combining AI, IoT, and blockchain, this research advances sustainable, high-efficiency farming for the future.

Keywords: climate change, resource depletion, and food security concerns.

A COMPREHENSIVE REVIEW OF DEEP LEARNING TECHNIQUES AND APPLICATIONS IN TEXT RECOGNITION

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Abstract: This comprehensive review explores the advancements in deep learning techniques for text recognition, addressing the significant challenges posed by complex environments, such as varied fonts, obstructions, and noisy backgrounds. The survey highlights state-of-the-art models, including Convolutional Neural Networks (CNNs), Convolutional Recurrent Neural Networks (CRNNs), and their hybrid forms, alongside applications in product label recognition, healthcare, food safety, augmented reality, and accessibility for visually impaired individuals. Furthermore, it examines critical challenges in the field, including multilingual support and dataset augmentation, while outlining key datasets used for training and evaluation. The paper also discusses performance metrics for evaluating model effectiveness, proposes a novel advanced model integrating modern techniques, and emphasizes the importance of real-time deployment across various platforms. This review serves as a foundational resource for researchers and practitioners aiming to enhance text recognition technologies in diverse real-world applications.

Keywords: Convolutional Neural Networks (CNNs), Convolutional Recurrent Neural Networks (CRNNs), and their hybrid forms, alongside applications

EFFECTIVE ANDROID MALWARE DETECTION USING A DEEP LEARNING – BASED HYBRID APPROACH

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Abstract: Malicious Android applications pose a significant threat to mobile security, necessitating the development of robust detection systems. This paper presents a hybrid deep learning model combining Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks to enhance malware detection. The CNN component effectively extracts spatial features from static data, while the LSTM component captures temporal dependencies in dynamic data. By integrating these feature representations, the model demonstrates improved performance in detecting malicious behaviors using the Drebin dataset. Experimental results show that the hybrid CNN+LSTM model outperforms standalone CNN or LSTM models in terms of accuracy, precision, recall, and F1-score. This highlights the advantage of leveraging both spatial and temporal feature extraction in malware detection.

Keywords: Mobile Security, Hybrid, Drebin, Malware detection

**AI-POWERED LANGUAGE TRANSLATION: INTEGRATING OCR, NLP,
AND DEEP LEARNING FOR ENHANCED ACCURACY**

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Abstract: Developing a more advanced, accurate and context-sensitive translation system is critical across various domains. This study presents an innovative language translation system that integrates multiple artificial intelligence-driven technologies to enhance accuracy, adaptability, and efficiency. The approach leverages Generative AI (Gen AI) in conjunction with Optical Character Recognition (OCR), Natural Language Processing (NLP), and Deep Learning techniques to deliver high-quality translations while preserving contextual integrity. The system begins by utilizing OCR technology to extract textual content from diverse input sources, including scanned documents, images, and handwritten text. This enables the conversion of unstructured textual data into a machine-readable format, forming the foundation for further processing. To ensure precise translation, the system employs Natural Language Processing (NLP), which interprets linguistic nuances, idiomatic expressions, and contextual variations. This allows for a more natural and meaningful translation compared to traditional machine translation methods. Furthermore, the integration of CycleGAN, a deep learning model, significantly enhances both text extraction and translation quality. CycleGAN facilitates context-aware translation by reducing distortions, eliminating translation errors, and adapting to variations in linguistic structures. This deep learning-powered approach addresses a major limitation of conventional machine translation systems, which often struggle with literal translations and loss of contextual meaning. By overcoming these challenges, this research study contributes to the development of a more accurate, adaptable, and scalable translation solution. The system is designed for real-time applications across diverse industries, including education, healthcare, and e-commerce, enabling seamless communication across languages and breaking down linguistic barriers in global interactions.

Keywords: Gen AI, NLP, OCR, CycleGAN, Artificial Intelligence, Deep learning

**EXPLORING THE IMPACT OF SOCIAL MEDIA ON ACADEMIC
PERFORMANCE-INSIGHTS FROM A SURVEY-BASED ANALYSIS**

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Abstract: This study examines the influence of social media on students' academic performance, with a focus on how students' economic and social backgrounds may shape this impact. Through a survey, the research gathers data on students' social media usage patterns and their perceptions of its effect on their studies. The findings suggest that many students believe social media positively impacts their academic outcomes, though it also serves as a potential source of distraction. A significant number of students report multitasking between studying and social media. The research underscores that social media can be a powerful tool for learning, but its benefits depend on how it is utilized. The study emphasizes the role of critical thinking in assessing the credibility of information encountered on social media platforms. Using statistical methods such as regression and correlation analysis, the study explores the relationship between social media habits and academic performance. The results offer valuable insights into the nuanced role of social media in education, providing important implications for educators, students, and policymakers.

Keywords: Social media, academic performance, effectiveness, Critical thinking, distraction, regression analysis, correlation analysis, statistical modeling, predictive analytics.

ANTI-MAGIC LABELING ON ANTI FUZZY CYCLE AND COMB GRAPH

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Abstract: A fuzzy graph is a mathematical structure that incorporates the concept of uncertainty, or fuzziness, into traditional graphs. Classical graph theory depicts edges between nodes as binary relationships, showing the presence or absence of a connection between them. In contrast, fuzzy graphs can represent degrees of connection or membership, providing a more realistic and flexible framework for describing real-world systems with ambiguous or imprecise relationships. The idea of fuzzy graph labeling is to extend traditional graph labeling to handle vague information associated with vertices, edges, or both. Using this extension, relationships within a graph can be represented in a more nuanced manner, acknowledging that not all connections or characteristics are absolute. This paper aims to study the concepts of anti-magic labeling for anti-fuzzy graphs. Also, we determine the edge anti-magic (EAM) and vertex anti-magic (VAM) for some classes of anti-fuzzy graphs and derive the properties for the same.

Keywords: fuzzy graph, anti-fuzzy graph, anti-fuzzy graph labeling, anti-magic graph

**AN REVIEW ON SLEEPING ABNORMALITIES DETECTION USING
CLASSIFIERS**

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Abstract: It is crucial to preserve appropriate levels of both mental and physical stability for overall health and wellbeing. Even with substantial scientific investment, the public continues to face difficulties related to poor sleep quality. Poor sleep quality now affects individuals of all ages. Insufficient sleep can lead to a wide range of neurological conditions. Sleep disorders are common in all population segments, regardless of gender. This public health concern has a substantial influence on both mental and physical quality of life. Narcolepsy, hypersomnia, insomnia, parasomnias, breathing issues during sleep, and abnormal circadian rhythms are a few common examples of disorders associated to sleep. When early symptom analysis is done correctly, some of these diseases can be treated; in these cases, receiving enough excellent quality sleep is essential to the patient's recovery. Artificial intelligence is being used in sleep medicine for a variety of purposes, such as population health, diagnosis and treatment of sleep disorders, and scoring of respiratory and sleep events in sleep labs. Even though artificial intelligence (AI) is still in its infancy, a variety of barriers keep it from becoming widely used in medicine. Intelligent technology has the potential to revolutionise healthcare by improving patient care, improving diagnostic capacities, and facilitating the management of sleep disorders. Existing deep learning and machine learning algorithms need to be standardised and controlled before they can be utilised in sleep clinics. The main objective of this work is to assess how well specific features perform when paired with ensemble learning to address classification problems in the multi-class sleep period. The main objective of this work is to assess how well specific features perform when paired with ensemble learning to address classification problems in the multi-class sleep period.

KEYWORDS: Artificial intelligence, Insomnia, Machine learning, deep learning, Sleeping stage.

ODIGAN

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Abstract: Odigan is a mobile application designed to help visually impaired individuals identify objects around them through the use of QR code technology and text-to-speech (T-T-S) systems. The core concept of Odigan is simple: a QR code is placed on objects, and when scanned with a smartphone, the app uses T-T-S technology to audibly announce the object's name, helping blind individuals identify and interact with their environment independently. This solution aims to bridge the gap in accessibility, providing visually impaired users with the ability to navigate and recognize objects without needing external assistance. The app's interface is designed to be intuitive, with large buttons, voice prompts, and compatibility with screen readers, ensuring ease of use even for those with limited technical experience. The QR codes are linked to a simple database where each object's name or description is stored, allowing users to update or add new information as needed. The T-T-S engine delivers clear and accurate audio feedback, supporting multiple languages for broader accessibility. Odigan's key benefit is its cost-effectiveness and scalability, as it only requires smartphones and QR codes—widely accessible technologies. The solution can be used in various settings, such as homes, workplaces, and public spaces, making it highly adaptable to different environments. The potential of Odigan lies in its simplicity and effectiveness, offering visually impaired individuals a tool to enhance their autonomy and confidence. By empowering users to identify objects independently, Odigan creates opportunities for increased inclusion and self-reliance, making everyday tasks more manageable and accessible.

Keywords: Odigan, visually impaired, text-to-speech, object identification, assistive technology, voice prompts, navigation aid.

**PARAMETER ESTIMATION IN FACTOR ANALYSIS MODELS USING
BAYESIAN METHODS WITH DIFFERENT PRIORS**

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Abstract: To investigate and demonstrate the application of Bayesian estimation techniques in factor analysis models, focusing on the estimation of factor loadings, latent factor scores, and residual variances using robust priors. Purpose: To provide a comparative analysis of the effectiveness of different priors, Normal, Cauchy-Log Normal, and Multivariate Normal-Inverse Wishart in Bayesian estimation. To emphasize the role of Bayesian methods in addressing challenges such as small sample sizes, heavy-tailed distributions, and complex data structures, especially in health-related research. To establish Bayesian methods as a flexible alternative to classical approaches like Maximum Likelihood Estimation (MLE). Develop a factor analysis model with observed variables (X), factor loadings (L), latent factor scores (f), and residuals (E). Employ Bayesian estimation techniques using Markov Chain Monte Carlo (MCMC) methods, specifically Gibbs Sampling, to derive posterior distributions of the parameters. Incorporate three types of priors: Normal Priors applied for simplicity and interpretability in factor loadings and scores. Cauchy-Log Normal Priors used to handle datasets with outliers and heavy-tailed distributions. Multivariate Normal-Inverse Wishart Priors utilized for capturing covariance structures. Perform simulations with 50,000 iterations of Gibbs Sampling and apply diagnostic checks (e.g., Gelman-Rubin) to ensure convergence. Use Metropolis-Hastings within Gibbs Sampling for non-conjugate priors like Cauchy and Log-Normal. Conclusion: This study successfully demonstrates the flexibility and robustness of Bayesian estimation techniques in deriving critical parameters of factor analysis models. The results indicate the choice of priors significantly affects the posterior distributions and model behavior. Ensures computational efficiency while providing a comprehensive exploration of posterior distributions. Bayesian methods are highly adaptable for health-related datasets and complex applications, outperforming traditional methods like MLE in terms of flexibility and model fit.

Keywords: Cauchy and Log-Normal, Diagnostic checks, Factor analysis models, Markov Chain Monte Carlo (MCMC) methods, Metropolis-Hastings within Gibbs Sampling,

**EDUCATIONAL GAMIFICATION: ENHANCING ENGAGEMENT
AND OUTCOME STUDY IN SCHOOL STUDENTS**

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Abstract: Gamification, the application of game design elements in non-game contexts, has gained enormous attention in education. This study explores the effects of gamification on school students' engagement, motivation, and academic performance. By incorporating elements such as points, badges, leaderboards, and interactive challenges into the learning process, educators aim to enhance student participation and enhance a more stimulating learning environment. The research examines both the cognitive and behavioral effects of gamification, highlighting its potential to improve retention, problem-solving skills, and collaborative learning. The findings suggest that while gamification can significantly enhance student motivation and learning outcomes, its effectiveness depends on careful implementation and alignment with pedagogical goals. This study contributes to the growing body of research on technology-enhanced learning and provides insights for educators seeking to optimize classroom engagement through gamification strategies.

Keywords: gamification, motivation, and academic performance

PIXEL WHISPER: COVERT VIDEO ENCRYPTION

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Abstract: In the digital age, securing sensitive information during internet transmission is critical. This paper presents a novel approach that integrates RSA encryption with Least Significant Bit (LSB) steganography to enhance communication security. RSA encryption generates secure public-private key pairs, ensuring robust data protection through encryption and decryption mechanisms. Encrypted data including text, images, videos, and audio files is covertly embedded within specific frames of video files using LSB steganography. Users can select the frames for embedding, adding flexibility and complexity to unauthorized detection or tampering while preserving the video's visual quality. This work also compares RSA encryption with two prominent algorithms: Advanced Encryption Standard (AES) and SHA-256 to evaluate their performance. While AES is faster and ideal for bulk data encryption, it requires secure key sharing. SHA-256, on the other hand, is a hashing algorithm suited for integrity verification but lacks encryption capabilities. Experimental results demonstrate that RSA's asymmetric nature, robust security, and versatility make it the optimal choice for secure communication systems.

Keywords: RSA encryption, LSB steganography, internet security, cryptography, data confidentiality, video steganography, secure communication, cryptographic comparison, covert transmission, multimedia embedding

**FAMILY CONNECT APP: ENHANCING FAMILY SAFETY, COMMUNICATION, AND
ORGANIZATION THROUGH TECHNOLOGY**

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Abstract: The Family Connect App was designed to address the unique needs of modern families, particularly in terms of safety, communication, and daily organization. By leveraging advanced technologies, this app provides an innovative solution to enhance connectivity and ensure the well-being of all family members. The primary goal of the Family Connect App is to foster closer family connections while enhancing safety and providing practical tools to simplify family life. Developed for Android devices using Kotlin, the app integrates a user-friendly interface with larger icons and text, ensuring ease of use for diverse demographics, including older adults. Key technical components include Firebase for secure data storage and the Google Maps API for accurate, real-time location tracking. The app includes real-time location tracking, geofencing alerts and an SOS button, enabling quick and effective communication during emergencies. Users can engage in voice/video calls and send voice messages, fostering seamless communication among family members, irrespective of their location. A secure parent-child login mode provides control over children's access, while features like medication reminders help manage the health of elderly family members. The app includes shared family calendars, facilitating better organization by tracking appointments and tasks. Push notifications offer timely reminders to ensure that family members stay on top of their schedules. The Family Connect App empowers families to stay connected, organized, and safe. By offering a combination of practical tools and a focus on accessibility, it addresses a wide range of needs for families across different age groups. By providing a secure, user-friendly platform for communication, organization and safety, the Family Connect App represents an innovative solution that enhances the everyday lives of families. This app is a testament to the potential of technology to improve family dynamics in today's fast-paced world.

Keywords: Family safety, communication, app development, Android, elderly care, geofencing, real-time location tracking.

SALES AND INVENTORY MANAGEMENT SYSTEM (SIMS)

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Abstract: The Point of Sale (POS) Inventory System is an integrated solution designed to simplify and automate the processes of sales and inventory management for businesses of various sizes. It serves as both a sales tool and a backend management system, allowing users to track inventory, manage transactions, and monitor sales in real-time. The system is built using PHP for the front end, offering an intuitive, easy-to-navigate interface for employees or business owners to interact with the system. This makes it accessible even to users with limited technical expertise. The back end utilizes MySQL, a powerful relational database management system, to securely store and retrieve essential data such as product information, customer records, transaction histories, and more. With features that include managing product categories and sub-categories, businesses can organize and classify inventory items in a logical manner. The system also allows for detailed customer management, storing contact information and transaction histories, which can help with personalized customer service or loyalty programs. The invoicing functionality streamlines the process of generating sales receipts, reducing the time spent on manual data entry and minimizing human error. The system's automation features reduce the chances of mistakes in data entry, ensuring that inventory counts, sales figures, and customer data are consistently accurate. By automating routine tasks such as updating stock levels, generating reports, and tracking sales, the POS Inventory System improves overall operational efficiency, saving both time and labor. Additionally, this solution provides business owners with detailed, real-time reports, enabling them to make informed decisions about inventory management, purchasing, and pricing strategies. In the long run, this system not only improves the accuracy and speed of day-to-day operations but also contributes to better decision-making and business growth by offering a structured, reliable method for handling transactions and inventory.

Key Words: Inventory Management, Data Organization, Fast Information, User Friendly Interface, Error Reduction

ATTENDANCE MANAGEMENT SYSTEM WITH USE OF GEO LOCATION AND FACE RECOGNITION

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Abstract: The Attendance Management System with Geo location and Face Recognition is designed to automate and enhance the process of recording attendance in educational institutions, workplaces, or other organizations. This system integrates geo location tracking and facial recognition technology to ensure secure and accurate attendance marking while preventing proxy attendance. The front-end of the system is developed using HTML, CSS, and JavaScript, ensuring a user-friendly and interactive interface. The back-end is built with PHP and MySQL, handling authentication, attendance records, and user data securely. Users must be within a predefined location range (e.g., 100 meters from the institution) to mark attendance. The system captures their real-time location using GPS and validates their presence through Geo location Tracking. Once the location is verified, the system uses face recognition technology to authenticate the user before marking attendance. This ensures that only authorized individuals can register their presence through face recognition. Attendance data, including timestamps, location details, and facial recognition results, are securely stored in a MySQL database, making it easy for administrators to access reports and analytics. Administrators can monitor real-time attendance, generate reports, and manage user records efficiently through admin board. This system enhances security, reduces attendance fraud, and improves accuracy by combining geo location and biometric authentication. It is scalable and can be extended to various sectors, including schools, colleges, and corporate offices.

Keywords: Geo Location, Face Recognition, Tracking, biometric authentication

NO HELMET DETECTION WITH AUTOMATIC NUMBER PLATE RECOGNITION

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Abstract: Road accidents and fatalities resulting from failure to wear helmets while riding motorcycles are prevailing issues in many countries. This project aims at designing a comprehensive system that will automatically detect helmet violation and recognize vehicles in use through an Automated Number Plate Recognition technology. It integrates the advanced computer vision techniques along with the deep learning models for the detection of helmet usage and recognizing the license plates from live video feeds or images. The system uses algorithms like YOLO or Faster R-CNN to detect or not detect a helmet on riders. At the same time, it uses techniques like Optical Character Recognition (OCR) for extracting vehicle details. This approach ensures that law enforcement agencies can observe traffic violations in real-time. It is more scalable and efficient for improving road safety and bringing people into better compliance with the traffic rules and regulations. The proposed system is robust, cost-effective, and can be integrated into existing traffic surveillance infrastructures for seamless operation.

Keywords—component, formatting, style, styling, insert .

BIJECTIVE FUZZY PLANAR AND NON-PLANAR GRAPH IN SMART CITY TRAFFIC NETWORK

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Abstract: In this paper a new concept of bijective fuzzy planar and non-planar graph is introduced. Considerable and effective edges of bijective fuzzy planar and non-planar graphs have been identified. Fuzzy planarity values have been calculated. Based on this value Smart city traffic network system is analyzed. The concept of Bijective function for vertices and edges help in prioritizing traffic flow.

Keywords: bijective fuzzy planar, non-planar graphs, effective edges

**TOWARDS PRECISE GRAPE LEAF DISEASE DETECTION: A HYBRID
OPTIMIZATION STRATEGY USING SPARROW SEARCH AND SLIME
MOULD ALGORITHMS**

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Abstract: Grapes, being a vital agricultural commodity, are susceptible to various diseases that significantly impact yield and quality. Despite the availability of diverse methodologies for grape leaf disease identification, there remains ample room for improvement in achieving accurate results. This study, guided by insights from extensive literature review and in consultation with a research supervisor, outlines a comprehensive set of objectives aimed at enhancing disease detection accuracy. Firstly, we explore the spectrum of diseases reported in grape leaves, facilitating a deeper understanding of the challenges involved. Subsequently, an analysis of existing research endeavors is conducted to identify gaps in current methodologies. Additionally, we delve into available datasets and technological tools to evaluate their suitability for implementation. A pivotal aspect of this research involves synthesizing the findings into a comprehensive literature review and the publication of a pioneering research paper focusing on gap analysis. Further, we scrutinize various feature extraction

techniques pertinent to image processing to lay the groundwork for subsequent model development. Leveraging a hybrid machine learning approach, incorporating Sparrow Search Algorithm (SSA) and Slime Mould Algorithm (SMA), we aim to construct a robust model aimed at refining detection accuracy. The ultimate goal is to augment the efficacy of disease detection in grape leaves, thereby contributing to sustainable agricultural practices and ensuring enhanced yield and quality.

Keywords—Hybrid Machine learning Model, SSA, SMA, Detection accuracy, practices-yield-quality, Grape leaf diseases.

CYBERSECURITY CHALLENGES AND SOLUTIONS IN IOT SMART HOME DEVICES

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Abstract: As the adoption of Internet of Things (IoT) devices continues to grow, particularly within smart homes, cybersecurity has become a critical concern. This paper explores the evolving role of cybersecurity in safeguarding smart home devices and IoT ecosystems. We analyze key cyber attacks from the past decade that targeted IoT and smart home networks, examining the impact on users and industries, and extracting lessons learned from several real-world case studies. These cases demonstrate the vulnerabilities of IoT systems and the strategies used to defend against and mitigate such risks. The discussion highlights the importance of a multi-layered security approach, encompassing secure device design, network defenses, and user education. Furthermore, we explore the challenges posed by the interconnected nature of smart home systems, which often involve multiple devices and platforms. In conclusion, this paper stresses that robust cybersecurity frameworks are essential to ensuring the security and privacy of users, as well as maintaining trust in the future of IoT-enabled smart homes. We also examine the primary drivers of cyber threats in IoT ecosystems, such as insecure device configurations, weak authentication, and the expansion of connected devices. This paper advocates for a holistic security approach that combines secure hardware, strong encryption, continuous monitoring, and proactive software updates to protect against emerging threats. The need for cybersecurity awareness at the consumer level is also emphasized, as the human element remains a significant risk factor in the security landscape. As IoT smart home devices become an integral part of everyday life, the vulnerabilities in these devices present new challenges. Cyber threats, including malware, device hijacking, data breaches, and privacy violations, pose significant risks to users. In response, technologies like blockchain, AI-driven security measures, and advanced encryption are gaining traction as part of the defense strategy. This paper discusses these technological advancements, alongside common cybersecurity practices, to ensure that smart home systems remain secure and trustworthy.

Keywords: cybersecurity, IoT, smart home devices, cyber threats, privacy protection, secure design, encryption, blockchain

**FROM DUMMIES TO DIGITAL: REVOLUTIONIZING MEDICAL
TRAINING WITH VIRTUAL TWINS**

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Abstract: The educational method of traditional medical training depends highly upon the use of physical mannequins which replicate human physiology and diagnostic cases. The training benefits from these models exist but they present major obstacles including the expense combined with restricted availability and fixed non-machine learning simulation capabilities that do not display live biological response changes. Digital twins have emerged into practice through the need for training solutions which offer scalable benefits alongside lower costs alongside interactive features. The integration of digital twin technology into healthcare training presents itself as a modern practical approach instead of using conventional mannequins for education. Student interaction with realistic clinical scenarios spanning multiple medical problems becomes possible in digital twin systems because they operate through ongoing real-time data updates. Through remote access surgeon trainees can overcome distance limitations as well as financial restrictions to obtain their medical education. The initial investment in Artificial Intelligence, Virtual Reality, and Augmented Reality may seem high, but digital twins offer huge long-term benefits. They need less maintenance, can be easily updated, and provide more diverse training options without constant replacements. Plus, they boost engagement and retention by offering immersive, real-time learning experiences. This paper concludes how digital twins could complement, not replace, traditional medical training methods.

Keywords: Digital twins, Artificial Intelligence, Virtual Reality, and Augmented Reality

**BEYOND THE CALL: A WEARABLE-BASED AUTOMATED SYSTEM FOR
EMERGENCY MEDICAL RESPONSE**

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Abstract: Emergency healthcare needs call for advanced patient monitoring technology and optimal ambulance dispatch systems because healthcare demand continues to rise. This study presents a hospital-integrated emergency response method that enables patient medical information registration through websites or applications at the closest three to four healthcare institutions near them. Patients get personalized medical devices, which function as continuous vital sign checkers. An alert system, along with a buzzer notification automatically activates when a patient's pulse rate reaches below the determined threshold and sends this alert to all the registered hospitals. A hospital accepting the emergency alert stops other facilities from dispatching multiple ambulances, thus generating operational efficiency. The developed system requires wearables, enabled by IoT technology, that integrates hospital data into the cloud while implementing GPS tracking of ambulances in real-time mode. The research analyses current emergency response weaknesses that stem from delayed human interventions, and absence of continuous patient status assessment, and suboptimal ambulance distribution. This research presents findings that showcase time-saving achievements through an advanced emergency healthcare resource management system. This work maintains significance for medical research because it strengthens patient outcomes together with shortening ambulance response times and enhancing hospital operational efficiency. The future development of this platform features AI prediction of patient conditions, connected to blockchain security for medical records, and smart home devices that function as emergency alert systems.

Keywords: buzzer notification, suboptimal ambulance distribution and blockchain security

**STUDY OF SORET AND DUFOUR EFFECT ON UNSTEADY MHD FREE
CONVECTIVE FLOW IN A VERTICAL POROUS MEDIUM IN THE
PRESENCE OF CHEMICAL REACTION AND HEAT**

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ABSTRACT This study investigates the Soret and Dufour effect within an unsteady MHD-free convective flow in a vertical porous medium, considering additional influences such as thermal radiation, heat source, and chemical reaction. Numerical simulations are used to analyse the impacts of the Soret and Dufour effect, thermal radiation, heat source, and chemical reaction on the flow dynamics. BY Applying non-dimensional quantities, the governing equations are converted into a set of numerical equations. A numerical solver, second order differential equation method, is applied to solve the resulting system of equations with appropriate boundary conditions, considering slip conditions. Various parameters like Grash of numbers for mass and heat transfer, as well as the Schmidt number, are explored to examine the velocity, temperature, and concentration profiles. The numerical results are presented graphically.

Keywords: Dufour effect, MHD (Magnetohydrodynamics), Free convective flow, Vertical porous medium, Thermal radiation, Finite Difference Method.

RELIABILITY OF CONSECUTIVE K-OUT-OF-N: F SYSTEMS: A REVIEW

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ABSTRACT: This study investigates the Soret and Dufour effect within an unsteady MHD-free convective flow in a vertical porous medium, considering additional influences such as thermal radiation, heat source, and chemical reaction. Numerical simulations are used to analyse the impacts of the Soret and Dufour effect, thermal radiation, heat source, and chemical reaction on the flow dynamics. BY Applying non-dimensional quantities, the governing equations are converted into a set of numerical equations. A numerical solver, second order differential equation method, is applied to solve the resulting system of equations with appropriate boundary conditions, considering slip conditions. Various parameters like Grash of numbers for mass and heat transfer, as well as the Schmidt number, are explored to examine the velocity, temperature, and concentration profiles. The numerical results are presented graphically.

Keywords: Consecutive k-out-of-n: F system, Steady state availability, system reliability, reliability theory

SOLVABILITY AND CONTROLLABILITY OF FRACTIONAL DIFFERENTIAL SYSTEMS

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ABSTRACT : This study investigates the Soret and Dufour effect within an unsteady MHD-free convective flow in a vertical porous medium, considering additional influences such as thermal radiation, heat source, and chemical reaction. Numerical simulations are used to analyse the impacts of the Soret and Dufour effect, thermal radiation, heat source, and chemical reaction on the flow dynamics. By applying non-dimensional quantities, the governing equations are converted into a set of numerical equations. A numerical solver, second order differential equation method, is applied to solve the resulting system of equations with appropriate boundary conditions, considering slip conditions. Various parameters like Grashof numbers for mass and heat transfer, as well as the Schmidt number, are explored to examine the velocity, temperature, and concentration profiles. The numerical results are presented graphically.

Keywords: Dufour effect, MHD (Magnetohydrodynamics), Free convective flow, Vertical porous medium, Thermal radiation, Finite Difference Method.

**IMPROVING THE ACCURACY OF START-UP SUCCESS PREDICTION
USING DECISION TREE ALGORITHM IN COMPARISON WITH LASSO
REGRESSION**

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ABSTRACT: To Evaluate the Decision Tree and Lasso Regression Algorithms Effectiveness in forecasting Startup Success and to identify which performs better in this regard. Decision Tree Algorithm (N=10) and Lasso Regression (N=10) are applied to the datasets of startup success prediction which includes a total of 1500 analysis composed of 1090 rows and 18 columns for enhancing the accuracy in predicting the startup success. The sample size of 10 in each group is estimated using ClinCalc with the G power of 0.8 and the alpha $\alpha=0.05$. Depending on the accuracy, the prediction of startup success is evaluated. Results: Lasso Regression (80.57%) is more accurate in predicting the startup success than Decision Tree Algorithm (74.92%). This indicates that there is a statistically significant difference between the two algorithms with $p=0.038$ (Independent sample t-test $p<0.05$). Conclusion: The mean accuracy of Lasso Regression is significantly better when compared to Decision Tree Algorithm.

KEYWORDS: Startup Success, Decision Tree, Lasso Regression, Data Processing, Accuracy, Mean, Standard Deviation.

**PREDICTING THE BEST COLLEGE PLACEMENT STRATEGIES
UTILIZING LOGISTIC REGRESSION AS OPPOSED TO SVM FOR
INCREASED ACCURACY**

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ABSTRACT: This study investigates the Soret and Dufour effect within an unsteady MHD-free convective flow in a vertical porous medium, considering additional influences such as thermal radiation, heat source, and chemical reaction. Numerical simulations are used to analyse the impacts of the Soret and Dufour effect, thermal radiation, heat source, and chemical reaction on the flow dynamics. BY Applying non-dimensional quantities, the governing equations are converted into a set of numerical equations. A numerical solver, second order differential equation method, is applied to solve the resulting system of equations with appropriate boundary conditions, considering slip conditions. Various parameters like Grash of numbers for mass and heat transfer, as well as the Schmidt number, are explored to examine the velocity, temperature, and concentration profiles. The numerical results are presented graphically.

Keywords: Dufour effect, MHD (Magnetohydrodynamics), Free convective flow, Vertical porous medium, Thermal radiation, Finite Difference Method.

G20 POLITICS AND CURRENT AFFAIRS

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ABSTRACT: This study investigates the Soret and Dufour effect within an unsteady MHD-free convective flow in a vertical porous medium, considering additional influences such as thermal radiation, heat source, and chemical reaction. Numerical simulations are used to analyse the impacts of the Soret and Dufour effect, thermal radiation, heat source, and chemical reaction on the flow dynamics. BY Applying non-dimensional quantities, the governing equations are converted into a set of numerical equations. A numerical solver, second order differential equation method, is applied to solve the resulting system of equations with appropriate boundary conditions, considering slip conditions. Various parameters like Grash of numbers for mass and heat transfer, as well as the Schmidt number, are explored to examine the velocity, temperature, and concentration profiles. The numerical results are presented graphically.

Keywords: Dufour effect, MHD (Magnetohydrodynamics), Free convective flow, Vertical porous medium, Thermal radiation, Finite Difference Method.

**APPLIED PROBABILITY IN THE FIELD OF LANGUAGE
TRANSLATION USING AI**

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ABSTRACT : The modern mathematical theory of probability has its roots in attempts to analyze games of chance by Gerolamo Cardano in the sixteenth century, and by Pierre de Fermat and Blaise Pascal in the seventeenth century. Christiaan Huygens published a book on the subject in 1657. Probability theory treats the concept in a rigorous mathematical manner by expressing it through a set of axioms. On combining two happening topics that is, Applied probability which is the application of probability theory to statistical problems and other scientific and engineering domains. Artificial intelligence (AI) is a set of technologies that enable computers to perform a variety of advanced functions, including the ability to see, understand and translate spoken and written language, analyze data, make recommendations, and more. AI is the backbone of innovation in modern computing, unlocking value for individuals and businesses. In Artificial Intelligence and Cognitive Science, probabilistic approaches are critical for generating, reasoning, and making decisions. Use of statistical models to translate text from one language to another can improve the accuracy of AI models. Large bilingual text corpora can be used to build probabilistic models that determine the likelihood of a sentence in the target language given a sentence in the source language. This approach will mark a significant shift in natural language processing (NLP). Use of probability can enhance the Efficiency: much faster, extensive translation needs. Scalability: can handle high-volume translation tasks, enabling global communication, Quality: become more reliable, approaching the quality of human translators. This statistical approach improves translation accuracy, reduces errors, and enhances fluency, addressing common issues in automated translation processes like word ambiguity and syntax inconsistencies.

Keywords: Cognitive Science, Probability theory, high-volume translation tasks and human translators

AN ANALYTICAL STUDY OF THE INDIAN STOCK EXCHANGE

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ABSTRACT: To Evaluate the Decision Tree and Lasso Regression Algorithms Effectiveness in forecasting Start up Success and to identify which performs better in this regard. **Materials And Methods:** Decision Tree Algorithm (N=10) and Lasso Regression (N=10) are applied to the datasets of startup success prediction which includes a total of 1500 analysis composed of 1090 rows and 18 columns for enhancing the accuracy in predicting the startup success. The sample size of 10 in each group is estimated using ClinCalc with the G power of 0.8 and the alpha α =0.05. Depending on the accuracy, the prediction of startup success is evaluated. Results: Lasso Regression (80.57%) is more accurate in predicting the startup success than Decision Tree Algorithm (74.92%). This indicates that there is a statistically significant difference between the two algorithms with $p=0.038$ (Independent sample t-test $p<0.05$). **Conclusion:** The mean accuracy of Lasso Regression is significantly better when compared to Decision Tree Algorithm.

Keywords: Startup Success, Decision Tree, Lasso Regression, Data Processing, Accuracy, Mean, Standard Deviation.

GREEN COMPUTING AND SUSTAINABLE TECHNOLOGIES

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Abstract: The exponential growth of digital infrastructure has brought about unprecedented environmental challenges, including escalating energy consumption, resource depletion, and the generation of electronic waste (e-waste). In response, sustainable technology and green computing have emerged as critical fields aimed at mitigating these environmental impacts. Green computing focuses on energy-efficient hardware, eco-friendly design, cloud computing, and virtualization to reduce resource consumption and e-waste. Sustainable technologies, on the other hand, encompass advancements in renewable energy systems and the circular economy, striving to balance environmental preservation with economic growth. This paper delves into the integration of these fields, examining their benefits, including reduced carbon footprints, cost savings, and regulatory compliance. Furthermore, it explores the challenges and future directions for achieving a sustainable digital future.

Keywords: Sustainable Technology; Green Computing; Digital Infrastructure; Energy-Efficient Hardware; Eco-Friendly Design; Cloud Computing; Virtualization; Circular Economy; Renewable Energy Systems; Resource Consumption; Increased E-Waste.

**IMPROVING THE ACCURACY OF PREDICTING ENGLISH EDUCATION
USING NAIVE BAYES ALGORITHM IN COMPARISON WITH
K-NEAREST NEIGHBOURS ALGORITHM**

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Abstract : Improving the Accuracy of Predicting English Education using Naive Bayes Algorithm in comparison with K-Nearest Neighbours Algorithm. Naive Bayes Algorithm (N=10) and K-Nearest Neighbours Algorithm (KNN)(N=10) are applied to the datasets of English Education and comparing the datasets with each of the Algorithm which is consist of 1105 samples from the dataset for improving the accuracy of predicting the English education. A significance level () of 0.05 and a G-power value of 0.6 are employed to get the statistical analysis. The sample size of 10 in each group is estimated using CLINCALC. The primary need is to find which Algorithm is best in Naive Bayes and K-Nearest Neighbours Algorithm. The Analysis provides the Accuracies of both the algorithms. The K-Nearest neighbours algorithm has the highest accuracy of 88.7070 and the Naive Bayes algorithm has 80.9790. There is a significant difference between the two accuracies of KNN and Naïve Bayes algorithm in Machine Learning. By this we found that the K-Nearest Neighbours algorithm has the highest accuracy for predicting English Education. The result shows that the K-nearest Neighbours algorithm has the highest accuracy than the Naive Bayes algorithm by the improvement in accuracy percentage. Thus, we can say that the k-Nearest Neighbours algorithm predicts the accuracy successfully.

Keywords: English Education, Naive Bayes, K-Nearest Neighbours (KNN), Accuracy, Machine Learning, Analysis.

ANALYSIS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR FUTURE GENERATIONS AND ITS BENEFITS

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Abstract : The study aims to explore the applications of AIML (Artificial Intelligence Machine Learning) in future generations, emphasizing its role in conversational AI systems. It focuses on understanding AIML's benefits, limitations, and its potential for integration with emerging AI technologies to provide scalable, efficient, and privacy-focused solutions. **Materials :** AIML frameworks such as Program-O, Pandorabots, or Rivescript. Chatbot development environments. Case studies of AIML applications in domains like education, healthcare, and IoT. **Methods:** Literature Review: Analyzing existing research on AIML and its role in chatbot development. Prototyping: Developing AIML-based conversational systems to test their functionality and adaptability in specific domains. Integration Testing: Combining AIML with machine learning models to evaluate hybrid system performance. Comparative Analysis: Comparing AIML with modern NLP models (e.g., GPT or BERT) in terms of efficiency, cost, and scalability. **Results:** AIML demonstrates excellent performance in structured and rule-based conversational scenarios. It integrates well with IoT and edge computing, providing lightweight and offline-capable solutions for future devices. AIML - based hybrid systems effectively combine rule-based and AI-powered capabilities to handle diverse conversational contexts. The simplicity and adaptability of AIML make it ideal for prototyping and domain-specific applications like healthcare, education, and customer support. However, AIML's static nature limits its ability to adapt to evolving conversations without external integrations.

Keywords: AIML, chatbots, Future generations, Conversational AI, Pattern Matching, Rule-Based systems, Hybrid AI systems, IoT integration, Natural language processing (NLP), Lightweight AI solutions.

**ENHANCING PLACEMENT PREDICTION FOR EMPOWERING STUDENT
SUCCESS WITH SUPPORT VECTOR MACHINE THROUGH ADVANCED
ANALYTICS AND PREDICTIVE MODELLING WITH K-NEAREST
NEIGHBOUR (KNN).**

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Abstract: Enhancing placement prediction for empowering student success with support vector machine through advanced analytics and predictive modelling with K- Nearest Neighbour (knn). Materials and Methods: The study utilized the Kaggle dataset as its primary source of data, delineating two distinct group, Group I and Group 2, each comprising 20 samples, were utilised in this study. Group I employed the support vector machine, while Group 2 utilised the k-nearest neighbour. The total sample size for the study was 1294. Sample size calculations for statistical analysis, as well as the subsequent performance comparison were conducted and implementation was done using Clin cal. The statistical analysis was carried out using clincalc.com with a statistical power (G-power) set at 0.95%, alpha (α) at 0.05, beta (β) at 0.05. The analysis primarily focused on comparing the performance of the support vector machine, and Algorithm using accuracy value as the key evaluation metric. Result: In terms of accuracy, support vector machine, (55%) outperforms k-nearest neighbour (45%), with a two-tailed, $p > 0.05$ significance value of < 0.001 . Conclusion: In summary, the accuracy of support vector machine, outperforms k-nearest neighbour accuracy.

Keywords: support vector machine, k-nearest neighbour, Placement Prediction, Student Success, Educational Empowerment, Career Placement.

**ELEVATING AIR QUALITY INDEX PREDICTIONS THROUGH LOGISTIC
REGRESSION COMPARED WITH RANDOM-FOREST FOR ENHANCED ACCURACY**

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ABSTRACT: This research article's primary goal is to increase the accuracy of air quality index prediction using logistic regression as opposed to random forest. **Materials and Methods:** This study compares a random forest algorithm with a sample mean size of 10 sets (i.e., ten sets overall) and a logistic regression with as ample size of five sets in order to improve the accuracy of the analysis. This study's mean accuracy was calculated using an alpha value of 0.8, a G-Power value of 0.8, and a confidence interval of 95% using the ClinCalc software appliance under supervised learning. **Results:** The results of this study demonstrate that the logistic regression approach has an accuracy of 72.47% and the random forest method has an accuracy of 49.96%. Statistical significance was shown by the significance value of $p=0.000$ ($p<0.05$) after conducting an independent sample T-Test analysis. **Conclusion:** The random forest algorithm and the logistic regression technique are combined in the current study. The current study experiment has shown that the logistic regression algorithm performs more perfectly than the random forest strategy.

Keywords: Air Quality Index (AQI), Predictions, Logistic Regression, Random Forest, Accuracy Enhancement, Comparative Analysis, Pollution Prediction.

A STUDY ON AI IN BLOG/CONTENT MANAGEMENT

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ABSTRACT: In today's competitive digital ecosystem, blogging plays a crucial role in content marketing strategies, fostering brand awareness, customer engagement, and SEO performance. Effective blog and content management requires a strategic approach that includes content planning, search engine optimization (SEO), audience engagement, and performance tracking. This paper explores the significance of blog management, delves into various content management strategies, highlights essential tools for content creation and scheduling, and emphasizes the need for continuous adaptation in response to technological advancements such as artificial intelligence, multimedia content, and evolving user behaviors. Furthermore, the research examines the integration of automation tools, content personalization techniques, and the impact of social media on blog traffic and audience retention. By evaluating both traditional and modern practices, the study identifies emerging trends such as voice search optimization, visual storytelling, and the increasing importance of long-form content in building authority and trust. The paper also addresses the challenges that content creators face in maintaining consistency and relevance while adapting to algorithm changes and audience expectations. It emphasizes the need for real-time data analytics to better understand user engagement and behavior patterns, ensuring content strategies are continually refined. Moreover, it considers the growing importance of mobile-first strategies and the role of interactive content such as quizzes, polls, and videos in boosting audience participation. Additionally, the paper highlights how influencers and partnerships can amplify blog reach and credibility. The influence of voice search and AI-driven content recommendations further requires businesses to refine their SEO techniques and optimize for new search paradigms. By providing insights into these key areas, this research aims to offer businesses, marketers, and content creators actionable strategies to enhance their blog management practices, improve SEO outcomes, and drive sustainable growth in a rapidly evolving digital landscape. The study underscores the necessity of maintaining a flexible, adaptable approach to content creation, enabling businesses to stay ahead of competitors and continually meet the expectations of an increasingly dynamic digital audience.

Keywords: optimization; performance tracking; artificial intelligence.