NAAC A+

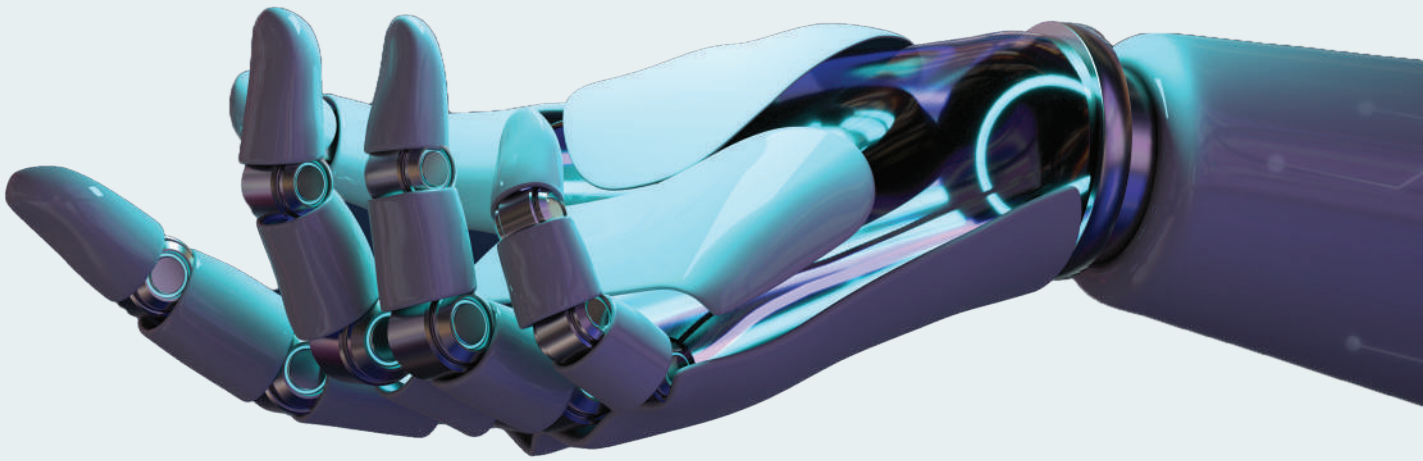
Marwadi University
Marwadi Chandarana Group

ASCIS 2025

4TH INTERNATIONAL CONFERENCE ON

Advancements in Smart Computing & Information Security

Conference Proceedings



EDITED BY
TEAM, FoCA

Hosted by the Faculty of Computer Applications (FCA) at Marwadi University, the 4th International Conference on Advancements in Smart Computing & Information Security (ASCIS) provides a platform for disseminating cutting-edge research and fostering collaboration between academia and industry. The conference will take place from September 11–13, 2025, bringing together leading researchers, academicians, and industry experts from around the globe. Our organizing committee comprises eminent professionals, including individuals recognized in the top 2% of global scientific researchers on the Stanford list, as well as experts from top-ranked institutions such as the IITs and NITs. A robust program committee, advisory board, and focused outreach initiatives will ensure high-quality research submissions are received and reviewed. The conference will feature presentations of selected research papers from scholars, researchers, and professionals, along with a dedicated Ph.D. Forum for young researchers to showcase their progress. Further information is available on the official website: https://ascisconf.org.

CONFERENCE TRACKS

Artificial Intelligence (AI) & Machine Learning (MI)

Smart Computing

Cyber Security

WORKSHOP TRACKS

Core AI / ML Technologies

Cross-Disciplinary Applications

EVENT SPONSORED BY

Dst
Department of Science and Technology
Government of Gujarat

GUJARAT COUNCIL ON SCIENCE AND TECHNOLOGY
GOVERNMENT OF GUJARAT

D-Link®
Building Networks for People

K7 INTERNATIONAL

Samatrix.io

ASCIS 2025

Marwadi University, Rajkot

4th International Conference on

Advancements in Smart Computing & Information Security

Conference Proceedings

Marwadi University
Marwadi Chandarana Group

NAAC A+

Title	Proceedings of 4th International Conference on Advancements in Smart Computing and Information Security
Authors' Name(s)	Dr. R. Sridaran
Published By	Self-Published
Publisher's Name and Address	Marwadi University, Rajkot – 360003.
Printer's Details	TRANSCAN, Rajkot.
Edition Details	4th Edition
ISBN	978-81-959510-3-1

Message from Provost

Prof. (Dr.) R.B. Jadeja
(Provost, Marwadi University)

It gives me great pleasure to extend my heartfelt greetings to all the participants, researchers, academicians, and industry experts attending the International Conference on Advancements in Smart Computing and Information Security (ASCIS 2025) from 11th – 13th September at Marwadi University, hosted by the Faculty of Computer Application.

ASCIS has become a distinguished platform for knowledge sharing, fostering innovation and building collaborations across diverse disciplines in computing, information science and intelligent systems. The 2025 edition carries forward this legacy, bringing together bright minds from academia, research and industry to deliberate on the latest trends, challenges and opportunities shaping the future of technology.

Hosting the ASCIS 2025 Conference is a testimony of our vision of advancing impactful research and strengthening global academic and industry connections. I congratulate the organizing committee, advisory board, reviewers and all contributors who have worked hard for this conference. I also extend my best wishes to the participants and authors whose scholarly contributions enrich these proceedings.

Message from Pro Vice-Chancellor

Prof. (Dr.) Sanjeet Singh
(Pro Vice-Chancellor, Marwadi University)

Dear Research Collaborators,

I am delighted to extend my heartfelt congratulations to the Faculty of Computer Applications for the successful organization of the 4th International Conference on Advancements in Smart Computing and Information Security (ASCIS - 2025). It is truly commendable to see this prestigious event being held for the fourth consecutive year, showcasing the unwavering commitment and dedication of our faculty to advancing knowledge in this vital field. This conference continues to serve as a distinguished platform for researchers, academics, and industry professionals to exchange knowledge, discuss innovations, and explore emerging trends in the rapidly evolving domains of AI & ML, smart computing, and information security.

As technology advances at an unprecedented pace, the significance of smart computing and information security has become even more critical. This year's conference brings together global experts to share their insights, present pioneering research, and foster collaborations that will shape the future of these fields. The discussions and outcomes from ASCIS - 2025 at Marwadi University will contribute meaningfully to addressing the pressing challenges of data protection, cybersecurity, and intelligent systems in our increasingly interconnected world.

Marwadi University remains deeply supportive of all research endeavours, recognizing that conferences like ASCIS are vital platforms for the dissemination of knowledge to society. They also provide invaluable opportunities for networking and collaboration among researchers, practitioners, and industry leaders.

I am confident that the collaborations formed during this event will open new avenues for impactful research in the future. These partnerships hold the potential to inspire innovative ideas and drive remarkable advancements across our fields. I look forward to witnessing the transformative contributions that will emerge from these collaborations in the years ahead.

Message from Executive Registrar

Shri Naresh Jadeja
(Executive Registrar, Marwadi University)

In our continued pursuit of nurturing a vibrant research ecosystem, Marwadi University remains committed in creating platforms that inspire knowledge sharing, innovation, and collaboration. Conferences such as ASCIS play a pivotal role in bringing together researchers, academicians, and industry professionals to exchange ideas and explore solutions to contemporary challenges.

I am confident that ASCIS 2025 will once again serve as an enriching forum to present cutting-edge research, foster meaningful discussions, and build lasting partnerships.

Message from General Chair

Prof. (Dr.) R. Sridaran
(Dean, Faculty of Computer Applications, Marwadi University)

It is with great pleasure that I welcome you all to the **4th International Conference on Advancements in Smart Computing & Information Security (ASCIS-2025).**

I am immensely grateful to the academic community for their overwhelming response and high-quality research contributions. Each paper published in this conference opens up new avenues for further exploration, and I am confident that this compilation of research will be an invaluable resource for the academic world.

This year, we are excited to introduce a new workshop series, **AI & ML Frontiers Cross-Disciplinary Applications and Case Studies,** with selected papers to be published in dedicated Publish in the globally recognized Springer CCIS series in Open Access mode. This new initiative is designed to provide even more opportunities for scholarly contribution and dissemination.

I would also like to extend my sincere thanks to **Springer CCIS** for their continued partnership, as well as to our generous sponsors, particularly the **GUJCOST** and **DST**, for their unwavering support. A special thanks to our distinguished keynote speakers whose insightful talks are sure to spark innovative research ideas for the next generation of scholars.

Finally, my heartfelt gratitude goes to our university management and the various committee members for their dedication and hard work in making ASCIS-2025 a success. I look forward to the fruitful discussions and collaborations that will emerge from this conference.

Index

AI-Driven Predictive Analytics in Metallurgical Marketing: Enhancing Demand Forecasting and Supply

Tarun Madan Kanade[1], Jonathan Joseph[2], Tushar Savale[3], Radhakrishna Batule[4]

1 Faculty of Management, Symbiosis Institute of Operations Management, Symbiosis International (Deemed University), India
2 Faculty of Management, Thakur College of Engineering and Technology, Mumbai, India
3 Faculty of Management, Balaji Institute of Modern Management, Sri Balaji University Pune (SBUP), India
4 Faculty of Commerce and Management, Vishwakarma University, Pune, India

Abstract: Demand forecasting and supply chain efficiency issues in the metallurgical sector generate production inefficiencies and market instability. Traditional forecasting techniques fail to adapt to changing demand, causing overproduction or material shortages. AI-driven predictive analytics utilizing ML, DL, and big data analytics has revolutionized metallurgical marketing decision making. This study analyzes historical sales data, market trends, and consumer behavior to optimize demand forecasting using AI and predictive modeling. AI approaches including time series forecasting, neural networks, and regression models being tested for materials demand prediction. Our AI-driven supply chain optimization article focuses on inventory management, logistics, and supplier relationship management. A comparison shows that AI-enhanced models provide real-time data processing, automation, and superior accuracy than traditional forecasting methods. Research on AI in metalworking has demonstrated promising outcomes in cost reduction, risk mitigation, and operational agility. Research challenges include ethics, implementation costs, and data quality. AI driven decision-making has drawbacks. Finally, we consider blockchain integration, AI-driven sustainable manufacturing, and human-AI interaction in Industry 5.0. AI-powered predictive analytics may improve metallurgical supply chain planning and marketing, making them more efficient and competitive.

A Feature-Enriched Extractive Text Summarization Framework for Hindi Language Documents

Atul Kumar[1], Ashutosh Bajpai[2], Ashish Baiswar[3], Mahendra Kumar[4], Archana Dixit[5]

1,2,3,4 Chandigarh University Uttar Pradesh, Unnao, Uttar Pradesh, India
5 Tecnia Institute of Advanced Studies, New Delhi

Abstract : Natural language processing (NLP) relies heavily on text summarization, which is particularly important for languages like Hindi, which are both morphologically rich and resource-poor. For languages like Hindi, extractive summarization is both computationally efficient and linguistically robust because it finds and chooses the most important lines from the source text. This study examines a comprehensive framework for extractive summarization

in Hindi, integrating statistical, linguistic, positional, and semantic features. On the Indian Languages Corpora Initiative (ILCI) corpus, we evaluate the performance of TF-IDF, TextRank, and supervised learning approaches using both automatic metrics (ROUGE, BLEU) and human evaluation. It can be verified through our findings that hybrid and supervised models offer superior summaries in terms of relevance, coherence, and readability. Although the dataset size is not large enough to do benchmarking for ML/DL at a large scale, these results provide foundations for feature-enriched frameworks for improving summarization quality in the Hindi language. In our future research, we will extend our benchmarking for neural and transformer based models also.

Voice Veritas: Fake Voice Detection Using Deep Learning

Anju A[1], Heshikaa S[2], Assmiya J[3], Muthuselvan S[4],
Archana D[5], Beema Mehraj M[6]

1,2,3,4,5,6 Department of Information Technology KCG College of Technology,
Chennai, Tamil Nadu, India

Abstract: The rise of deepfake audio technology has sparked serious concerns about the authenticity of voice recordings, driving the need for reliable detection methods. This paper introduces Voice Veritas, a deep learning system designed to detect fake voices using a hybrid Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM) architecture. By analyzing Mel spectrograms of audio signals, the system uses CNNs to identify spatial patterns in the frequency domain and LSTMs to track temporal changes over time. Trained and tested on the ASVspoof 2019 dataset—a collection of 10,000 real and synthetic audio samples—the model undergoes preprocessing steps such as audio standardization, mel spectrogram conversion, and label encoding. The hybrid CNN-LSTM architecture achieves high accuracy. Experimental results highlight the model's ability to reliably distinguish genuine from fake audio, even when challenged by diverse spoofing techniques. Key innovations include the seamless integration of CNN and LSTM layers for capturing spatial and temporal details, a streamlined preprocessing workflow, and benchmark performance that sets a new standard in the field. This work addresses gaps in current audio forensics and offers a practical solution for real-world applications. Looking ahead, future research could explore adversarial training to enhance robustness and lightweight models for deployment on edge devices.

Brain Tumor Detection from MRI: Comparative Study of NIfTI, JPEG and PNG File Formats

Patel Kruti Dineshbhai[1], Dr. Himanshu Maniar[2], Dr. Sanjay Buch[3]

1 Research scholar, Bhagwan Mahavir Centre for Advance Research, Bhagwan Mahavir University
2 Associate professor, Bhagwan Mahavir College of Computer Application, Bhagwan Mahavir University
3 Director-IQAC Bhagwan Mahavir University

Abstract: The rise of deepfake audio technology has sparked serious concerns about the authenticity of voice recordings, driving the need for reliable detection methods. This paper introduces Voice Veritas, a deep learning system designed to detect fake voices using a hybrid Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM) architecture. By analyzing Mel spectrograms of audio signals, the system uses CNNs to identify spatial patterns in the frequency domain and LSTMs to track temporal changes over time. Trained and tested on the ASVspoof 2019 dataset—a collection of 10,000 real and synthetic audio samples—the model undergoes preprocessing steps such as audio standardization, mel spectrogram conversion, and label encoding. The hybrid CNN-LSTM architecture achieves high accuracy. Experimental results highlight the model's ability to reliably distinguish genuine from fake audio, even when challenged by diverse spoofing techniques. Key innovations include the seamless integration of CNN and LSTM layers for capturing spatial and temporal details, a streamlined preprocessing workflow, and benchmark performance that sets a new standard in the field. This work addresses gaps in current audio forensics and offers a practical solution for real-world applications. Looking ahead, future research could explore adversarial training to enhance robustness and lightweight models for deployment on edge devices.

Optimizing Query Performance in Relational Databases: A Comparative Study of Index Merge Strategies and Caching Techniques

Nilen Patel[1], Dr. Himanshu Maniar[2]
[1.] Research Scholar at Bhagwan Mahavir Centre for Advance Research, Bhagwan Mahavir University
[2.] Associate Professor at Bhagwan Mahavir College of Computer Application, Bhagwan Mahavir University

Abstract: In today's data-driven world, organizations face constant pressure to extract meaningful insights from complex databases while maintaining fast, responsive applications, making query optimization a critical challenge for database professionals. This research explores how two powerful techniques—index merge strategies and caching—can work together to dramatically improve MySQL query performance in real-world e-commerce

scenarios. We developed and tested practical Python solutions: an intelligent LRU caching system for rapid retrieval of frequent queries (ideal for read-heavy analytics workloads), and an index merge optimization framework leveraging MySQL's cost-based optimizer to handle complex multi-filter queries (like finding customers by location, date range, and product category). Testing on an e-commerce database with customers, orders, products, and reviews revealed significant performance gains—caching delivered near-instant responses for repeated queries while index merges excelled at complex multi-table filtering—though both approaches involve tradeoffs like increased memory usage and optimization complexity. By providing ready-to-use Python implementations, we bridge theory and practice, offering database team sactionable ways to optimize performance in production environments where millisecond smatter. Our findings demonstrate how strategic tuning of these techniques can help modern databases meet today's demanding speed and efficiency requirements while handling increasingly sophisticated queries.

A Hybrid AI Framework for Personalized Foundational Learning Using Decision Trees and Fuzzy Logic

V. Prem Kumar[1], Dr. K. Rajakumari[2]

1 Ph.D Research Scholar, Department of Computer Science, Bharath Institute of Higher Education and Research (BIHER), Chennai, India
2 Associate Professor, Department of Computer Science,
Bharath Institute of Higher Education and Research (BIHER) Chennai, India

Abstract: Individualized basic instruction is an important consideration in determining outcomes of early learning, but is not necessarily provided by conventional systems in amanner that is flexible and visible. To overcome these shortcomings, a hybrid AI framework is suggested where decision trees will be combined with fuzzy logic to customize the instruction to an individual, not only depending on cognitive indicators but also on behavioral indicators. The approach entails entropy-based decision tree models and fuzzy inference modeling of subjective variables such as motivation and engagement. The system was trained and tested on learner data from a large-scale educational dataset. The model reached 94.2% instructional match grade, 91.8% adaptivity of engagement, and 96.3% explainability index. In struggling learners, there was a 21.6% increase in the accuracy of the quiz and a 43.8% decrease in content switching due to their personalized reinforcement. Personalization, transparency, and curriculum alignment were found to be better than other existing systems through the proposed design. These findings reaffirm what hybrid AI systems can mean in providing effective, real-time, and explainable learning in basic education.

AI-Based Early Learning Assistant Using Speech Recognition and Concept Mapping

V. Prem Kumar[1], Dr. K. Rajakumari[2]

1 Ph.D Research Scholar, Department of Computer Science, Bharath Institute of Higher Education and Research (BIHER), Chennai, India
2 Associate Professor, Department of Computer Science, Bharath Institute of Higher Education and Research (BIHER), Chennai, India

Abstract: Adaptive, interactive learning systems, as well as multimodal learning systems, are required in early childhood education so that it can provide development learning as the fundamental need of a child. Conventional ways are usually unengaging and unresponsive in real-time, more so to the non-reading students. An early learning assistant that incorporates speech recognition and concept mapping based on AI to mitigate the limitations. The system uses a child-specific automatic speech recognition (ASR) model trained on speech datasets that it curated and a dynamic concept mapping engine that can create knowledge graphs out of the speech given to it. With the help of deep learning powered intent recognition and answer feedback loops, the assistant keeps to the learner's pace and knowledge level. Experimental tests indicate a Word Error Rate (WER) of 8.2% effects, a mapping concept accuracy of 92.6% and less than 284ms response latency, and an engagement score of 4.6/5.A better performance in semantic understanding and personalization than previous systems. The proposed solution secures accessibility, responsiveness, and effectiveness of early education with an intelligent conversational learning.

Diabetes Risk Prediction in Pregnant Women Using Deep Belief Network

V. Venkatesan[1], Dr. K. Rajakumari[2]

1 Ph.D. Research Scholar, Department of Computer Science, Bharath Institute of Higher Education and Research (BIHER), Chennai, India
2 Associate Professor, Department of Computer Science, Bharath Institute of Higher Education and Research (BIHER), Chennai, India

Abstract: Gestational diabetes is a severe condition in which pregnant women are affected and which causes difficulties to the mother and the child if it is not diagnosed. Identification of the threat of evolving diabetes early in pregnancy is important to trigger early intervention and increase maternal healthcare needs. The paper presents a deep learning (DL) model based on Deep Belief Networks (DBN) for binary classification of the risk of diabetes in pregnant females using the PIMA Indian Diabetes Dataset. Three preprocessing methods used to ameliorate the results in terms of prediction performance were, namely the Interquartile Range (IQR)-based outlier removal, the Robust Scaler (RS), and the Min-Max normalization. All the methods were applied in preprocessing the data before training the DBN model. Four major

metrics performance evaluation was applied including accuracy, precision, recall, and log loss. All combinations were tested but the Min-Max + DBN combination yielded the closest and consistent results thereby indicating the significance of proper preprocessing in DL pipelines. Although the performance of DBN together with IQR and RS was also decent, it was not as effective as Min-Max normalization. The results affirm that medical prediction problems require preprocessing to be very crucial. The study identifies the possibility of DL models particularly DBNs, in the development of reliable and efficient clinical decision support systems to help in the assessment of diabetes risk.

Enhancing BB84 Quantum Key Distribution: Analyzing the Impact of Noisy Channels and Future Advancements

Dr. Tejal Upadhyay1, Shailee Kapadia 2, Dr. Sonia Mittal3

1,2,3 Department of Computer Science and Engineering Institute of Technology,
Nirma University Ahmedabad, Gujarat, India

Abstract: Quantum Key Distribution (QKD) ensures theoretically unbreakable encryption by exploiting quantum mechanical principles. This work analyzes the BB84 protocol under realistic
noisy channels using IBM's Qiskit Aer simulator with depolarizing, amplitude damping and phase damping noise models. Simulations with 10,000 qubits per run show that the Quantum Bit Error Rate (QBER) increases from 0% to 12% as depolarizing noise probability reaches 0.05, reducing the Secure Key Rate (SKR) to near zero once QBER exceeds the security threshold 11%. Although depolarizing noise causes the steepest theoretical SKR decay, we observed that amplitude damping produced unexpectedly higher QBER and faster SKR collapse than predicted, due to basis-dependent asymmetries in state preparation and measurement. This deviation from analytical models highlights decoherence effects that are often underesti-mated in simulations. Our unique contribution is to demonstrate that amplitude damping poses a more severe practical threat to BB84 than symmetric depolarizing noise, providing critical insights for robust QKD deployments. Index Terms—Quantum Key Distribution (QKD), BB84 protocol, Quantum Cryptography, Quantum Noise Models, Secure Key Rate (SKR), Quantum Bit Error Rate (QBER).

Nonlinear Structure Detection in Cloud Workload Series: A Comparative Study of Testing Methods

Rohit Prajapati[1], Hiren Joshi[2]

1,2 Department of Computer Science, Gujarat University, Navrangpura, Ahmedabad-380009, Gujarat, India

Abstract: Cloud datacenter operating time series workloads follow nonlinear patterns due to auto-scalable and heterogeneous infrastructure used in provisioning resources, and highly fluctuating user workloads. Most statistical and machine learning models are applied to cloud workloads without pre-testing for nonlinearity, and as a result, they either underestimate the evaluated modelsor unnecessarily cause multiple models to be assembled. Hence, the identification of these nonlinear patterns is critical for the choice of appropriate models that improve forecasting accuracy, anomaly detection, and on-demand resource allocation. In order to identify nonlinear behavior, we used a number of statistical tests, the BDS (Brock-Dechert-Scheinkman) test, the Tsay test, Lyapunov Exponent (LE) Test on actual-time cloud performance metrics with the inclusion of the GWA- Bit Brain workload dataset. Every approach's efficacy is quantified in terms of sensitivity to nonlinearity, noise, and auto correlation robustness, and ability for various temporal structures. Further, a nonlinear machine learning model was used to validate the nonlinearity of the dataset. The findings offereffective recommendations for the selection of appropriate nonlinearity identifying techniques for cloud workload and a guideline for the selection of suitable machine learning models for accurate resource estimation and providing QoS-based cloud infrastructure.

A Systematic Review of Sentiment Analysis for Applications Utilizing Opinion Mining

Vyanktesh Raval[1] , Dr. Vimal Parmar[2]

1 Assistant Professor & Research Scholar, (School of Computer Application) Dr. Subhash University, India
2 Dean, (School of Computer Application) Dr. Subhash University, India

Abstract: Opinion mining, also known as sentiment analysis, it is a part of natural language processing(NLP) that focuses on finding and understanding subjective content in text data. The goal of this field is to determine that what people think, feel, and say in review. You can use this
method for separating opinion into neutral, negative, or positive categories based on how you feel about it. This is helpful in making decisions in a lot of cases. The goal of this method is to come up with an innovative approach to sort through sentiment analysis and opinion mining data that is based on genuine customer feedback. This research looks at all the problems, levels of difficulty, and methods that currently exist in opinion mining. You can see sentiment analysis making a real difference in everyday life. For example, it helps customer service teams

figure out what people really think, lets companies know how their products are doing, helps predict who might win an election, and keeps an eye on what's trending on social media. The knowledge from this in-depth review gives researchers and app creators what they need to keep making opinion mining tools smarter and more useful.

Leveraging Market Basket Analysis and Clustering for Personalized Retail Recommendations: A Case Study of a Local Supermarket

Rathimala Kannan[1], Asher Josh Immanuel K[2]

1,2 PSG Institute of Management, PSG College of Technology, Coimbatore 641004, Tamil Nadu, India

Abstract: To improve consumer satisfaction and boost sales in the quickly changing retail environment, tailored product recommendations are now crucial. While large retailers have employed market basket analysis (MBA) extensively, small, unstructured retail models such as kirana stores have not. This study explores the application of machine learning algorithms in generating customized product recommendations for a local supermarket. A transactional dataset comprising one month of sales records from a local supermarket (August 2024) was utilized for this study. The dataset contains 58,382 observations across nine variables. The objective of the study is to extract meaningful insights from the data by employing both association rule mining and clustering techniques. Specifically, the Apriori algorithm was applied to identify frequent item set patterns, while the k-means clustering method was used to segment transactions into distinct groups for further analysis. The study produced 147 association rules, which could be used to create personalized product suggestions by offering insightful information about items purchased together. In addition, the k-means clustering algorithm segmented the transaction dataset into three optimal clusters, as determined by the silhouette coefficient metric. The managerial implications of these findings are discussed in detail. Specifically, the results indicate that personalized recommendation systems can substantially enhance customer satisfaction while simultaneously improving sales conversion rates. Furthermore, the implementation of such systems allows supermarkets to reduce excess inventory by aligning stock levels more closely with customer purchasing patterns, while also ensuring that shoppers receive relevant and timely product suggestions

Early Prediction of novice Students Performance in an Introductory Programming Course using hyper parameter tuned Model

Mr. R.Vinoth[1], Dr. M. Sivasakthi[2]

1 Research scholar, Department of Computer Science and Applications, FSH, SRMIST, Vadapalani, Chennai, Tamilnadu, 600026,
2 Assistant Professor, Department of Computer Science and Applications, FSH, SRMIST, Vadapalani, Chennai, Tamilnadu, 600026,

Abstract: Undergraduates studying Computer Science (CS) and engineering need to hone their problem-solving abilities, which are especially crucial when tackling programming challenges involving basic strategies. These abilities should ideally be cultivated earlier in the programming learning process, especially in the preliminary few days or weeks of a Novice Student's (NS) first course. The growth of programming skills for total novices depends on their ability to solve problems and think logically. The primary element that may impact NS computing abilities is cognitive impairment and lack of cognition impairs students' ability to solve arithmetic and problem-solving issues. For many NS, Introductory Programming (IP) might be complicated. Additionally, these courses have a high dropout and failure rate. Since it enables human-AI relationship towards analytical guidance, where monitors will be instructed on how to assist and help NS where early interference is vital for predicting NS performance at an early stage is one possible solution to this issue. In the current study, a Prediction Model (PM) has been created especially to predict how well first-year CS will perform in the first challenging course in their field. In this regard, the study used data gathered during the first two weeks of IP courses delivered to a total of 2372 students to apply suggested Bayesian Optimization Hyper parameter Tuning (BOHT) for early performance prediction. The main aim of this research is to progress a way to identify "at risk" students early on and offer advice on how to help them become better programmers. The experimental results showed that the proposed BOHT model produced the best results when compared to other existing models, with an accuracy of 98.3%.

Decentralized Pan Card Forgery and Tampering Detection Using FLWR, CNN, OCR and Grad-Cam

Mohammed Hanan Hamza[1], Dr. Kavitha KS[2], Soumya Patil[3]

1,2,3 Department of Computer Science Engineering, Dayananda Sagar College of Engineering
Bengaluru, India

Abstract: In the modern security environment, detecting document forgery is an essential part of any strong identity verification system, and in our case, we are dealing with Indian PAN (Permanent Account Number) cards. The traditional method of forgery detection relies on deep

learning models built on the strength of centralized data collection and in doing so puts user privacy at risk. To prevent this trade off, we propose a system that is federated and is competent of detecting PAN card forgery without breaching privacy. We suggest a federated hybrid system
that includes Convolutional Neural Network(CNN) based on MobileNetV2, plus Tesseract Optical Character Recognition(OCR) pipeline. Each client with its own data trains a local model. In each round, only the new local model weights of clients are sent over a secure channel to a server in the middle, where they are combined using the Flower(FLWR) framework .A prediction only client/end user can then get updated global weights from the server to check for forgery in real time and then with Gradient weighted Class Activation Mapping (Grad-CAM) the localized tampered/forged areas are shown .We had three clients in our experiment, and each trained on their own private dataset. We then tested the final aggregated model on a test dataset. In this research, we propose a scalable technique that efficiently enables real time verification of PAN cards while respecting the privacy.

Geo-Intelligent Automation of Farmer Queries: A Hybrid Machine Learning Approach to Enhance Kisan Call Centre Efficiency

Ms. M. Kalai Arasi[1], Ms. R. V. Dhanusha[2], Dr. V. Srividya[3]

1 Assistant Professor, PSG Institute of Management, PSG College of Technology, India
2 Student, PSG Institute of Management, PSG College of Technology, India
3 Director, PSG Institute of Management, PSG College of Technology, India

Abstract: The Kisan Call Centre is a crucial platform that bridges the farming communities and the government in addressing the various agricultural queries across India. However, the predominant redundant queries concerning geographical location strain human advisors by making them perform the routine, mundane tasks. By harnessing advanced analytics, this study uncovers geospatial patterns in farmer queries with the intention of driving IPA (Intelligent Process Automation) in agricultural advisories. By using the dataset sourced from the Open Government Data portal, which had 1,59,325 Kisan Call Centre records from various districts of Tamil Nadu, Geo-clustering via K-Means clustering was performed by geo tagging districts with latitude-longitude coordinates, which was then validated through the Elbow Method and Silhouette Score, resulting in four optimal regional clusters. Frequent patterns were extracted using the FP-Growth algorithm within each cluster, uncovering hidden, seasonal, and location specific high-frequency queries. Key insights include increased Animal Husbandry and Weather queries during summer, a concentration of Black Gram-related questions in Viluppuram during winter, and consistent horticulture queries in Kanchipuram. These findings enable two impactful recommendations in reducing advisor workload by implementing IVRS automation for high-frequency questions and integrating a district-aware AI recommender bot for query suggestions tailored to regional needs. This research promotes a scalable, data-driven, enhanced agri-advisory system that supports digital governance and improves service delivery efficiency across the nation.

Assessing the Financial Sustainability of AI-Powered Infrastructure and Cyber Security Protocols in India's Smart Cities

Subhash D Pawar[1], Adesh Doifode[2], Udayan Mukherjee[3], Laxman Doiphode[4]

1 U. D. Pathrikar Institute of Management, Chh. Sambhajinagar, India
2 Pune Institute of Business Management, Pune, India
3 Woxsen University, Hyderabad, India
4 Navsahyadri Education Society Group of Institutions, Pune, India

Abstract: India's rapid Urbanisation is driving the adoption of AI-powered infrastructure and cyber security protocols within its smart cities. This study evaluates the financial sustainability of these technologies in the Indian urban context, addressing critical gaps in lifecycle cost modelling, recurring cyber security expenses, and governance frameworks. Drawing on a comprehensive literature review of global and national research from 2019 to 2025, the paper identifies key challenges such as high initial capital investment, energy consumption of AI systems, and escalating cyber security risks. It emphasises the necessity of integrated financial models that incorporate operational, cyber security, and decommissioning costs alongside ethical and social equity considerations aligned with the Sustainable Development Goals. The study advocates for context-sensitive, scalable financial strategies tailored to India's infrastructural diversity and socio-economic realities. The results provide actionable recommendations for policymakers and city planners to establish resilient, equitable, and financially sustainable urban innovation initiatives, thereby contributing to a sustainable urban transition in emerging economies.

The Convergence of Finance and Technology: A Bibliometric Study of Fintech's Impact on Banking Innovation

Dr. Tushar Ranpariya[1], Dr. Priyanka Suchak[2], Dr. Jignesh Hirapara[3], Mr. Milan Doshi[4]

1 Assistant Professor, Faculty of Management Studies, Marwadi University, Rajkot
2 Associate professor, School of Management, RK university, Rajkot
3,4 Assistant Professor, Faculty of Computer Application, Marwadi University, Rajkot

Abstract: This paper explores the revolutionary contribution of fintech technology to revolutionize the bank sector with innovations such as blockchain, artificial intelligence, and electronic banking products. It discusses how the above innovations spur enhanced financial services, efficiency in operations, customer satisfaction, and regulatory regulation while pointing out related opportunities and challenges for traditional bank institutions.

Spot the Fake: Vision Transformers in the Fight Against Deep Fakes

Kunal Pandya[1], Prof. (Dr.) Vishal Dahiya[2]

1,2 Sardar Vallabhbhai Global University, Ahmedabad-380015, India

Abstract: The spread of high-fidelity Deep Fake content has created extremely serious problems in the politics, society, and security domains. Conventional detection techniques, which rely mainly on convolutional neural networks (CNNs), are increasingly being replaced with more advanced synthetic generation mechanisms. With their natural self-attention and ability to model global context, Vision Transformers(ViTs) have proven to be promising substitutes. This review comprehensively examines 160 contributions spanning diverse approaches in deep fake detection, from temporal inconsistency exploitation to hybrid CNN–ViT architectures and fairness aware methods. We analyze the evolution from conventional CNN-based forensic detectors to the state-of-the-art ViT approaches, highlight technical innovations in patch embeddings and multi-head attention, and compare performances on benchmark datasets. Open issues such as data imbalance, computational overhead, robustness against adversarial techniques, and ethical fairness are discussed. Finally, future research directions are outlined, including self-supervised learning, efficient attention approximations, continual adaptation strategies, and multimodal extensions. This review demonstrates that while ViTs have significantly advanced deepf ake detection, further interdisciplinary research is needed for robust, real-world deployment.

Design and Evaluation of Hybrid Quantum Classical Architectures for Scalable Deep Learning Models

Simrin Fathima Syed[1], Madhu Shukla[2],Vipul Ladva[3], Neel Dholakia[4,],
Ravi Bagthaliya[5]

1,2,3,4 Department of CSE-AI, ML, DS, Marwadi University, Rajkot, Gujarat, India-360003
5 Department of English and Communication Skills, Marwadi University, Rajkot, Gujarat, India-360003

Abstract: Quantum computing is an emerging trend for improving the scalability and efficiency of deep learning models. This study, therefore, describes the development of hybrid quantum classical models that hybridize quantum neural primitives with conventional deep learning models. Utilizing variational quantum circuits (VQC) and a hybrid optimization approach, the framework overcomes issues with computational resources, over fitting , and scalability when faced with large datasets. The models were tested on image classification tasks, achieving much faster training and gaining comparable and in certain cases even better accuracy with respect to all classical counterparts. The results are synthesized into an agile and compact architecture that can potentially be used on NISQ devices. The architecture is tailored for NISQ-era devices by employing shallow parameterized circuits, noise-aware training,

modular design choices. This ensures robustness against limited coherence times, qubit noise, gate errors, making framework practical for near-term quantum hardware. On benchmark datasets, the hybrid model achieved a 2% increase in classification accuracy compared to classical baselines and 15% reduction intraining time while maintaining competitive stability against noise in quantum only implementations. However, modest accuracy gains underscore the need for deeper analysis of how quantum layers contribute to feature representation and generalization.

Improving Question Generation with Retrieval-Augmented Generation and Semantic Search Using Cosine Similarity Validation

Shubham Singh[1], Sattva Doshi[2], Saurabhkumar Sharma[3], Vansh Mehta[4],
Priyanca Gonsalves[5], Sweedle Machado[6], Stevina Corriea[7]

1,2,3,4,5,6,7 Information Technology, Dwarkadas J. Sanghvi College of Engineering, Mumbai, India

Abstract: The traditional approach of manually creating questions from educational materials has proven time-consuming and inefficient for educators. While Large Language Models(LLMs)
offer automation potential, they frequently produce questions lacking contextual precision and relevance to the source material. This paper presents a Smart Question Answer Generation System that leverages Retrieval Augmented Generation (RAG) combined with artificial intelligence to significantly enhance contextual accuracy in generated questions. Our system transforms PDF content into vector embeddings stored in a specialized database, enabling sophisticated semantic search capabilities that correctly interpret context-dependent terms. For instance, the system can distinguish whether ”Apple” refers to the technology company or the fruit based on surrounding context. The implementation incorporates Bloom’s taxonomy for cognitive classification, cosine similarity scoring for comprehensive answer validation, and intelligent image classification for question-relevant visual content. Users can efficiently save, search, and repurpose generated question-answer pairs for various educational applications, including examination preparation and question bank development. Comprehensive experimental evaluation demonstrates that our RAG + DeepSeek R1 (70B) model achieves remarkable 94.5% accuracy with 800ms response time, substantially outperforming the baseline Gemini only LLM approach which achieves 78.2% accuracy with 1200ms response time. These results clearly establish both the superior performance and enhanced accuracy of our system compared to traditional LLM-only methodologies. Index Terms—Automated Question Generation, Retrieval Augmented Generation, DeepSeek R1, Cosine Similarity, Vector Databases, Bloom’s Taxonomy.

A Hybrid Transformer–LSTM Framework for Real-Time Appliance Energy Demand Forecasting in Smart Environments

Pranvendra Naruka[1], Madhu Shukla[2], Vipul Ladva[3], Neel Dholakia[4]

1 Department of Computer Engineering - Data Science, Marwadi University, Rajkot GJ 360003, India
2,3,4 Department of CSE - AI, ML & DS, Marwadi University, Rajkot GJ 360003, India

Abstract: In the Industry 4.0 era, intelligent energy management is emerging as a critical aspect to optimize efficiency and sustainability in smart spaces. Real-time energy demand predictions are also crucial for the emergence of adaptive control systems and the stochastic allocations of resources at the appliance level. Motivated by this, this paper introduces a hybrid deep learning based framework that leverages the power of both Transformer encoders and Long Short-Term Memory (LSTM) models in the context of appliance level energy consumption forecasting. The Transformer block models cross-interactions and inter-feature correlations among multivariate time series data as well as learns long-range dependencies, where the LSTM can refine sequential temporal patterns to improve the forecasting performance. The model is trained on time-stamped input sequences with engineered temporal signatures based on sinusoidal encoding. The customized preprocessing pipeline enables proper normalisation and windowed sequence formation for real-time forecasting purposes. This architecture, in which the proposed architecture consisting of multiple federations, is intended to be a lightweight, modular, and flexible for usage in such energy aware applications as smart home, industrial IoT systems, etc. This research is a key step in pushing the boundary of predictive models in the smart energy systems, and leads to the possibilities of future extension in such aspects as multi-step prediction and context data fusion.

Behavioral Clustering and ERP Usage Trends in Service-Oriented Enterprises

Manoj Patel[1], Shalini Gupta[2], Amit Suthar[3]

1 Faculty of Computer Science and Applications, Gokul Global University, Siddhpur GJ 384151, India
2,3 Faculty of Engineering, Ganpat University, Mehsana GJ 384012, India

Abstract: Service sector firms are heavily reliant on the use of Enterprise Resource Planning (ERP) systems to manage business processes. But how all of these are used in a day-to-day basis across teams and offices is still something of a black box. In this paper, we investigate real-world usage patterns of an ERP using the SALT dataset, which consists of millions of records from a service-oriented ERP system. We correlate data in great detail and apply clustering methods to identify hidden behavior patterns that look at how sales offices functions and how often the different document types are operated, and other data trends over time. We find that a small number of sales offices carry a large majority of the ERP activity, some

document types and shipping terms rule the system, and the ERP activity follows weekly and season trends. Second, we cluster the usage of ERP using machine learning to better understand and improve ERP configuration and use. Service organizations can benefit from these results to optimize efficiency and personalize their ERP systems according to user behavior.

TEDA-Powered Anomaly Detection on USPS Images Using PySpark Streaming and MLAuto Cloud Framework: A Comparative Study

Madhuri Parekh[1], Madhu Shukla[2]

1 Department of Computer Engineering, Marwadi University, Rajkot. G.J 360003, India
2 Department of CSE - AI, ML & DS, Marwadi University, Rajkot GJ 360003, India

Abstract: The contribution of this paper is to provide an entire frame- work for anomaly detection on the USPS image dataset by means of the combination of the Typicality and Eccentricity Data Analytics (TEDA) and PySpark-based streaming and ML Auto Cloud benchmarking system. The primary objective is to assess the performance of TEDA in a big data streaming context and to compare its efficiency with those of automated machine learning pipelines. The PySpark implementation permits scalable processing of streaming image data and emulating an online anomaly detection pipeline with the Mahalanobis distance and TEDA. Meanwhile, the dataset is tested by batch learning under the inspiration of MLAuto- Cloud, in terms of accuracy, interpretability and latency. Large amount of visualization using PCA projections, Mahalanobis score distributions, and KMeans clustering confirms the detection of atypical samples. Our experimental results show that TEDA-PySpark pipeline has better interpretability and efficiency on streaming settings, while MLAuto Cloud achieves better classification accuracy over static data. This hybrid ex- perimentation also provides new perspectives how to place explainable anomaly detection systems to distributed architectures for practical computer vision applications.

Detecting Sleep States and Disorders of a Patient Using Machine Learning in Healthcares

Sonia Mittal[1], Deepika Shukla[2], Aradhya Soni[3]

1,2,3 Institute of Technology, Nirma University, India

Abstract: In recent times, the prevalence of sleep disorders has increased rapidly, posing serious risks to patient health. Therefore, early detection through an effective method is of utmost importance. Sleep Health and Lifestyle Dataset on Kaggle enables the investigation of Machine Learning techniques to determine sleep states and disorders, as well as analyze lifestyle factors, demographics, and sleep patterns. This study seeks to employ some of the most advanced ML algorithms in classification tasks focused on persistent features such as stress level, Body Mass Index (BMI), Quality of Sleep, Sleep duration, and Heart Rate. The goal is to build models that will recognize sleep state transitions and confirm if the subject suffers from certain disorders like insomnia or sleep apnea syndrome.

Edge and Distance Map Conditioning for Improved Cardiac Vessel Segmentation Using cGANs under limited annotated dataset

Ramyashri Kulkarni[1], Shrinivas D Desai[2], Vishwanath P Baligar[3]

1,2,3 School of Computer Science and Engineering. , KLE Technological University, Hubballi, Karnataka, India

Abstract: Cardiac vessel segmentation from angiographic images is of great importance for diagnosing and treating cardiovascular disease. Despite the great value that segmentations provide achieving high-quality annotated datasets of cardiac vessels is difficult and costly to achieve due to the complexity in time and manual labor required. This work proposes an advanced conditional generative adversarial network (cGAN) framework using hybrid conditioning using edge maps and distance maps to help provide complementary structural cues for the learning of vessel orientation. The edge map provides a boundary while the distance maps provide richer contextual information on the thickness and continuity of the vessel structure providing this framework additional prior information to ensure that the generated masks are accurate. The cGAN framework uses a generator based on residual embedding network architecture while the discriminator uses a patch based discriminator. The generator and discriminator are trained with a loss based on adversarial learning as well as L1 loss. It is the evidence from the experiments outlined in this work, that support the evidence that hybrid conditioning, outperformed edge conditioning, with better Dice coefficient, IoU, precision, recall and pixel-wise accuracy in limited annotated data. Overall, this study provides evidence that hybrid conditioning by using multiple structural cues referencing actual cardiac vessels improves quality and robustness of vessel segmentation in sparse real-world data.

Comprehensive Cloud Security through Fuzzy Logic: Protecting Privacy and Facilitating Data Recovery

Sachin Kumar Vishnoi[1] , Dr. Ashish Saini[2] and Dr. Amrita Kumari[3]

1 Research Scholar, Department of Computer Science, Quantum University, Roorkee.
2,3 Assistant Professor, Department of Computer Science, Quantum University, Roorkee.

Abstract: Cloud computing offers flexibility and scalability but remains vulnerable to threats such as data theft, unauthorized access, and privacy breaches. To address these challenges, we propose a Mamdani fuzzy inference system–based framework that dynamically adapts security measures to evolving conditions. The model integrates multi-factor authentication data, behavioral patterns, and anomaly-rich datasets to improve resilience against phishing, replay, and brute-force attacks. Experimental evaluation demonstrates significant improvements in detection accuracy (up to 92%), reduction in false positives (by 15%), and faster recovery time compared to baseline models. Visual analyses and comparative results validate the robustness of the approach, while the system's modular design enables seamless integration into diverse cloud environments. This work not only strengthens authentication and privacy protection but also highlights the potential of fuzzy logic to build adaptive, secure, and intelligent cloud infrastructures.

MedXAgent: Visual XAI based explanations of AI Agent Decisions in Medical Imaging for precision medicine in Smart Healthcare Systems

P.Ajitha[1]

1 Associate Professor, Department of Software Systems KG College of Arts and Science, Coimbatore

Abstract: In the era of precision medicine, Artificial Intelligence (AI) plays a pivotal role in medical imaging by enhancing diagnostic accuracy and efficiency. However, most existing AI models function as opaque "black boxes," raising concerns regarding trust, transparency, adaptability, and clinical adoption. To address these challenges, MedX Agent, an intelligent agent–based framework designed for automated diagnosis of medical images, including chest X-rays and brain MRIs is proposed here. Theframework integrates Explainable AI (XAItechniques to provide transparent, human-interpretable visual explanations. Specifically, MedX Agent combines predictive outputs with visualization methods such as Grad-CAM and SHAP, which highlight salient image regions contributing to decision-making. The system is evaluated on public benchmark datasets, namely ChestX-ray14 and BraTS, demonstrating competitive diagnostic accuracy alongside interpretable outputs. Performance is assessed using standard quantitative metrics including AUC, IoU, and Dice coefficient, while explanation quality is evaluated through insertion and deletion scores. Experimental findings indicate that

Med X Agent effectively balances diagnostic accuracy with explainability, thereby offering potential utility for research, clinical decision support, and deployment in real-world healthcare settings.

Ensuring Ethical Integrity in AI to Support and Sustain Job Satisfaction

Sarita Peddi[1], Geetha Manoharan[2]

1,2 School of Business, SR University, Warangal, Telangana, India

Abstract: This study examines the critical role of ethical integrity in AI deployment within the workplace, based on research conducted across eight organizations in Telangana. Findings are contextualized to this regional setting, and generalizability to other regions or sectors is limited. A quantitative design was employed using survey data of 341 employees. As artificial intelligence becomes increasingly prevalent, its influence on employee morale, motivation, and overall well-being is more significant than ever. The study also highlight that core ethical principles such as transparency, fairness, responsibility, and privacy significantly shape employees' perceptions and experiences with AI systems. The research emphasizes the necessity of implementing ethical AI design and deployment frameworks, along with best practices, to foster a healthy and satisfied workforce. Ultimately, the study demonstrates that integrating technological innovation with ethical considerations can empower employees rather than disrupt them, promoting sustainable happiness and stability within organizations. This underscores the strong connection between ethical AI practices and job satisfaction, suggesting that responsible AI implementation is essential for fostering a positive work environment.

Learning Dwarf Mongoose Optimization (LDMO) Based Feature Selection And Contractive Autoencoder (CAE)Classifier For Chronic Disease Management

R.Arulmathi[1], Dr.M.Sakthivanitha[2]

1 Research Scholar, Department of Computer Science, Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai, Tamil Nadu, India
2 Assistant Professor, Department of Computer Applications, Vels Institute of Science, Technology & Advanced Studies Chennai, Tamil Nadu, India

Abstract: Predicting Chronic Diseases (CD) is crucial to healthcare informatics. Humans today suffer from a variety of diseases due to their lifestyle choices and their treatment of the environment. In order to prevent the severity of these diseases, it is crucial to recognize and foresee them in their early stages. Feature selection will reduce the amount of time required for training the model and enhance the accuracy of disease prediction. Improving the accuracy of

classification systems depends extensively on feature selection. This research presents new feature selection and classification methods for CD diagnosis and prognosis. To increase the accuracy of disease diagnosis, Learning Dwarf Mongoose Optimization (LDMO) based feature selection is implemented by removing features that are less helpful or irrelevant. To enhance the searching capabilities, the LDMO algorithm with Learning Strategy (LS) is added; the revised alpha serves as a partial direction for the algorithm's updating process. The best essential feature that identifies the most useful aspects for CD prediction is selected using the LDMO method. A meta-heuristic technique called LDMO mimics the dwarf mongoose's compensatory behavioral modifications to mimic its foraging behavior. One particular kind of auto encoder is the Contractive Auto encoder (CAE). The penalty, which promotes the learnt representations to contract around the training is usually the Frobenius norm of the encoder activations to the input. The results demonstrate the superiority of CAE when compared to other methods based on precision, recall, F1-score, and accuracy.

A Comprehensive Machine Learning Framework for Early Detection of Lung Cancer

P.Lavanya[1], S.Vijaya[2], S.Elakkiya[3]

1,3 Assistant Professor, Department of Information Technology, KG College of Arts and Science, Coimbatore, India
2 Associate Professor & HoD, Department of Information Technology, KG College of Arts and
Science, Coimbatore, India

Abstract: Due in large part to delayed diagnosis and the lack of early-stage symptoms, lung cancer continues to rank among the deadliest illnesses worldwide. Early identification is critical to improving treatment outcomes and survival rates. This study proposes a comprehensive machine learning framework for lung cancer prediction using symptom-based patient data. The dataset, sourced from Kaggle, contains 1000 patient records with 25 attributes including lifestyle and symptom indicators such as smoking habits, anxiety, coughing, and chest pain. Ten classification algorithms, including Logistic Regression, Decision Tree, K-Nearest Neighbors, Naïve Bayes variants, Random Forest, Support Vector Classifier, Gradient Boosting, XGBoost, and Multi-Layer Perceptron were assessed using Python libraries Scikit learn and XGBoost. Performance was evaluated via accuracy, precision, recall, F1score, and computational time based on a 70:30 train-test split. Ensemble models, particularly Random Forest and XGBoost, achieved the highest accuracy, consistent with cited literature. Limitations include the small dataset size, absence of cross validation, and lack of external validation, which may affect generalizability. Future work should explore larger, diverse datasets and incorporate real-time clinical data to enhance diagnostic reliability. This approach has potential for integration into clinical decision support tools for early lung cancer detection.

Emerging Trends in Adaptive and Privacy-Preserving Machine Learning for Credit Card Fraud Detection

Dipak Thanki[1], Jaypalsinh A. Gohil[2]

1 Assistant Professor, Faculty of Computer Applications, Marwadi University, Rajkot, Gujarat 360003. India.
2 Associate Professor, Faculty of Computer Applications, Marwadi University, Rajkot, Gujarat 360003. India.

Abstract: Electronic payment systems are expanding at speeds never dreamed of before due to global connectivity, the ability to execute real-time transactions, and increasing trend towards cashless transactions. The systems now comprise e-commerce, mobile wallets, and decentralized financial systems, which are revolutionizing the way individuals transfer value around the globe. But this advancement is no longer secure with sophisticated financial fraud methods getting a head start on conventional ways of detecting fraud. The villains employ sophisticated machine learning, bot net automation, and synthetic identities to outsmart legacy rule-based systems. It is ever more necessary to safeguard real-time credit card transactions. This is because it saves user trust, ensures new rules are complied with, and maintains the world economy robust as new technology such as contactless biometrics and IoT payments emerge. Concept drift, skewed class distribution, disjointed and fragmented data contexts, and increasing issues with data privacy are but a few of the issues that existing fraud defense systems have to contend with. All these contribute to making it increasingly difficult to stop threats instantly and effectively. The paper considers new solutions to all these challenges through emphasis on dynamic adaptability, high dimensional anomaly separation, and privacy-conscious collaborative intelligence for financial networks. The material is beneficial to banks, payment service providers,security architects, and politicians who wish to make their systems more secure from future fraud without violating data privacy.

An Empirical Study on the Role of Artificial Intelligence in Shaping Sustainable Consumer Behaviour

Sujatha R[1], Sonal Gayathri C K[2]

1,2 PSG Institute of Management, PSG College of Technology, Coimbatore, India

Abstract: This research investigates the role of Artificial Intelligence (AI) in shaping sustainable consumer behaviour, examining how AI-driven recommendations influence consumer decision-making, sustainable purchasing behaviour, and trust in environmentally conscious products and services. It concludes that AI-powered insights and personalized recommendations significantly enhance consumer awareness, engagement, and adoption of sustainable choices. The theoretical framework emphasizes how AI implementation, consumer trust, and external cultural, economic, and technological factors influence sustainable purchasing decisions. PLS-SEM using SmartPLS software was utilized to evaluate the relationships between AI, consumer awareness, and sustainable purchasing behavior. The

findings aim to provide insights into the effectiveness of AI in fostering sustainable consumption patterns and highlight its potential in promoting environmentally responsible decision-making. The study also addresses ethical considerations and challenges associated with AI-driven sustainability efforts. Ultimately, this research contributes to the growing discourse on the intersection of AI, consumer behaviour, and sustainability, offering valuable implications for businesses, policymakers, and consumers.

Linguistic Biometrics: Continuous Authentication Using Personalized Grammar, Vocabulary, and Typing Behavior

Tejas Gampawar[1],Sneha Yadav[2], Sandhra Ann[3], Ceija[4],
Archana Prabhakaran Nair[5], Swapna M. P.[6]

1,2,3,4,5 Department of Computer Science and Engineering, Amrita School of Computing, Amrita Vishwa Vidyapeetham, Amritapuri, India
6 Center for Cybersecurity Systems and Networks, Amrita Vishwa Vidyapeetham, Amritapuri, India

Abstract: Conventional authentication systems, relying on one-factor or two-factor methods like passwords and hardware tokens, have historically shown significant vulnerabilities. To overcome these shortcomings, we introduce an innovative continuous authentication framework that leverages a user's distinct linguistic and behavioral fingerprint, derived from routine device interactions. Our approach captures a range of features such as typing speed, spelling error tendencies, slang, acronyms ,and vocabulary preferences to profile the user's writing style across diverse contexts. Unlike traditional keystroke dynamics or touch-based biometrics, this method adapts to shifts in tone or language, accom-modating scenarios from formal correspondence to casual, multilingual exchanges. We employ a BiLSTM-based model, trained exclusively on user data to create robust, personalized profiles. Our research emphasizes privacy-preserving on-device processing and compares multiple anomaly detection metrics using the BiLSTM model, selecting the most effective methods to ensure reliable authentication. Real-time anomaly detection occurs locally, flagging potential impersonation based on detected deviations during typical device use.

Enhanced Classification and Segmentation of Human Embryo Images Using Hybrid Fuzzy Clustering and Meta-Heuristic Optimization Techniques

Mrs. D.Vijaya Shree [1], Dr.B.L.Shivakumar[2]

1 Research Scholar, Department of Computer Science, Sri Ramakrishna College of Arts & Science, S N R Sons College Road, Coimbatore 641 006
2 PRINCIPAL, Department of Computer Science, Sri Ramakrishna College of Arts & Science,
S N R Sons College Road, Coimbatore 641 006

Abstract: This research introduces an advanced technique for the classification and segmentation of human embryo images, aimed at improving diagnostic accuracy in in-vitro fertilisation (IVF). A dataset comprising 840 microscopic images was pre-processed for binary classification using Adaptive Histogram Equalisation (AHE) and Perona Malik filtering to enhance contrast and minimise noise. Segmentation utilised the Fuzzy Adaptive Local Information C-Means (FALICM) algorithm, which was further enhanced through various meta-heuristic methods such as Particle Swarm Optimisation (PSO), Firefly Algorithm (FA), Ant Colony Optimisation (ACO), Grey Wolf Optimiser (GWO),and Bat Algorithm (BA). This hybridisation aims to address FALICM's susceptibility to noise and initialisation issues by utilising the global search capabilities of meta-heuristic optimisers, thereby enhancing segmentation stability and accuracy. The BA-FALICM hybrid demonstrated enhanced segmentation performance compared to the others. Classification was conducted prior to and following segmentation, with the classification performed after segmentation achieving the highest accuracy. The evaluation employing the Dice Similarity Coefficient (DSC), Jaccard Index (IoU), Peak Signal-to-Noise Ratio (PSNR), and Structural Similarity Index (SSIM) indicated notable enhancements in segmentation quality and classification robustness. This study introduces the integration of fuzzy clustering with meta-heuristic optimisation for embryo analysis, which enhances the reliability of embryo selection and may improve success rates in IVF procedures.

Medi Guard – The AI-Powered Drug Interaction Checker

Aryan Ausekar[1], Oshan Gharat[2], Amey Parab[3], Prof.Vidya Gogate[4]

1,2,3 dept. Electronics and Computer Science, Shah & Anchor Kutchhi Engineering College Mumbai, India
4 Associate Professor, Department of Electronics and Computer Science Shah & Anchor Kutchhi Engineering College, Mumbai ,India

Abstract: Medi Guard is an AI-powered drug interaction checker designed to enhance medication safety by identifying harmful interactions across a broad range of drug classes. The system combines a curated SQLite knowledge base with AI analysis via the Gemini API to deliver real-time results through an intuitive web interface built on Django and Tailwind CSS.

In a benchmark evaluation using validated reference data, Medi Guard achieved 95% overall interaction classification accuracy, a mean response time of 2–3 seconds, and an 89% user-satisfaction score from a pilot study of 50 users. Interactions are graded using explicit criteria aligned with minor, moderate, and severe categories and presented with actionable recommendations. Medi Guard targets both healthcare professionals and patients, wit safeguards (e.g. confirmation prompts and provenance links) to reduce over-reliance on AI by promoting human oversight. Index Terms—Drug interaction checker, AI-based analysis, medication safety, Django framework, SQLite database, Gemini API, clinical decision support, real-time monitoring, Tailwind CSS, web application.

Applied Modified Metaheuristic: Machine Learning Tuned for Software Defect Detection

Vuk Kostic[1], Radovan Dragić[2], Luka Jovanovic[3], Miodrag Zivkovic[4], Branislav Radomirovic[5], Vico Zeljkovic[6], Petar Spalevic[7], D Kavitha[8], Nebojsa Bacanin[9]

1,3,4,6,9 Faculty of Informatics and Computing, Singidunum University, Danijelova 32, 11000, Belgrade, Serbia.
2 Art of Design, Novi Knezevac, Serbia
5 Institute of Artificial Intelligence, Serbia
7 Faculty of Technical Sciences Kosovska Mitrovica, University of Pristina in Kosovska Mitrovica, Serbia
8 Department of Mathematics, Saveetha School of Engineering, SIMATS, Thandalam, Chennai, Tamilnadu, India.

Abstract: Software development involves structured methodologies encompassing coding, testing, debugging, and deployment, but faces challenges due to large codebases, diverse contributors, and high complexity. Manual testing and defect detection are increasingly inadequate, especially given the test oracle problem and coverage gaps. Artificial intelligence (AI) offers a promising alternative, enabling automated test case generation and defect identification. However, AI-based models struggle with imbalanced datasets, unstable software metrics, and the complexity of hyper parameter tuning an NP-hard problem. To address this,meta heuristic algorithms, galvanized by nature, provide efficient search strategies for optimization. This study contributes by developing a modified meta heuristic algorithm for hyper parameter optimization, presenting a classifier for software defect detection, and proposing a supporting framework for continuous development and tuning. Real world testing using publicity available data suggest promising outcomes, with the top performing models tuned with the adapted algorithm attaining accuracy as high as .903846.

Attention-Guided Multi-Modal Deep Fusion Network for Early Prediction of Alzheimer's Disease using Structural MRI and PET Imaging

P. Jeba Christybai[1], R.Priya[2]

1 Department of Computer Science, School of Computing Sciences, Vels Institute of Science, Technology & Advanced Studies, Chennai, India, Tamil Nadu
2 Department of Computer Applications (PG), School of Computing Sciences, Vels Institute of Science, Technology & Advanced Studies Chennai, Tamil Nadu, India

Abstract: Alzheimer's Disease (AD) is a neurodegenerative disorder characterized by progressive neuro degeneration, and it is one of the most common types of dementia worldwide. Being able to accurately and timely diagnosis AD remains a challenge in neuroscience. Our work presented in this study introduces a fully functional deep learning framework called Attention-Guided Multi-Modal Deep Fusion Network (AMDF-Net) that can help to predict the early diagnosis of Alzheimer's disease using structural MRI (sMRI) and FDG-PET imaging data through an integrated model. In AMDF-Net, we utilize dualbranch 3D convolutional neural networks (CNNs) as well as Transformer encoders to extract local and global spatial dependencies within volumetric brain images or their associated volumetric datasets. The output of the subsequently fused data is more indicative of the spatial and unique relationship because of the integrated cross-modal attention mechanism, which concurrently aligns and optimises the salient disease-related information across both modalities. The AMDF-Net was compared against the current leading state-of-the-art multi modal models on the Alzheimer's Disease. Neuro imaging Initiative (ADNI) dataset, attaining 92.1% accuracy, 95.4% AUC, and 0.91 F1 score. Explainability was established through Grad-CAM and Transformer attention maps, enabling clinicians to examine visually representative imaging of clinically relevant brain regions associated with the disease. These successful results indicate that attention guided multi-modal deep learning should be investigated further as a way to address future clinical decisions around the accuracy and interpretability of diagnosis of Alzheimer's disease derived from neuro imaging data.

Meta-Heuristic Ensemble Feature Selection (MEFS) and Stacking Deep Ensemble Classifier (SDEC) Model for Weather Prediction and Renewable Energy Demand Forecasting

Lekshmi Mohan[1], R.Durga[2]

1 Research Scholar, Department of computer Science, Vels Institute of Science, technology and Advanced Studies, Chennai, Tamil Nadu, India
2 Professor, Department of Advanced Computing & Analytics, Vels Institute of Science, technology and Advanced Studies Chennai, Tamil Nadu, India

Abstract: Wind speed and solar radiation varies is a predictable part of generating electricity from renewable resources. However, renewableenergy data is unpredictable and disorganized is a difficult process. Deep learning is a technique for identifying the high-level invariant structures and intrinsic nonlinear features in the dataset. Enhancing the effectiveness of forecasting models requires feature selection, which is the process of identifying and choosing the most relevant elements from the dataset. In this paper, Meta-heuristic Ensemble Feature Selection(MEFS) model, and Stacking Deep Ensemble Classifier (SDEC) modelare presented for feature selection and classification of wind speed and weather forecasting. The dataset, which was collected from Kaggle, contains four years' worth of Spanish weather, price, generating, and electrical consumption data. The dataset was sourced from the Trans-mission Service Operators (TSO) public portal, the European Network of Transmission System Operators for Electricity (ENTSOE). Min-maxnormalization was applied to pre-process the dataset. Entropy Binary Dragonfly Algorithm (EBDA), Adaptive Weight Dung Beetle Optimization (AWDBO), and Inertia Weight Wild Horse Optimizer (IWWHO)were combined into MEFS. SDEC is an ensemble method that com-bines the procedure of several models, such as the Peephole Long Short-Term Memory Network (PLSTM), Conditional Generative Adversarial Network (CGAN), and Lagrange Contractive Auto Encoder(LCAE)). SDEC model improves forecasting performance by training a meta-learner (Weighted Averaging Ensemble (WAE)) on the outputs of the underlying models. PLSTM gates can enter the cell since they have direct links or peepholes to the cell state. CGAN creates a corresponding number of samples to predict electricity from renewable sources including forecasted and actual samples. LCAE is an unsupervised Artificial Neural Network (ANN) with a regularization term using a Lagrange multiplier for forecasting prediction. Finally, WAE is used tomerge the results of individual models. Root Mean Square Error(RMSE), Mean Absolute Error (MAE), Pearson Correlation Coefficient (r), Nash Sutcliffe Efficiency (NSE), precision, recall, f-measure, and accuracy metrics is used to evaluate the efficiency of forecasting approaches.

Smart Intelligence Cyber Security Based on Hash Coded Stegno-Lattice Block Policy Steganography Using Edwards-Curve Digital Signature Algorithm

Sreena G Nair[1], Dr. K. Rohini[2]

1 Research Scholar, Department of Computer Science, VISTAS, Chennai.
2 Professor, Department of Computer Science, VISTAS, Chennai.

Abstract: This paper introduces a novel approach to smart intelligence cyber security, addressing vulnerabilities inherent in traditional methods that often succumb to authentication and key policy failures, leading to cyber-attacks. Our proposed system leverages Hash Coded Stegno Lattice Block Policy (HCS-LBP)to enhance data protection by creating pixel blocks interconnected through star link convective points, generating unique hash IDs for block-level security and sequence integrity. To further fortify the system, the Edwards-curve Digital Signature Algorithm (ECDSA) generates lattice block folding encryption, effectively encrypting the content within each block. A Master Key Authentication Policy (MKAP) is then implemented to establish a robust Key policy with granular access control mechanisms. Finally, Merkle Tree Block Level Integrity Verification (MTBLIV) integrated with Proof of Stake (PoS) is utilized to verify key integrity and ensure secure data handover at the peer end. This multi-layered approach aims to provide a resilient and secure framework forsmart intelligence systemsagainst evolving cyber threats.

Android Malware Detection (AMD) Using Stacked Deep Learning Ensemble Classifier Fusion (SDLECF) With Nature-Inspired Based Ensemble Feature Selection(NIEFS)

Anuja A Rajan[1], R.Durga[2]

1 Research Scholar, Department of computer Science, Vels Institute of Science, technology and Advanced Studies Chennai, Tamil Nadu, India
2 Professor, Department of Advanced Computing & Analytics, Vels Institute of Science, technology and Advanced Studies Chennai, Tamil Nadu, India

Abstract: Android is the most rapidly expanding mobile computer platform, which has been targeted by a variety of malware. It can be effectively identified using Deep Learning (DL) techniques. Typical feature selection algorithms disregard feature correlation which has been solved by using wrapper-based feature selection models. Wrapper-based techniques take a lot of time to select feature subsets. In this paper, Nature-Inspired Based Ensemble Feature Selection(NIEFS), and Stacked Deep Learning Ensemble Classifier Fusion (SDLECF)classifier has been introduced for combination of DL methods with increased detection accuracy. NIEFS model is developed based on a variety of evolutionary computation approaches, such as the Cauchy Operator Squirrel Search Algorithm (COSSA), Lévy Flight Pigeon-Inspired Optimization (LEFPIO), and Fuzzy Membership Grasshopper Optimization

Algorithm (FMGOA) for eliminating redundant or unnecessary features. The outputs of various approaches have been integrated using Mutual Information (MI). SDLECF is introduced by merging many models (Bidirectional Gated Recurrent Unit (Bi-GRU), Sparse Auto encoder based Deep Neural Network (SAE-DNN), Bidirectional Long Short-Term Memory (BDLSTM), and Mean Weight Deep Belief Network (MWDBN)) to attain highest malware detection performance. Bi-GRU can handle data sequences in both forward and backward direction. SAE-DNN includes of three components like an encoder, a decoder, and a classification. BDLSTM classifier is a category of Recurrent Neural Network (RNN) which works on both forward and backward directions. MWDBN includes of Multiple Restricted Boltzmann Machine (RBM) layers for classification. Finally, classifier performance was measured using MATrix LABoratory R2020a(MATLABR2020a) and the metrics like Precision (Pre), Recall (Rec), Fmeasure (FM), and Weighted F-measure (WFM).

Ambient Intelligence in Smart Hospital Rooms :A Context-Aware System for Patient-Centric Healthcare

Jayabhaduri Radhakrishnan[1], Shekhar R[2]

1,2 Alliance School of Advanced Computing, Alliance University, Bengaluru, Karnataka 562106, India

Abstract: This research work introduces an AmI-based framework for Smart Hospital Rooms (SHRs) which makes use of algorithmic reasoning to support smart patient monitoring and adaptive healthcare environments. The essence of the system is a rule-based context inference engine implemented in the Py Know framework, which processes real time multimodal sensor data, including heart rate, oxygen saturation, ambient temperature, humidity, and patient activity, and infers clinically meaningful states. These states, Health Emergency, Patient Sleeping, andRoom Unoccupied, are utilized to re automated actuation responses like turning alarms on, changing environment controls, or alerting care givers. The system embeds an edge-based IoT architecture supported by secure Message Queuing Telemetry Transport (MQTT) communication, voice command through Amazon Alexa, and a real-time video stream via ESP32-CAM. It logs and visualizes data via InuxDB and Grafana, facilitating ongoing monitoring and analysis. A centralized server interface enables multi-room and ICU-level deployment. Experimental evaluation illustrates the system's reliability, context accuracy, and scalability deployment potential in intelligent healthcare environments.

Monetary Policy Optimization through Neural Network Forecasting of Banking Sector Stability

Dr. Monica Verma[1], Dr. Nazia Jamal[2]

1 Associate Professor, Department of Commerce, Marwadi University ,Gujrat,
2 Assistant Professor, Institute of Management Sciences, Second Campus, University of Lucknow, Jankipuram Extension-226021, Lucknow,

Abstract: Conventional approaches to estimation and forecasting include the use of linear statistical models for instance linear regression equations, which are good but the relationships between variables are non-linear and this causes the models to be slightly off in their prediction. On the other hand, using neural networks and particularly LSTM and ANN has proved to enhance the ability to forecast important factors such as NPLs, CAR and liquidity ratios. As such, these models enable the central banks to distinguish between complex patterns in otherwise enormous datasets providing them with more accurate and efficient ways in which they pre emptively respond to systematic risks. Thus in this paper, we discuss how neural networks can be used to enhance the efficiency of monetary policy by more accurate predictions on stability of the banking sector. The work also reveals the fact that neural networks are superior in terms of speed and baseline accuracy in comparison to the conventional models. The benefits of the former in achieving vital stability or continued solvency are apparent. The near aspirations for the study of these models should lie in a seamless combination of the above named hybrid models, for example coupling neural networks and reinforcement learning, as well as real-time policy updates based on constantly CL output. The paper will use the neural network architecture, owing to the characteristics of the economic time series data. That is why, LSTM networks were selected as the primary model since they are effective in the analysis of time- dependent data and can consider long-range dependencies in economic variables to find out meaningful results.

A Neural Network Approach for Translating English to Sanskrit Using LSTM Encoder-Decoder Architecture

Neha Vaswani[1], Krupa Mehta[2]

1,2 FCAIT, GLS University, Ahmedabad, Gujarat

Abstract: From the earliest of civilizations, language has served as the defining feature of people's activities in regards to interaction with others and preservation of culture. Knowledge transmission and retention became easier as a result of language and its development. In today's world, the need to tackle linguistic gaps has skyrocketed. English is an example of a language that has become a global lingua franca that enables people from different cultures to interact seamlessly while Sanskrit is an example of a language that has preserved ancient India's intellectual and spiritual wealth. The focus and goal of this paper is to identify the hindrances faced when trying to translate these two languages and incorporate the latest advancements in

machine learning, more specifically, Long Short Term Memory (LSTM) networks, to create a working system for English to Sanskrit translation.

Analyzing Traffic Patterns: A Literature Review of Machine Learning Techniques in Road Traffic Management

Bhavesh Jayantilal Cholera[1], Sunil Lalchand Bajeja[2]

1 Research scholar, Faculty of Computer Application, Marwadi University, Rajkot, Gujarat, India
2 Associate Professor, Faculty of Computer Application Marwadi University Rajkot, Gujarat, India.

Abstract: This literature review investigates the advances in machine learning algorithms pertinent to real-time road traffic management, organized into four comprehensive phases. The first phase focuses on vehicle detection and classification, analyzing algorithms such as YOLO, CNNs, and SVMs for their performance and accuracy in real-time applications. The second phase delves into traffic pattern analysis using various machine learning approaches, including K-Means, DBSCAN, and Random Forests, highlighting their capabilities and limitations in different traffic scenarios. The third phase emphasizes the accurate prediction and classification of traffic conditions to enhance traffic management systems, utilizing models like LSTMs, GRUs, and ARIMA for time-series analysis. The final phase discusses traffic routing strategies, employing algorithms such as Dijkstra's, A*, and reinforcement learning to optimize route suggestions based on contextual data. The review identifies significant research gaps, including the need for novel methodologies and the integration of big data technologies, while also exploring future research directions to refine these algorithms for smarter urban traffic management. Overall, this work underscores the importance of adopting and advancing machine learning techniques to address the complexities of real-time traffic systems effectiv.

Hypertension Detection Using ANOVA-Correlation Feature Selection with Updated Diagnostic Thresholds using Machine Learning approach

Mirajkumar Malama[1], Jigna Jadava[2]

1 Student. Department of Computer Science and Engineering (Data Science), Vishwakarma Government Engineering College (VGEC), 382424, India
2 Assistant Professor. Department of Computer Engineering, Vishwakarma Government Engineering College (VGEC), 382424, India

Abstract: Hypertension is a major global health concern and a leading contributor to cardiovascular diseases. Accurate early detection is essential for timely intervention and

management. Previous studies using the National Health and Nutrition Examination Survey (NHANES) data have largely focused on demographic and questionnaire-based features, potentially limiting predictive performance. This study proposes an extended approach to hypertension prediction by incorporating features from three NHANES data categories: de-mographic , examination, and laboratory data. Data from the 2013–2014, 2015-2016, and 2017–2018 cycles were combined to form a comprehensive da-taset[1]. 197 features were considered, and Analysis of Variance (ANOVA)-based feature selection was applied to identify the 15 most significant predictors, primarily related to body fat distribution and anthropometric measure-ments. The classification of hypertensive and normal individuals was based on the updated threshold of 130/80 mm Hg as per recent clinical guidelines. Multiple machine learning models including Logistic Regression, Decision Tree, SVM, Random Forest, and K-Nearest Neighbors (KNN) were trained using both train-test split and Stratified K-Fold cross-validation to ensure fair evaluation on the imbalanced dataset. Logistic Regression demonstrated the most consistent and superior performance in terms of accuracy with 84.02% and Area Under the Curve (AUC) Score of 90.1%. These findings highlight the importance of incorporating diverse clinical features particularly fat distribution metrics such as android and gynoid fat regions and Inflation level for improving hypertension prediction. Such physiological indicators, often overlooked in previous studies, show strong association with hypertension risk. Our results demonstrate that leveraging examination and laboratory data alongside traditional demographics can significantly enhance predictive performance in hypertension risk assessment. External validation with the 2011–2012 NHANES cycle achieved an AUC of 91.01%, confirming the relevance of selected features.

A Collaborative and Interpretable AI Model for Chronic Kidney Disease Prediction Using Federated Learning

Mr. P. Marimuktu[1], Dr. Dinesh Dattatray Patil[2], Dr. Manoj Narhar Behere[3]

1Assistant Professor, Department of Computer Applications, Ayya Nadar Janaki Ammal College (Autonomous), Sivakasi, Tamilnadu, India.
2Associate Professor & Head, Department of Computer Science and Engineering, SSGB College of Engineering and Technology, (Autonomous) Bhusawal , Maharashtra, India.
3Vice-Principal , RCPET's Institute of Management Research and Development, Shirpur, Maharashtra, India.

Abstract: Chronic Kidney Disease (CKD) remains a major global health concern, often progressing undetected until advanced stages. Accurate early prediction is critical, yet traditional AI approaches rely on centralized data, raising privacy concerns and limiting collaboration across healthcare institutions. This research proposed a novel collaborative CKD prediction framework that leverages Federated Learning (FL) to enable decentralized model training over multiple hospitals except sharing susceptive patient data. To address the "black-box" nature of deep learning models, we integrate Explainable Artificial Intelligence (XAI) techniques-specifically SHAP (SHapley Additive exPlanations) to enhance interpretability and foster clinical trust in the predictive outcomes. The proposed model is evaluated using real-world CKD datasets in a simulated federated environment, measuring performance in terms of

accuracy, precision, recall, and area under the curve (AUC). Our federated model achieves performance comparable to centralized models (accuracy: 97.3%, AUC: 0.98) while maintaining data privacy. The XAI integration provides meaningful insights into key predictive features such as serum creatinine, blood pressure, and albumin levels, aligning with clinical understanding. This work demonstrates that privacy-preserving, interpretable AI is not only possible but essential for the future of collaborative healthcare diagnostics.

Lie To Me : A Multi-Agent System for Detecting Hallucinations in Large Language Models

Kokou Elvis Khorem Blitti[1], Fitsum Getachew Tola[2], Madhu Shukla[3], Vipul Ladva[4], Neel Dholakia[5]

1,2,3,4,5 Marwadi University, Rajkot, Gujarat, India

Abstract:. Large Language Models (LLMs) can produce human-like responses across various domains from healthcare to history. Millions of people use those models and chatbots daily, and some use them to get responses in critical domains like healthcare, law, and so on. However, the most concerning problem found in those models is hallucination, where false, misleading, or exaggerated information is produced. Many people use the models without cross-checking the content generated by the models, which can lead to some unforeseen consequences. Guaranteeing the trustworthiness and reliability of AI systems needs to be done with the utmost caution, given the sensitive nature of some domains. In this study, we use one of the most widely used methods in recent months to detect hallucinations: an LLM-based metric. We propose a novel and unique architecture based on recent advances in the LLM field, especially the advances in agentic AI. We call it "LieToMe", a multi-agent-based system that we believe can detect hallucinations more accurately than existing systems. It includes 3 worker agents: a Retrieval Augmented Generation agent, a Web agent, and a Domain-based agent. In this paper, the focus is on the healthcare domain, although the modularity of the system allows it to adapt to other domains like law, science, and soon. The system computes a Composite Hallucination Score (CHS) that contains weights we can vary depending on the domain. We use some state-of-the-art models to test our hallucination detection system. Good results have been achieved, constituting solid proof of concept of this method.

Efficient and Ethical Data Collection from E-Commerce Platforms via Web Scraping: A Case Study on Amazon Product Reviews

Asha Patel[1], Bhavesh Patel[2], Helly Patel[3], Ajay Patel[4]

1,2,3,4 Faculty of Computer Applications, Ganpat University, Mehsana, India

Abstract: This study proposes an efficient and ethically grounded methodology for extracting large-scale product review data from Amazon, aimed at supporting data-driven research in e-commerce analytics. Unlike conventional scraping practices, the novelty of this work lies in integrating a technically rigorous pipeline with explicit ethical safeguards, making it both reproducible and adaptable to diverse research contexts. The approach encompasses environment setup, URL and DOM structure analysis, HTTP request management, and structured data storage using Python libraries such as Requests, BeautifulSoup, and Pandas. Particular attention is given to the practical challenges of DOM-based scraping, including frequent HTML structure changes, nested elements, pagination, and dynamically loaded content, which often hinder consistent data extraction in e-commerce platforms. Ethical scraping practices are embedded throughout the pipeline, including User-Agent rotation, rate limiting, and compliance with website terms of service, thereby minimizing detection risks and ensuring responsible data use. The resultingdataset is structured to enable downstream applications such as sentiment analysis, customer feedback modeling, and recommendation system development. By addressing both the technical complexities of DOM-based scraping and the ethical considerations of large-scale data collection, this case study contributes a novel, scalable, and responsible framework for e-commerce research.

Smart Agriculture System (SAS) for Vertical Farming: A Review, Architecture and Implementation

Anjali Joshi[1], Ankita Renuka[2], Amit Sata[3]

1,2 Assistant Professor, Department of Computer Engineering-AI & Big Data, Marwadi Univeristy, India
3 Professor, Department of Mechanical Engineering, Marwadi Univeristy, India

Abstract: The levels of carbon dioxide (CO2), volatile organic compounds (VOCs) and insufficient oxygen have continuously reduced the quality of indoor air (IAQ) of city areas. To answer this question, this paper presents a Smart Agriculture System (SAS) of vertical farming to incorporate air-cleaning plant species and real-time environmental sensors to improve the IAQ of confined spaces. A bibliometric study of Scopus® and Web of Science® databases revealed current global trends in smart vertical farming, thus guiding the design of a five-layer SAS architecture including: Physical, Sensing, Data Acquisition, Network, and Application layers. Physical layer involves the use of plant species which have been tested to have polluting

and oxygen releasing properties. Sensing layer measures main parameters at any one time, such as temperature, humidity, light intensity, CO2, O2, and VOC concentrations. ESP32 microcontrollers process data, and transmit it through MQTT/HTTP protocols to a cloud platform where it is further analyzed. A user friendly application displays the real time and historic trends, hence ensuring that anomalies are identified and actionable recommendations are generated. The prototype testing confirmed that the system is successful in keeping IAQ healthy and it is scalable and ecologically sustainable to use in urban households.

Novel Transfer Learning Framework for Lung Cancer Detection based on Integer Wavelet Transform (IWT) Sub-Ban Decomposition and a customized Fused ResNet50Architecture (IWTFused ResNet50)

Dr.C.Prema[1],K.Emily Esther Rani[2], Dr.G.Indra Navaroj[3]

1, 2 Jayaraj Annapackiam CSI College of Engineering, Nazareth, Tamil Nadu-628616,India
3 Vel Tech RangarajanDr.Sagunthala R&D Institute of Science and Technology,Chennai, Tamil Nadu, India

Abstract: Accurate and early detection of lung cancer is needed to save the lives of patients. After COVID – 19, lung cancer contributes more to death worldwide. To eradicate this, we propose a deep learning-based diagnostic framework that integrates Integer Wavelet Transform (IWT) with a customized Fused ResNet50 architecture to classify lung CT images into three categories: Normal cases, Bengin cases, and Malignant cases. Initially, the input CT images are preprocessed and decomposed using IWT to extract LL (approximation) and LH (horizontal detail) Sub-Bands, which capture essential spatial-frequency characteristics of lung tissues. These Sub-Bands are resized and fused channel-wise to form a two-channel composite image, which serves as input to the network. The proposed model modifies the conventional ResNet50 by introducing parallel convolutional pathways for each Sub-Band in the early layers, followed by concatenation and joint feature learning in the deeper layers. This fusion strategy effectively combines low-frequency and edge related features, enhancing the model's ability to distinguish between subtle texture variations in different lung cancer types. The model is trained and evaluated on the publicly available The IQ-OTHNCCD lung cancer dataset using an 80:20 train-test split. The experimental results show that Fused ResNet50 achieves a superior classification performance, attaining an overall accuracy of 99%, precision of 88%, recall of 97%, and F1 score of 99%. The architecture also demonstrates robust convergence and reduced over fitting due to the Sub-Band fusion mechanism. This approach presents a reliable and interpretable solution for automated lung cancer detection using CT images.

Enhancing Bird Flu Outbreak Predictions Using Data Mining Techniques

Dr. Deeba K[1], Dr. Jamberi K[2], B. Saratha[3]

1 Assistant Professor, School of Computer Science, and Applications, REVA University, Bangalore, India
2 Associate Professor, School of Computer Science and Applications, REVA University, Bangalore, India
3Assistant Professor, Department of Artificial Intelligence & Data Science, R.M.K Engineering College Chennai, Tamilnadu

Abstract: The avian influenza, or bird flu, is widely considered a serious threat to domestic poultry and to humans. Early and accurate predictions of bird flu outbreaks play a key role in the effective control and prevention of these diseases. We aim to explore the potential of our proposed data mining techniques, which help gain valuable insights into the patterns and risk factors of the disease, for improving flu outbreak predictions. Decision trees, support vector machines (SVM), random forests, and neural networks are data mining techniques that can work through large datasets and reveal hidden correlations between the environmental, climatic, and epidemiological factors contributing to bird flu outbreaks. This synergy of historical outbreak data, weather trends, and migratory bird patterns empowers researchers to create predictive models that offer crucial early warnings, enabling authorities to introduce preventive measures in a timely manner. Other methods, such as clustering and classification algorithms, assist in identifying high-risk areas and predicting possible outbreak locations. One of the study's main focuses is the benefits of applying data mining for bird flu prediction, such as higher accuracy, rapid analysis, and the capacity to process huge volumes of real-time data. Yet some issues related to data availability, model interpretability, and computational complexity should be solved to implement it properly. The integration of machine learning and artificial intelligence with data mining techniques provides more accurate predictions, making it a powerful method for disease surveillance. These findings underscore the need for data-driven approaches in managing the avian influenza. Using sophisticated computational methods, decision-makers, veterinary experts, and health organizations can pre-emptively diminish the effects of avian influenza outbreaks, minimizing costs and threats to public health. The limited reporting and tracking of diseases also result in less attention and resources from government departments in public health.

Deep fake Face Detection Using CNN and Transformer Architectures for Enhanced Digital Security

Swari Patel[1], Roma Kataria[2], Jaiprakash Verma[3], Sumedha Arora[4]

1,2 Institute of Technology, Nirma University, Ahmedabad, Gujarat, India
3,4 Department of Computer Science, Nirma University, Ahmedabad, Gujarat, India

Abstract:The increase in deepfake technology through synthetic facial manipulation using deep learning raises significant privacy concerns, misinformation risks, and trust issues. This research analyzes deep fake face detection using Convolutional Neural Networks (CNNs) and Transformer based architectures. We employ VGG19, ResNet50, and DenseNet121 alongside Vision Transformer (ViT) and Swin Transformer to distinguish fake from real facial images. Performance evaluation includes accuracy, precision, recall, F1-score, and ROC AUC metrics, supported by confusion matrix analysis. While traditional CNNs showed moderate accuracy,Transformer-based models, particularly Vision Transformer and Swin Transformer, achieved exceptional results—85%–86% accuracy and AUC scores of 0.93–0.92, respectively. Attention-based models prove highly effective in capturing subtle manipulations present in deepfake content. The proposed detection system can be integrated into real-time media verifiers, content moderation tools, and forensic software to strengthen digital security and combat misinformation.

Mapping AI Governance Models in Finance: A Cross-Country Comparative Study

Ravi Baijulal Bhandari[1], Neha Ramteke[2], Harshal Anil Salunkhe[3], Abhishek Raidas[4]
Rajkumar Kankariya[5], Khushali Oza[6]

1,2 Indira University, Pune, India
3 MIT World Peace University,Pune,India
4 Indira Institute of Management, Pune, India
5 Company Secretary, Pune, India
6 SCMIRT, Pune

Abstract: The financial service industry is filled with possibilities brought by artificial intelligence (AI), including algorithmictrading, robo-advisory, fraud detection, and credit scoring. But the proliferation of AI raises ethical and regulatory issues, such as bias, opacity, and systemic risk. This paper qualitatively compares AI governance models for finance across five major jurisdictions (EU, US, UK, Singapore, and India). These jurisdictions are united in their objectives of enhancing responsible innovation, protecting consumers, and ensuring transparency, but their regulatory approaches range widely in terms of scope, legal effect, and ethical emphasis. The EU is at the vanguard through its AI Act, which employs a precautionary and rule-driven approach, imposing strict obligations on high-risk uses. By contrast, the US uses a sector-specific, principles-based approach based on existing financial sector regulation and voluntary frameworks, including the NIST AI Risk Management Framework. Both the UK and Singapore have principles-based approaches which promote transparent, accountable, and innovative models based on fluid models, for instance the FEAT framework. India: As an emerging fintech leader, India is building its own balanced model under RBI's FREE-AI initiative, based on global best practices. The article constructs asystemic comparison chart on AI regulation, enforcement institution, financial AI application, and AI ethics of the codifiedrules. Thematic analysis identifies key dimensions (explained-by, fairness, accountability, standardization potential). The study adds to the increasing policy conversation on regulating AI by providing policy guidelines which highlights dynamic governance, international collaboration, and integration of ethics throughout the AI lifecycle in finance.

Sanskrit to English Translation: A Review

Tejas Davada[1], Abhijit Patil[2], Dhruv Chheda[3], Maitri Doshi[4]

1,2,3,4 K. J Somaiya Institute of Technology, Sion, Mumbai – 400077

Abstract: Sanskrit being the most culturally rich language has many deep insights and is diverse in all fields from religious texts, scientific and philosophical documents and poetic rhymes. In the modern world in today's time the Sanskrit language has been gaining a lot of interest in the western youth as they have understood the importance of this language, so to make them accessible the Sanskrit language in easy format globally the paper discusses an approach to translate it into English. This paper highlights different approaches used for Sanskrit to English Translation and presents an idea of using Neural Machine Translation (NMT) approach for Sanskrit-to-English translation utilizing tokenization, word embedding via Word2Vec, and a Transformer-based architecture. The paper also aims to employ reinforcement learning and transfer learning techniques to enhance translation accuracy while addressing the complexities of Sanskrit's morphology and flexible syntax. The dataset when used will be extracted from Itihasa a large scale corpus from Sanskrit to English Translation. This corpus contains Sanskrit Shlokas and their English translations extracted by two epics viz. the Ramayana and Mahabharata. It also dicusses the key challenges faced by the current translation models and highlights their issues, and further propses an approach that aims to resolve them through a new model.

Predicting Melanoma Tumor Size Using Clinical and Biophysical Attributes

Neel Dholakia[1], Madhu Shukla[2], Vipul Ladva[3], Simrin Fathima Syed[4], Kalpesh Popat[5]

1,2,3,4 Department of Computer Science Engineering- AI, ML, DS, Marwadi University, Rajkot, Gujarat, India,
5 Department of Computer Applications, Marwadi University, Rajkot, Gujarat, India

Abstract: Melanoma, the most fatal of skin cancers, is most challenging early detection and treatment as it exists in varied sizes, shapes and degrees of malignancy. The current work makes use of this comprehensive set of clinical and biophysical features to estimate melanoma tumour size - a factor of fundamental importance for disease progression assessment and therapeutic management. Features: The dataset has features like mass , malignancy ratio, exposed area, and damage ratio, which presents a multidimensional description of the tumors. Through statistical analysis and predictive model building, important factors controlling tumor size are determined and their relationships quantified. Visual intuition and quantitative analysis show that parameters such as surface area exposed and the malignancy ratio are significant factors which result in the size of the tumor. Additionally, the study utilises state of the art machine learning to predict with high accuracy to offer a strong platform for early diagnosis and targeted intervention. This study demonstrates the promise of predictive analytics in cancer

medicine, thus driving improved clinical outputs. With this we also intend to provide valuable contribution to the global fight against cancer of the skin to assist with making informed and timely decisions.

YOLOCR: Towards Smarter OCR for Real-TimeText Recognition

Prithviraj Sawant[1], Piyush Tyagi[2], Bhavya Dedhiya[3], Aditya Yawalkar[4]
Umang Patel[5]

1,2,3,4,5 Somaiya Vidyavihar University

Abstract: Accessibility remains a critical challenge for visually impaired individuals, particularly in accessing textual information from their surroundings. Traditional Optical Character Recognition (OCR) systems often struggle with real-time performance and context-aware text processing, making it difficult for users to receive coherent and efficient auditory feedback. To address this, we propose a real-time text recognition and speech conversion system designed for visually impaired users. Our approach integrates a custom-trained YOLOCR model for text region detection, Easy OCR for optical character recognition, and GoogleText-to-Speech for auditory output. Unlike traditional OCR systems that process text line by line, our method prioritizes text-dense regions, ensuring coherent and efficient information delivery. Experimental results demonstrate a detection accuracy of 75.2% mAP@0.5, an OCR Word Accuracy Rate of 92.5%, and a Text-to-Speech correctness of 95.0%, and a real-time performance of 18 FPS. This solution enhances accessibility by improving text recognition accuracy and reducing cognitive load for visually impaired individuals.

AI-Powered Learning: Assessing ChatGPT's Influence on Student Engagement and Autonomy

Ms. Chetana Rane[1], Mr. Lakhichand Patil[2], Dr. Kalpesh Popat[3] Dr. Smita Bhanap[4]
Dr. Rasika Kulkarni[5]

1 Student, M.Sc. Data Science, Fergusson College (Autonomous), Pune,Maharashtra, India.
2 Assistant Professor, Fergusson College (Autonomous), Pune, Maharashtra, India.
3 Associate Professor, Marwadi University, Rajkot, Gujarat, India.
4 Assistant Professor, Fergusson College (Autonomous), Pune, Maharashtra, India.
5 Assistant Professor, Fergusson College (Autonomous), Pune, Maharashtra, India.

Abstract: This research examines the determinants of students' attitudes towards Chat GPT's effect on learning, formulates a predictive model, tests its validity, and extracts influential predictors of positive and negative attitudes. Google Forms survey gathered data from 315 students (19–21 years old) on their use and attitudes towards Chat GPT. Preprocessing involved cleaning, feature selection, and encoding, whereas exploratory data analysis (EDA) detected patterns with stacked bar charts, box plots, and heat maps. Machine learning algorithms, such as Logistic Regression, Random Forest, and XG Boost, were used to forecast the beliefs of students regarding the impact of Chat GPT, with model performance measured via accuracy, precision, recall, F1-score, and confusion matrices. Analysis showed that over half (52.2%) of students felt that Chat GPT enhanced their learning, while 43.3% of them had challenges recalling information mediated by AI. 45.9% of students were concerned with academic misconduct, and 51.2% were concerned with possible interference with skill acquisition. Increased use and user friendliness were associated with greater self-reported dependence. Amongst predictive models, Random Forest provided the greatest accuracy (98%), followed by XGBoost (96%), with the top F1-score (0.97) and best recall of the target class. Logistic Regression, as a baseline, worked relatively poorer with a total accuracy of 82% and inability to predict minority classes.These results offer empirical support for both the benefits and pitfalls of integrating AI into learning, and identify potential risks of dependence and over-reliance.

A Real-Time Ai-Driven Prenatal Nutrition Framework Integrating Multi-Modal Data for Personalized Maternal Care

K. Rajasankari[1], S. Silvia Priscila[2]

1 Research Scholar, Department of Applications, Bharat Institute of Higher Education and Research, Chennai, Tamil Nadu, India.
2 Associate Professor, Department of Computer Applications, Bharat Institute of Higher Education and Research, Chennai, Tamil Nadu, India

Abstract: Hidden hunger, also known as micronutrient deficiencies in pregnancy, is a very dangerous risk to both the mother and the child. Current prenatal nutrition models are based on

generalized nutritional guidelines and cannot be adjusted to genetic, physiological and environmental differences. IoT data,dietary records, genetic research, and medical imaging data are still disjointed, which constrains the number of personalized care opportunities. In order to close these gaps, we present a real-time AI-based prenatal nutrition system, which combines multimodal data, such as wearable IoT streams, genetic and epigenetic profiles, dietary records, and 3D/4D ultrasound images. The system uses an ensemble deep learning system that integrates U-Net, ACSNet, EU-Net, MSNet, and PEFNet to give adaptive dietary suggestions, and CapsNet facilitates dynamic fetal health. The constant IoT feed guarantees a dynamism in real-time, and ultrasound imaging improves anatomical examination. Experimental outcomes show that the 94% accuracy of predicting the micronutrient deficiencies significantly outperform the traditional use of single-model methods, with the use of ultrasounds enhancing the accuracy of fetal monitoring by 31 percent. This framework provides early personalized nutrition interventions timely, to promote prenatal care using the precision health strategies to maximize the maternal and fetal outcomes.

Sentiment Analysis in the Construction Industry: Evaluating User Experiences with Virtual Reality Services

Priyanga T[1] , Firdaus Bashir [2], Narendra Rathnaraj[3]

1,2,3 Assistant Professor, PSG Institute of Management, PSG College of Technology, Coimbatore, Tamil Nadu, India

Abstract: The construction sector plays a vital role in driving economic development of India. There has been recurring dissatisfaction among consumers, particularly during the project handover phase, where issues such as material mismatches and design misalignment often lead to deconstruction, partial demolition, or diminished client satisfaction. In response to these challenges, virtual reality has emerged as a promising solution. By enabling clients to explore and experience their projects virtually prior or while in the construction phrase virtual reality minimizes miscommunication, reduces waste, and curtails the likelihood of costly revisions. This study investigates consumer perceptions of this services in construction by analyzing sentiment data from 92 users who engaged with virtual reality enabled features, including virtual walkthroughs of unbuilt homes, interior design previews, paint texture trials, and tile selections. This study integrating Presence Theory into the context of consumer experiences with virtualreality in the construction industry. A structured questionnaire was used to collect user feedback, and a corpus-based sentiment analysis approach was applied to examine the emotional and experiential dimensions of VR usage. The study underscores the value of integrating VR technologies in construction as a strategic tool for improving project outcomes and fostering sustainable growth. The findings offer actionable insights for construction firms seeking to improve client engagement, optimize resource use, and gain competitive advantage. By integrating immersive technologies into early design stages, companies can proactively address client expectations, minimize waste, and foster trust. Ultimately, the study advocates for a human-centered digital transformation in construction ,wherein VR is not merely a visualization tool but a strategic enabler of innovation, transparency, and long-term value in project delivery.

Leveraging Machine Learning Algorithms for Precise Heart Disease Prediction

Dr.S.Vijaya[1], Dr.D.Padmapriya[2]

1 Associate Professor and Head, KG College of Arts and Science
2 Assistant Professor , KG College of Arts and Science

Abstract: Heart disease ruins one of the primary causes of death worldwide, imposing the improvement of accurate and trustworthy prediction models for quick finding and intervention. The aim of this study is to evaluate and compare the performance of the prediction results by the three machine learning approaches Random Forest (RF), Artificial Neural Networks (ANN), and Extreme Gradient Boosting (XGBoost). The experimental work used on two benchmark datasets: Heart.csv and Heart Failure Clinical Records Dataset downloaded from thekaggle.com. To achieve high effectiveness data pre-processing, feature selection, and model fitting strategies were used. The results of three methods compared based on evaluation metrics such as accuracy, false positive rates, precision, recall and F1-score. To increase prediction accuracy, we used an efficient technique that involved data pre-processing, feature selection, and model fitting. To evaluate all these three models‟ interpretability and computational efficiency a comparative analysis performed based on the metrics Accuracy, Precision, Recall and F1-Score. On both datasets Heart.csv and Heart_Failure_Clinical_Records_Dataset (downloaded from Kaggle.com website), RandomForest reliably achieved the highest prediction accuracy (95.5% & 90% respectively), trailed closely by XGBoost (93.9% & 91.67% respectively), while ANN returned (89% & 90.33% respectively) depending on hyper parameter tuning. In terms of false positive rates, RF established lower FPR than XGBoost and ANN, obtained balanced sensitivity and specificity effectively. Feature selection enriched RF and XGBoost more significantly than ANN, representing that tree-based approaches inherently lever redundant features well. From the above experimental result shows that, while all three models have excellent predictive abilities, the Random Forest method's improved performance and interpretability make it better suitable for clinical applications. Our study emphasises the relevance of ML approaches in detecting the heart diseases in advance, take timely medical decisions, and lowering patients' risk of cardiovascular disease.

Real-Time Knowledge Access Using Large Language Models and Web Technologies

M Jayaram[1], Ch Jyothi[2], Deepthi T[3], Sri Ramya[4], Paka Srikanth[5]

1 Professor, Department of CSE (AI&ML), AVN Institute of Engineering and Technology, Hyderabad.
2,3 Assistant Professor, Department of CSE (AI&ML),AVN Institute of Engineering and Technology, Hyderabad.
4,5 Department of CSE (AI & ML), AVN Institute of Engineering and Technology, Hyderabad.

Abstract: This study addresses the challenge of real-time knowledge access from dynamic web data, where conventional search engines return raw links without contextual insight. We present Insight flow, a web-based chat companion that integrates Trafilatura for content extraction, Hugging Face embeddings for semantic search, FAISS for vector indexing, and GROQ's LLaMA 3.3 70B model via Lang Chain for intelligent, memory-based interaction. Experiments demonstrate high retrieval accuracy (up to 98% for single-URL queries), low latency (<300msfor semantic search), and strong user satisfaction (89%). The system enables URL-driven contextual Q&A, open-ended dialogue, and session memory. Our contribution lies in providing a scalable, efficient platform for knowledge augmentation that balances accuracy, speed, and conversational continuity. The proposed framework has applications in academic research, business intelligence, and real-time decision-making.

Improving Accurate Prediction in Cardiovascular Disease and Optimizing using Novel Nesterov Accelerated Gradient in Comparison with Gradient Boosting Classification

G. Ezhilvani[1], Dr. G. Thailambal[2]

1,2 Department of Advanced Computing and Analytics, VISTAS, Chennai

Abstract: Traditional approaches and machine learning (ML) incorporate the neural network process in predicting all medical complications and detecting the severity of health issues, mostly considered critical conditions. Heart diseases are common nowadays in all generations and occur in clinical challenges in all countries. Cardiovascular is one kind of heart disease that specialists and experts handle to diagnose in the early stages. Several ML classifiers were implemented and some produced results as incorrect diagnoses addressed as inaccurate in the medical field. The proposed work novelty Nesterov Accelerated Gradient approach produces optimal prediction due to finding the severity of cardiovascular disease. Data are preprocessed using the classification of severity in heart diseases using the Novel Gradient Boosting Classification (NGBC) algorithm which has the same classes observed manually and systematically. From the classification, output was achieved to categorize the classes that can obtain an accuracy of 94.8% accuracy based on training the model and testing in prediction.

To improve performance analysis and suggest diagnosis, the proposed algorithm produces precision, recall, and confusion matrix metrics of heart disease using Novel Nesterov Accelerated Gradient (NNAG) compared with XGboost and Aquila optimizer. The better optimization demonstrates how healthcare based on heart diseases can be effectively handled at an earlier stage to save human lives.

Early Prediction Of Central Precocious Puberty using ANN+VGG16 Model

P. Ezhilarasi[1], T. Sree Kala[2]

1 Research Scholar, Assistant Professor, Pachaiyappa's College for Men, Kanchipuram
2 Professor, VISTAS, Chennai Department of Advanced Computing Sciences, VISTAS

Abstract: Girls who show secondary sexual traits before the age of eight and boys who do so before the age of nine are said to have precocious puberty. It is associated with accelerated growth, premature reproductive maturation, and substantial psychological and physiological transformations. Kids who go through puberty early are more likely to get type 2 diabetes, heart disease, depression, die young, and girls are more likely to get breast cancer. These health issues show how important it is to find and treat problems quickly. This work employs machine learning and deep learning techniques to forecast central precocious puberty. Our approach combines luteinizing hormone(LH) data with pelvic ultrasound imaging utilizing an integrated Artificial Neural Network (ANN) and VGG16 model. The suggested ANN+VGG16 model did better than previous benchmark models, with an accuracy of 92.87% and a precision of 94.26%. This framework offers a dependable way to forecast early puberty, which helps doctors make decisions and improve long-term health outcomes.

Real-Time Detection of Wildlife Intrusion in Agricultural Fields Using Edge-Optimized Deep Learning Models

Syed Ibrahim H[1], S. Silvia Priscila[2]

1 Research Scholar, Department of Computer Applications, Bharat Institute of Higher Education and Research, Chennai, Tamil Nadu, India.
2 Associate Professor, Department of Computer Applications, Bharat Institute of Higher Education and Research, Chennai, Tamil Nadu, India

Abstract: Wildlife movements on farmland pose a significant threat to crop production, farmer safety, and farming equipment in remote, unmanned settings. More traditional surveillance measures involving barriers and motion detector sensors are limited by, among other things, false alerts and lack of awareness of the surroundings. This study presents a deep learning (DL) framework to enhance the detection of wildlife movements by using RGB imaging, thermal

imaging, and motion detection. By employing lightweight models such as YOLOv5-Nano and MobileNetV3, the new environment incorporated spatial-temporal attention and a background suppression scheme to ameliorate the detection. These architectures were optimized for edge deployment with Tensor RT and quantization-aware training. The field testing of the proposed multi-modal architecture demonstrated high performance at 96.5% accuracy,94.8% precision, and 4% false alarms and excellent real-time performance demonstrating latency of 82 ms/frame, and energy consumption of 3.6 W/h. These results highlight the promise of an accurate deep learning-based multi-modal architecture for real-time wildlife detection, and set the stage for scalable smart agriculture applications.

A Multimodal Deep Learning Framework for Intelligent Animal Intrusion Monitoring in Farmlands

Syed Ibrahim H[1], S. Silvia Priscila[2]

1 Research Scholar, Department of Computer Applications, Bharat Institute of Higher Education and Research, Chennai, Tamil Nadu, India.
2 Associate Professor, Department of Computer Applications, Bharat Institute of Higher Education and Research, Chennai, Tamil Nadu, India

Abstract: Wildlife intrusions on farmlands result in substantial crop losses and financial hardship for farmers, particularly for those residing within close proximity of forests and wildlife areas. In this paper, a new multimodal deep learning(DL) architecture has been formulated with a proper combination of RGB,thermal and acoustic data, but also with the additional use of accelerometer / movement sensors as part of the pipeline to identify intrusions in a timely, accurate manner. The model architecture is made up of a combination of CNNs to extract features, an attention-based fusion model, temporal analysis (Temporal Convolutional Networks, TCN Layer) to include the time context of the intrusion, and is implemented on edge devices, giving it superior real-time capabilities. The proposed model can achieve 94.5% Accuracy, 95.2% precision, 93.7% recall, and F1 Score of 94.4% with a false alarm rate of 3.1%. These prelimi-nary results indicate the considerable advantages over the three baseline models, which included YOLOv5 and PIR-SVM systems, and promising results compared to spatial, temporal, and spectral detection methods. The proposed scalable solution would be robust enough, not only to issue automated alerts, but also allow for active learning, and represent a viable option for widespread deployment at farm-level, where smart farming in areas vulnerable to wildlife based intrusions still has great potential.

Revolutionizing Sustainable Agriculture with SoilFeX: A Multi-Modal Soil Feature Extraction Approach

R. Jeyashree[1], Dr. A. Poongodi[2]

1 Department of Computer Science, VISTAS, Chennai
2 Department of Computer Application - PG, VISTAS, Chennai

Abstract: Soil health prediction is the important for the agriculture and it is directly impact on choice of the crop, productivity and environmental sustainability. large-scale agriculture or real-time applications, conventional laboratory-based soil testing is time-consuming, labour-intensive, and costly. To focus the limitations this research proposed Soil FeX (Soil Feature Extractor). This is a holistic and multi-modal image-based algorithm focused on soil feature extraction automation through advanced image processing methods. This method is having series of components such as Multi-Scale-Directional-Gray-Level-Co-occurrence-Matrix (MSD-GLCM) for texture analysis, Multi-Scale Rotation-Invariant Local Binary-Patterns (MS-RI-LBP) for structural feature analysis, and Color-Auto-Correlogram (CAC) for spatial color assessment. It also extracts spectral features such as the Fourier Transform, Soil Moisture Index (SMI), and Normalized Difference Nitrogen Index (NDNI) to measure water content and nitrogen presence in the soil. This model also allowing holistic assessment of soil health based on regression integrates these characteristics to predict soil pH.

IOT and Machine Learning-Based Sugarcane Leaf Disease Classification

S. Akhil[1], Dr. R. Durga[2]

1,2 Department of Advanced Computing and Analytics, VISTAS, Chennai

Abstract: Leaf infections have a significant impact on sugarcane production, a valuable cash crop, and can result in substantial financial losses. Traditional methods of identifying illnesses are time-consuming and need specific expertise. In this research, we propose a machine learning (ML) technique based on quantum-behavior particle swarm optimization (QPSO) and image processing techniques for accurate disease detection, aiming to provide IoT-integrated sugarcane leaf disease prediction. Furthermore, the IoT sensors are connected to the camera modules to collect environmental data (temperature, humidity, and soil moisture) and gather images of sugarcane leaves. A Contrast-Limited Adaptive Histogram Equalization (CLAHE) algorithm is used in pre-processing to enhance contrast. After that, leaf segmentation is performed using a watershed algorithm to isolate the affected areas. The use of a lightweight deep learning model, Dense Net, for feature extraction is optimized for edge computing. Furthermore, the optimal hyper parameter selection can be done by classifying using a convolutional neural network (CNN) and a support vector machine (SVM), with improved performance through QPSO based on extracted features. Additionally, the implemented results are sent to a cloud-based or edge computing platform, allowing farmers to access disease

predictions through a mobile or web-based dashboard. Furthermore, it provides alerts and preventive measures to reduce crop losses. This system offers a cost-effective, scalable, and efficient solution for precision agriculture.

Empowering Early Cardiac Risk Detection Using Advanced Machine Learning Models

Rajshree Chandra[1], Devendra Kumar Singh[2]

1,2 Department of Computer Science and Engineering, Guru Ghasidas Vishwavidalaya, Bilaspur, Chhattisgarh, India

Abstract: Early and accurate diagnostic techniques are necessary for cardiovascular diseases (CVDs) to reduce adverse outcomes that remain a significant contributor which led to morbidity and mortality rates, globally. However, the characteristics of medical datasets can lead to misclassifications and lower generalizability, with imbalanced class distributions that affect the performance of predictive models. This study aims to provide a distinct methodology for CVDs using a deep learning model Multilayer Perceptron (MLP) and Long Short-Term Memory (LSTM) networks with the Synthetic Minority Oversampling Technique (SMOTE)to further CVD predictive processes. SMOTE allows the creation of syn samples, thereby addressing the class imbalance and allowing for an unbiased representation of classes in the training data. MLP is used to learn intricate patterns from structured clinical data, while LSTM captures the temporal dependencies of the data to improve predictive capabilities. The model is trained and assessed on a target CVD dataset with a commendable accuracy of 97.88%. This study evaluated the evidence presented in this combined MLP, LSTM and SMOTE model, which could produce a robust generalizable CVD predictive model.

An Intelligent Intrusion Detection and Mitigation model using Self-Supervised Auto encoders and Ensemble Learning

Veena S Badiger[1], Gopal K Shyam[2]

1 Research scholar, School of engineering, Presidency university. Assistant Professor, Presidency college. Bengaluru, Karnataka, India.
2 Professor, School of Engineering, Presidency University.

Abstract: The rapid growth of IoT devices and connected infrastructures has amplified vulnerabilities, making networks highly susceptible to sophisticated cyber-attacks. Traditional Intrusion Detection and Prevention Systems(IDPS) often suffer from high false positives, limited adaptability, and poor responsiveness to zero-day attacks. To overcome these challenges, this paper proposes a novel real-time Network Intrusion Detection and Prevention System (NIDPS) that integrates self-supervised learning with ensemble-based machine

learning in a Software-Defined Networking (SDN) environment. The proposed framework introduces two main core contributions. First, a soft voting ensemble classifier combining Decision Tree, Random Forest, Logistic Regression, and Light GBM is employed to achieve high accuracy in multiclass Intrusion detection. Second, a self-supervised autoencoder trained exclusively on benign traffic enables anomaly-based detection of zero-day and previously unseen attacks, enhancing adaptability. Detected threats are dynamically blocked using SDN-enabled flow rules, ensuring real-time mitigation without disrupting legitimate traffic. Experimental evaluation on the RT-IoT2022 dataset demonstrates the system's superior performance. The model achieved 99.7% detection accuracy, with precision, recall, and F1-scores near 98%, AUC-ROC of 1.0, and log-loss of 0.01. The mitigation engine further showed strong efficiency with a Mean Timeto Mitigate (MTTM) of 18 ms, Latency of 15–20 ms, throughput of 700 packets/sec, and blocking precision of 95% with only a 5% evasion rate. These results validate the proposed NIDPS as a scalable, low-latency, and highly accurate solution for protecting cyber-physical and IoT networks, ensuring resilience against both known and emerging cyber threats.

Magnetic Resonance images detection of Alzheimer's Disease

Velumani Thiyagarajan[1], L.Jaya Singh Dhas[2], Mrs.T .Deepika[3], Dr.S.Thilagavathi[4], Seethalakshmy Anatharaman5

1 Assistant Professor ,Department of Computer Science, Rathinam College of Arts and Science,Coimbatore-2
2 Assistant Professor, Department of Computer Science, Scott Christian College (Autonomous), Nagercoil, (Affiliated to Manonmaniam Sundaranar University, Tirunelveli), Tamil Nadu, India.
3 Assistant Professor, Department of Computer Science,Karpagam Academy of Higher Education,Combatore-21
4 Assistant Professor, Department of Computer Science, NIFT-TEA College of Knitwear Fashion, Tirupur-641606
5 Assistant Professor ,Department of Psychology,Rathinam College of Arts and Science,Coimbatore-21

Abstract*:* The aim of the paper is to study and design a CAD tool for Alzheimer's disease (AD) detection using linear SVM classifiers on MRI scans. Existing approaches often face challenges with high-dimensional feature spaces and limited data accessibility from repositories like ADNI. To overcome these, three SVM-based classifier proposals were explored. Results demonstrated promising accuracy, sensitivity, and specificity, particularly with cross-validation techniques. Notably, classifiers trained with image histograms showed superior performance in differentiating between AD, cognitively normal (CN), and mild cognitive impairment (MCI). Despite successes, initial approaches encountered difficulties, necessitating alternative methods. Challenges in data access and processing highlight the need for improved data management tools. Moving forward, refinements such as feature selection and testing with larger datasets could enhance classifier performance. Exploring deep neural networks as an extension may offer further insights into AD detection methodologies for early diagnosis and intervention.

Deep Dive into Machine Learning for Early Breast Cancer Classification

Indhushree[1], R. Kokila[2]

1,2 School of Computer Applications, Dayananda Sagar University, Kudlu Campus, Bangalore, India.

Abstract: Because breast cancer affects people everywhere, detecting it early and precisely is very important for patients' well-being. The goal of this study was to develop and evaluate a machine learning algorithm that can be used to better detect breast cancer. Our model was built using the publicly available "Breast Cancer Wisconsin Dataset". We conducted tests to compare the results of Logistic Regression, Support Vector Machine (SVM), Neural Networks, Random Forest, Naïve Bayes, and XGBoost since there are several elements to think about while making a medical diagnosis. To enhance the outcomes, we made sure the data was free from any missing information and the features were given an appropriate scale. To reduce the complexity, we use feature selection. We checked how each model performed by reviewing F1-score, precision, recall and accuracy. In order to stop overfitting, models are regularly tested by cross-validating and reviewing their learning curves. With an F1-score of 95.71% and an accuracy of 95.6%, our results demonstrated that the Neural Network model performed remarkably well, indicating that it may be highly beneficial in a clinical context. Using machine learning for healthcare prediction requires careful model selection and data preparation, as emphasized in this work. We also recognize the importance of protecting patient data privacy and security. We conclude that machine learning might significantly improve breast cancer diagnosis in its early stages, providing clinicians with a useful tool to aid patients and improving patient care overall.

Multimodal Transformer-Based Classification of Breast Cancer Laterality

Shaesta Mujawar[1], Aisha Shaikh[2], Anita Chaware[3]

1 SNDT Women's University, Santa Cruz W, India

Abstract: Accurate identification of breast cancer laterality (left versus right) is essential for treatment planning and clinical decision support. In this study, we propose a multimodal deep learning framework that integrates paired mammographic images with patient clinical features from the TCGA-BRCA dataset. We benchmark three backbone architectures—VisionTransformer (ViT), ResNet-50, and a custom Convolutional Neural Network (CNN)—to evaluate the effectiveness of multimodal fusion. Each model processes paired cancerous and normal breast images along with structured clinical metadata such as age, disease type, treatment history, and lymph node status.The Vision Transformer (ViT) achieved the highest test accuracy of 98.99% (95% CI: ±0.4%), followed by the CNN at 98.80% and ResNet-50 at 95.12%. McNemar's test indicated that both ViT and CNN significantly outperformed ResNet-

50 ($p < 0.01$).Error analysis revealed challenges in low-contrast cases and bilateral abnormalities. These findings demonstrate the novelty and effectiveness of combining paired image analysis with structured clinical data, highlighting the potential of multimodal transformers for robust and clinically relevant laterality prediction.

A Survey of Data Fusion and Integration Techniques for Cotton Quality Prediction in the Context of Gujarat

Risha Pandey[1], Dr Vikas Tulshyan[2],Dr.Kinjal Adhvaryu[3]

1,2 Silver Oak University, Ahmedabad, India
3 Sal Engineering College, Gujarat Technological University, Ahmedabad, India.

Abstract: Predicting cotton crop quality in Gujarat requires the integration of diverse data sources, including high-resolution weather data from the Indian Meteorological Department (IMD), pest and disease records from the Indian Council of Agricultural Research (ICAR), and long-term socio-economic trends. A review of existing studies reveals that weather parameters, such as rainfall, temperature, and humidity, are the most significant predictors of cotton yield, with both statistical models (e.g., multiple regression) and machine learning (ML) approaches (e.g., Random Forest, Gradient Boosting) demonstrating predictive utility. Weather-derived indices, such as drought indices and vegetation indices, enhance prediction accuracy compared to raw weather data. However, integrating pest/disease impacts and state-level trends into predictive models remains underexplored. While ML techniques outperform traditional statistical methods in capturing complex, nonlinear interactions, challenges remain in aligning heterogeneous datasets with varying spatial and temporal resolutions. Additionally, most existing models prioritize yield prediction over cotton quality metrics, such as fiber strength and length, which are critical for stakeholders. Future research should focus on developing holistic frameworks that combine IMD weather data,ICAR pest/disease records, and socio-economic trends using advanced ML methods with interpretable outputs. Such models would provide robust and actionable predictions, addressing key gaps in the field and enhancing decision-making for cotton crop quality management in Gujarat. Disease detection studies also cover where using CNN models demonstrated precisions exceeding 97–99%, clearly establishing the quantitative advantage of ML methods over traditional statistical approaches.

Medical Cloud-Based Data Management System

Dr.M.Prasad[1], Dr.M.S.Nidhya[2], Shubham Shukla[3], R.Yamini[4],
K.Soni Sharmila[5], Dr Balajee Maram[6],

1 Associate Professor, Dept of CSE, VIT,Chennai.
2 Associate Professor, School of Computer Applications, Dayananda Sagar University, Bangalore. 3 Assistant Professor, Dept of Computer Engineering and Applications, GLA University, Mathura Uttar Pradesh
4 Dept of Computing Technologies Faculty of Engineering and Technology,Kattankulathur
5 Dept of CSE, Shri Vishnu Engineering College for Women, Bhimavaram
6 Professor & Dean(PhDProgram),School of Computer Sciencand Artificial Intelligence, SR University, Ananthasagar,Hasanparthy, Warangal.

Abstract: Many studies are now collecting medical records thanks to the proliferation of IT. However, most projects have problems with data management. Issues of security, privacy, flexibility, scalability, and mystery emerge when an enormous volume of information is made by different sensors and shipped off the server through Wireless Sensor Network (WSN). Existing patient health data gathering designs do not address a variety of security concerns. Here, we analysed a protected Health cloud infrastructure for gathering medical records from patients. The foundation of our work is the combination of WSN , Cloud computing and Block Chain storage Access. To provide data security, privacy, and granular access control, we suggest using Cyphertext Policy-ABE inside our cloud architecture. In addition, we have placed restrictions on thequalities of certain patient subsets in order to minimise the storage of irrelevant information.

PermDroid: A Privacy-Preserving framework for Android malware detection using Federated Learning

Ranjan Manhas[1], Arvind Mahindru[2], Himani Arora[3]

1,2 Department of Computer Science and Applications, DAV, University, Jalandhar, 144012, Punjab, India.
3 Department of Mathematics, Guru Nanak Dev University, Amritsar, 143005, Punjab, India.

Abstract: Android has become increasingly popular due to the wide availability of applications across multiple app stores. Previous studies have proposed malware detection models based on centralized techniques; however, these approaches raise significant privacy concerns for users. To overcome this limitation, we propose a federated learning-based framework that enables privacy-preserving malware detection. The framework employs a Deep Neural Network (DNN) for training on the cloud side, while a semi-supervised machine learning approach is applied on the client side. Experiments were conducted on a dataset of 2,00,000 Android applications distributed across 200 clients over multiple rounds of federation. Results show

that the proposed framework achieves 98.7% accuracy when tested on real-world applications, highlighting its effectiveness and applicability.

CNN-Based Feature Learning with Gradient Boosting for Secure Code Analysis

Himanshu Yadav[1], Kapil Kumar Nagwanshi[2]

1,2 Department of Computer Science and Engineering, Guru Ghasidas Vishwavidalaya, Bilaspur, Chhattisgarh, India

Abstract: The expanding intricacy of modern software schemes has made them prone to a varied range of posing severe threats to security vulnerabilities, critical infrastructures and sensitive data. Traditional vulnerability detection approaches often struggle with accuracy and scalability, particularly when managing diverse and large codebases. To deal with these encounters, this research proposes an ensemble framework that incorporates Deep Convolutional Neural Networks (DCNN) with powerful gradient boosting algorithms XGBoost and CatBoost for effective software vulnerability detection. An ensemble approach unites the potencies of both deep learning and gradient boosting to reduce false alarms and enhance detection accuracy. Experimental results reveals that both DCNN along with XGBoost and DCNN along with CatBoost models accomplish high detection operation an accuracy of 90.28%, precision of 90.24%, recall of 90.24%, F1 score of 90.23%, and an AUC PR of 0.9205. In comparison, the DCNN along with XGBoost model accomplishes a slightly better accuracy of 90.29%, precision of 90.28%, recall of 90.27%, F1-score of 90.27%, and an AUC-PR of 0.9208. The results feature the effectiveness of the ensemble approach in recognizing vulnerable code sections, offering a scalable solution for increasing software security in real-world purposes.

Multimodal Machine and Deep Learning Approaches for Lung Cancer Prediction: A Survey and the Hetero Fusion-Lung Net Model Using CT and Clinical Data

N Viswanadha Reddy[1], Bobba Veeramallu[2]

1,2 Department of Computer Science and Engineering, Koneru Lakshmaiah, Education Foundation, (Deemed to be University), Andhra pradesh, India.

Abstract: Lung cancer is the leading cause of cancer death worldwide, highlighting the urgent need for faster, more accurate methods for early prediction. With decades of experience at the intersection of AI and oncology, I will guide you through the latest AI strategies designed to meet this challenge, focusing on a new multimodal architecture: Hetero Fusion-Lung Net. We will assess how current models blend clinical histories with CT scans and tackle persistent

issues like model interpretability, architectural resilience, and precise feature engineering. Hetero Fusion-Lung Net builds upon existing research by employing an attention-infused ensemble to seamlessly integrate structured clinical data with CT visuals. The model follows a methodical pipeline, beginning with Dynamic Noise-Structure Alignment (DNSA) for data preprocessing. Next, an advanced MAFT++ model, augmented with Cross-Modal Attention Filters(CMAF), selects the most salient features. For the core analysis, Multi-Level Capsule Attention Networks (ML-Cap A Net) and Feature Correlation Encoders (FCE) work in tandem to uncover critical patterns. The process culminates in an Ensemble of CrossSpace Experts (ECSE), which synthesizes outputs from the various deep learning modules to generate a single, robust prediction. This architecture not only underscores the power of multimodal integration but also serves as a practical blueprint for the next generation of clinical tools. By prioritizing accuracy, interpretability, and reliability, Hetero Fusion-Lung Net represents a critical effort to bridge the gap between advanced research and daily medical practice.

An In-Depth Analysis of Emerging Technologies in Contemporary Healthcare- A Review

Kamal Saluja[1], Tanya Khaneja[2], Sunil Gupta[3], Reema Gupta[4], Vikas Solanki[5]

2 Department of Commerce, Delhi School of Economics, University of Delhi
1,3,4,5Chitkara University Institute of Engineering and Technology, Chitkara University, Punjab, India

Abstract: This review article examines the rapid integration of new technologies into modern healthcare systems to address critical challenges such as inefficiencies, rising costs, limited access, and complexities in data administration. The primary concern is the fragmented application of digital tools and technology, which often exhibit deficiencies in interoperability and scalability within healthcare systems. The technique involved asystematic literature assessment of over 40 peer-reviewed articles from the past decade, concentrating on technologies such as artificial intelligence (AI), Internet of Medical Things (IoMT), blockchain, telemedicine, and big data analytics. The study employed thematic analysis to categorise and evaluate the functions, benefits, and limitations of several technologies within clinical, administrative, and research sectors. The findings indicate significant enhancements in diagnostic precision, remote patient surveillance, instantaneous data transmission, and personalised treatment regimens. Data protection, regulatory compliance, infrastructural inadequacies, and user adoption pose significant challenges. The article concludes that while emerging technologies are transforming patient outcomes and healthcare delivery, a reliable framework ensuring security, interoperability, and ethical governance is essential for sustainable use. Future research should prioritise the explicability of artificial intelligence, criteria for integration, and equitable access to advancements in digital healthcare.

PRIME: Pediatric Response and Interaction Medical Engine – The Basic insights

Kannadasan R[1], Prabakaran N[2]

1,2 School of Computer Science and Engineering, Vellore Institute of Technology, Vellore- 632014, Tamilnadu, India

Abstract: There is a growing body of evidence that refers to a great potential for Artificial Intelligence (AI) to positively contribute to the delivery of pediatric healthcare services in terms of being effective, affordable and timely for the patients and caregivers alike. A pediatric AI chatbot can act as an interesting way to fill in the gaps between clinical appointments by providing useful information regarding common childhood diseases, developmental milestones, immunizations, and general health. The chat bot is able to incorporate natural language pro-cessing (NLP) and machine learning (ML) to comprehend questions, offer answers backed by research and ask human specialists for assistance if necessary.The users of the AI bot include parents and caregivers of children which prompts the designers of the chatbot to advocate for the use of simple language to enhance understanding. It can perform ailment evaluations, recommend some over-the-counter medicine, and instruct caregivers when to pursue medical assistance for their child. Explaining further, the pediatric chatbot would, in addition to general advice given by the AI first bots, extend their functions to emotional issues by providing children frequent emotional wellbeing checks, as well as educational materials about behavioral or developmental issues in children. The pediatric AI chat bot's objectives of helping in improving the accessibility of healthcare information are achievable and justified because of the feedback received, incessant advances made, as well as the policies put in place to safeguard data. This tool holds great promise in improving the outcomes of pediatric care in areas that are lacking proper way of care.

Mitigating Data Bias and Errors through Machine Unlearning for Accurate Human Skin Disease Prediction

Balajee Maram[1], Someswari Perla[2], D. Nagaraju[3], Sathishkumar V E[4], Vaggi Ramya[5]

1 School of Computer Science and Artificial Intelligence, SR University, Warangal, Telangana, 506371.
2 Department of CSE - AI&ML, GMR Institute of Technology, Rajam, Andhra Pradesh, India
3 Department of Physics, Vaagdevi College of Engineering, Bollikunta, Warangal, Telangana, India. 506 005
4 School of Computing and Artificial Intelligence, Faculty of Engineering and Technology, Sunway University, No. 5, Jalan Universiti, Bandar Sunway, 47500 Selangor Darul Ehsan, Malaysia.
5 Reg.No: 2403C50038, PhD Scholar, Department Of CSE, School Of Computer Science And
Artificial Intelligence, SR University, Warangal, Telangana, India.

Abstract: Skin disorders affect nearly 900 million individuals worldwide, but diagnostic error alone is responsible for nearly 20% of misdiagnosis and requires more accurate predictive systems to be in place. While artificial intelligence (AI) algorithms hold great potential for dermatalogic diagnosis, they are often undermined by erroneous, skewed, or wrongly labeled training datasets. Here, we introduce a selective erasure model that erases biased or corrupted training samples without full retraining. On a densely annotated dermatology image dataset of over 25,000 labeled images, our scheme enhanced diagnostic accuracy by 12.8%, reducing error rates substantially from conventional deep learning models. The method also minimized false positives by 21.4%, improving both clinical safety and credibility. Beyond performance enhancements, the methodology enables machine unlearning techniques that ensure patient anonymity, ethical application of AI, and adaptability, forming the foundation for secure and equitable skin disease prediction models.

Municipal Solid Waste Prediction using SARIMA and Exponential Smoothing

Bela Shrimali[1], Shivangi Surati[2], Himani Trivedi[3],Om Patel[4], Tarjani Patel[5]

1,4,5 Department of Computer Science and Engineering, Institute of Technology, Nirma University, Ahmedabad, India
2 Department of Computer Science and Engineering, School of Technology, Pandit Deendayal Energy University, Gandhinagar, Gujarat, India
3 Department of Computer Engineering, LDRP Institute of Technology and Research, Gandhinagar, Gujarat, India

Abstract: The world faces a notable challenge with a substantial increase in waste production, driven primarily by the rapid expansion of urban areas and industrial growth. The primary objective is to evaluate the effectiveness of machine learning models in forecasting Municipal Solid Waste (MSW) generation within a specific geographic region, considering its patterns in the amount of waste generated. In this paper, nine distinct machine learning and deep learning models are trained and experimented with, along with the two proposed models, to gauge their performance in forecasting the periodic volume of generated waste. To ensure a comprehensive assessment, two machine learning models, Seasonal Autoregressive Integrated Moving Average (SARIMA) and Exponential Smoothing, are implemented. The study utilizes daily waste datasets from multiple places, viz. Moratuwa, Dehiwala & Boralesgamuwa from Sri Lanka, Ballarat from Australia, Austin from Texas, and Austin Waste and Diversion dataset. In essence, this study serves as a comparative analysis evaluating the performance of the two models in both datasets. The results of this study show that both models have varying effectiveness in predicting waste generation at different locations. In addition, the results indicate that the proposed methods perform better than the ones evaluated.

Rejuvenated Particle Swarm Optimization-Based Classifier for Big Sentiment Data Classification

Dr.B.Suchitra[1], Dr.J.Ramkumar[2], Dr.V.Valarmathi[3]

1,2,3 Assistant Professor, Department of Information Technology & Cognitive Systems, Sri Krishna Arts and Science College, Coimbatore, Tamil Nadu, India.

Abstract: Sentiment analysis has emerged as a critical research domain for understanding user opinions from large-scale online platforms. This study proposes a Rejuvenated Particle Swarm Optimization-Based Classifier (RPSOC) designed to address the challenges of classifying sentiments in massive product review datasets. The Amazon Product Review Dataset, comprising four domains—Books, DVDs, Electronics, and Kitchen Appliances—has been employed for evaluation. The proposed framework integrates Support Vector Machine with a Gaussian kernel, while RPSOC optimises its parameters through a modified Particle Swarm

Optimization strategy that incorporates fitness variance and mean particle distance to prevent premature convergence. MATLAB has been utilised as the primary tool for experimentation and analysis. Comparative results demonstrate that RPSOC consistently outperforms baseline classifiers, achieving 79.17% classification accuracy against an average of 60.2% by existing methods, along with improved precision, Matthews Correlation Coefficient, and F1-score, thereby validating the effectiveness of the proposed approach.

Classification of Cross-Domain Sentiments in Big Data using Renewed Genetic Algorithm

Dr. Valarmathi V[1], Dr. Ramkumar J[2], Dr. Suchitra B[3]

1,2,3 Assistant Professor, Department of Information Technology and Cognitive Systems, Sri Krishna Arts and Science College, Coimbatore, Tamil Nadu, India

Abstract: Due to the widespread nature of online shopping and the low barrier for uploading a message, sentiments or opinions expressed there to give the most up-to-date and comprehensive information possible. The field of sentiment analysis is becoming increasingly important, yet there is currently no comprehensive research on product reviews. In classifying the reviews of product reviews, it is crucial to (1) detail the obstacles that still need to be overcome,(2) highlight the most significant developments to date, and (3) assess how far it's come over the years. This research article proposes a novel classifier, namely Renewed Genetic Algorithm (RGA) to effectively classify the reviews of products on the Amazon Online Shopping Website. RGA concentrates more on local search for accurately classifying product reviews. Improved classification accuracy is achieved by basing classification on fitness computation. This research employed a review dataset consisting of 4 distinct product domains from the Amazon Online Shopping Website to compare how well RGA performs compared to existing classifiers. When compared to standard classifiers, the results favor the proposed classifier RGA. The renewed genetic algorithm (RGAC) has achieved up to 89% Precision, 86.8% F1-Measure, 86.4% Accuracy, and an MCC of 72.9% across Amazon review domains. These results represent gains of 10–25% over competitive baselines, confirming the method's superiority in cross-domain sentiment classification.

Hybrid Knowledge Base Architecture for Real-Time Conversational AI

Vijaya Bharathi A[1], Prashant Nitnaware[2]

1 Research Scholar, Pillai College of Engineering, New Panvel, Maharashtra, India
2 Assistant Professor, Pillai College of Engineering, New Panvel, Maharashtra, India

Abstract: Recent years have seen rapid progress in conversational AI, yet existing systems continue to struggle with producing factually correct and contextually appropriate responses in

real time. This paper proposes a hybrid knowledge base architecture that integrates symbolic reasoning with neural representation learning to address these challenges. The design combines a symbolic knowledge graph for precise, verifiable query resolution with a transformer-based embedding module for contextual interpretation. A third layer supports dynamic data handling, enabling real-time updates and adaptation to evolving information streams. We implemented and evaluated the prototype on benchmark dialogue datasets, measuring accuracy, latency, and scalability. The hybrid system achieved significant improvements over both symbolic-only and neural-only baselines, particularly in multi-turn and domain-specific scenarios. Statistical analysis confirms that the observed gains in intent recognition, slot-filling, and response latency are consistent and robust. Beyond performance, the architecture offers practical benefits: symbolic components provide interpretability and traceability, while neural modules contribute flexibility and fluency. This balance enhances both conversational quality and user trust. Although deployment introduces challenges in computational overhead and integration complexity, the findings suggest that hybrid approaches offer a promising pathway toward real-time, reliable, and context-aware conversational agents for applications such as customer support, healthcare, and education.

Data-Driven Predictive Maintenance: Evaluating ML and DL Models with Enhanced OEE Metrics

Ms. Pranita Bhosale[1], Dr. Sangeeta Jadhav[2]

1 Research Scholar, Dr. D. Y. Patil Institute of Technology, Pimpri-Chinchwad, Pune, India
2 Head of Department of IT Engineering Army Institute of Technology, Dighi Hills Pune, India

Abstract: this study introduces a modern solution to predictive maintenance by integrating a Modified Overall Equipment Effectiveness (OEE) framework and comparing the performance of various Machine Learning (ML) and Deep Learning (DL) models. Traditional OEE, based only on Availability (A), Performance (P), and Quality (Q), often provides limited insights, especially in real-time industrial applications. This research incorporates additional parameters — Utilization (U) and Condition (C) — to form a more comprehensive Modified OEE, which better reflects machine health and operational efficiency. To support predictive maintenance, models such as Random Forest (RF), XGBoost, Artificial Neural Networks (ANN), and Long Short-Term Memory (LSTM) were evaluated on both sample and real-time datasets. Results indicate that LSTM consistently outperforms other models with the lowest False Negative Rate (FNR = 0) and highest F1 Score (100%) on real-time data. Modified OEE values highlight a more accurate degradation trend compared to traditional OEE, especially during suboptimal machine performance days. This integrated approach not only improves maintenance scheduling but also enhances production reliability and decision-making in Industry 4.0 environments.

Multi-Class Land Cover Classification in Satellite Images Using U-Net and Attention Mechanisms

T. Lakshmi Prasanna[1] and Dr. C. Rajabhushanam[2]

1, 2 Department of Computer Science and Engineering, Bharath Institute of Higher Education and Research (BIHER), Chennai, India

Abstract: For environmental monitoring, urban planning, and resource management, it's important to be able to accurately classify land cover from satellite images. When it comes to spatial and contextual awareness, traditional pixel-wise categorization approaches typically have trouble, especially in landscapes that are diverse and varied. In this study, it suggested a new deep learning framework that combines U-Net architecture with improved attention mechanisms to classify land cover types in high-resolution satellite pictures. The U-Net's encoder-decoder structure gathers contextual data at different scales, and channel and spatial attention modules are included into skip links to dynamically improve the relevance of features. This synergy makes it easier to tell the difference between classes and draw boundaries, particularly in areas with mixed or unclear land cover types. This can use benchmark satellite datasets to train and test our model, and it works better than baseline U-Net and other cutting-edge approaches. From the results obtained the proposed model in ISPRS Potsdam gave overall accuracy of 91.4%, mIoU of 78.5% and Mean F1 Score of 82.3% and in DeepGlobe gave overall accuracy of 89.1%, mIoU of 74.2% and Mean F1 Score of 79.5% respectively. The suggested model shows better generalization, noise resistance, and efficiency while dealing with images of different resolutions. Our method offers a solution for automated land cover mapping in remote sensing applications that can be scaled up and works well.

HySCAF: An Explainable and Efficient Feature Selection Strategy for Gestational Diabetes Prediction

Thejaswi Nandyala[1] and Dr. K. Baalaji[2]

1, 2 Department of Computer Science and Engineering, Bharath Institute of Higher Education and Research (BIHER), Chennai, India

Abstract: Gestational Diabetes Mellitus (GDM) is a relatively frequent complication of pregnancy with severe health effects of the mother and the fetus. Pre-diagnosis determination of GDM using the clinical data in the initial stages could be utilized to deliver effective early treatments, however, the misrepresentation of irrelevant and redundant features and noisy features complicate issues of machine learning models. To overcome these issues, this paper proposes very novel feature selection scheme named Hybrid Shapley-correlation filter with Adaptive weighting (HySCAF).The method proposed will combine the Shapley value-based feature importance with the model-aware evaluation, correlation-based filtering to get rid of redundancy, and an adaptive weighting mechanism which combines statistical variability and clinical relevance to select features according to their priorities. Applying a Kaggle publicly available GDM dataset, the success of HySCAF was confirmed by using it in conjunction with

an XGBoost classifier. The model performance was assessed with the help of accuracy (87.4%), precision (85.3%), recall (89.1%) and F1-score (87.1%)and it was compared with other conventional methods like RFE, LASSO, Mutual Information and PCA feature selection methods. Findings indicate that HySCAF performed better than baseline methods in all metrics of predictive accuracy and interpretability. The framework presents a powerful and interpretable method of feature selection on medical datasets and has a high potential of being implemented in the real-life GDM screening systems. Future work involves testing with larger data sets, and incorporating domain knowledge in the clinical domain more systematically.

A Two-Stage Hybrid Preprocessing Framework for Improving Machine Learning-Based Gestational Diabetes Prediction

Thejaswi Nandyala[1] and Dr. K. Baalaji[2]

1, 2 Department of Computer Science and Engineering, Bharath Institute of Higher Education and Research (BIHER), Chennai, India

Abstract: Gestational Diabetes Mellitus (GDM) must be anticipated early and precisely to prevent the complications to both the mother and the child. However, the prediction of GDM is most often done on an unbalanced, noisy, and heterogeneous clinical data, thus it is rather difficult to GDM predictions with a traditional machine learning model. In this study, a new preprocessing step is the suggested method which would enhance predictive capabilities of GDM since it would entail a multi-phase refinement of the data. Firstly, there are missing values that are addressed using Multiple Imputation by Chained Equations (MICE) and outliers using Interquartile Range (IQR)approachthen, Z standardization is used to make data normal. The data is fixed by encoding categorical variables into one-hot so that they can be modeled. To address the issue of excessive class imbalance and noise In data A hybrid approach that uses SMOTE with Cluster Filtering (SMOTE-CF) and Weighted Edited Nearest Neighbor (ENN) is suggested. The SMOTE-CF is employed to generate high quality synthetic minority samples with pure clusters as opposed to the Weighted ENN, which removes mislabeled or borderline cases with a distance-weighted disagreement score. This is then cleaned up data that is being trained on a Gradient Boosting Classifier. The results of the experiments with two real datasets indicate that the recalls and F1-score improved significantly compared to the traditional preprocessing methods that indicates the clinical usefulness of the method in the timely and consistent diagnosis of GDM.

DeepSegNet: A Deep Learning-Based Framework for Semantic Segmentation of Satellite Imagery

T. Lakshmi Prasanna[1] and Dr. C. Rajabhushanam[2]

1, 2 Department of Computer Science and Engineering, Bharath Institute of Higher Education and Research (BIHER), Chennai, India

Abstract: Semantic segmentation is made more difficult by the high intraclass variability, spectral heterogeneity, and thin object boundaries found in high-resolution satellite imagery. To overcome such hurdles, one needs to use architectural paradigms that can understand both the overall sketch and the finer details of a given location. A cutting-edge deep learning platform, DeepSegNet, is proposed in this study. Its single purpose is semantic pixel-by-pixel satellite data segmentation. The architecture combines three important innovations in a hierarchical encoder-decoder network: an adaptive receptive field learning module, an Attention-Enhanced Skip Connections (AESC) feature propagation module, and an Adaptive Residual Refinement Module (ARRM) structural correction module. With uniform preprocessing and augmentation techniques, the system is evaluated on two benchmark datasets, SpaceNet v2 and ISPRS Vaihingen. DeepSegNet reliably outperforms state-of-the-art techniques in quantitative findings. An efficient ablation study has confirmed all of the architectural elements. Retaining object boundaries is made more efficient, and performance on low-frequency and small-class instances is improved, as supported by qualitative studies.

Deep Learning Approach for Gestational Diabetes Mellitus Classification Using LSTM Neural Network Model

V. Venkatesan[1] and Dr. K. Rajakumari[2]

1, 2 Department of Computer Science and Engineering, Bharath Institute of Higher Education and Research (BIHER), Chennai, India

Abstract: When left untreated, Gestational Diabetes Mellitus (GDM) can be very dangerous to the health of the mother and child. In this paper, we will present an effective DL classification framework to predict GDM as early as it is possible using clinical data. It consists of three primary steps: preprocessing, feature extraction, and classification. First, Min-Max scaling is employed to normalize the data, bringing features to a common range. Three other feature extraction methods are then used to dimensionally reduce and extract informative patterns: Principal Component Analysis (PCA), Recursive Feature Elimination (RFE), and Autoencoders. To classify, a Long Short-Term Memory (LSTM) neural network is used because it has been noted to be very effective in dealing with sequential and temporal data in medical data. Of the three combinations of pipelines MinMax+PCA+LSTM, MinMax+RFE+LSTM, and MinMax+Autoencoder+LSTM, the MinMax+PCA+LSTM pipeline reports the best results. The performance is measured based on accuracy rate, Area Under the ROC Curve (AUC-ROC), Matthews Correlation Coefficient (MCC), and Cross Entropy Loss (CEL). MinMax+PCA+LSTM model has the best accuracy, AUC-ROC as well

as MCC with the least loss, which shows that this model is robust and reliable. The model is verified on the publicly available GDM dataset in Kaggle proving its capabilities to be used in clinical decision support in GDM diagnosis.

Linux Kernel Hardening Against SSH Attacks: An Audit Log-Driven Approach

Premkumar. S[1] and Dr. Edwin Shalom Soji[2]

1 Ph.D Research Scholar, Department of Computer Science, Bharath Institute of Higher
2 Assistant Professor, Department of Computer Science,
Bharath Institute of Higher Education and Research (BIHER) Chennai, India

Abstract: Linux SSH is a solution for remote access with the required security, but is often attacked using brute force, privilege escalation, and reverse shell attack processes by an adversary. The traditional intrusion detection systems are usually incapable of seeing into the kernel and respond slowly. An audit log-based kernel attack-hardening strategy, utilizing the Linux auditd mechanism to trace activity down to specific shell system calls. These logs are in the form of vectors, and a Discrete-Time Markov Chain is used to model session behaviour, which is then classified over a Long Short-Term Memory (LSTM) network. Response at the kernel level is provided through eBPF in real-time enforcement. Extended audit-based datasets were used to test the proposed system, and results indicated that the latency and detection accuracy were very low, 0.38 seconds and 97.84% and the false positive rate was also low at 1.12% with minimal CPU and memory overhead. The audit-based approach is a scalable, real-time intrusion prevention application of SSH that would harden the audit security posture of system software so that it succeeds against emerging patterns of attack.

Anomaly Detection in Linux Kernels: A Framework for SSH Intrusion Prevention

Premkumar. S[1], Dr. Edwin Shalom Soji[2]

1 Ph.D Research Scholar, Department of Computer Science, Bharath Institute of Higher Education and Research (BIHER), Chennai, India
2 Assistant Professor, Department of Computer Science, Bharath Institute of Higher Education and Research (BIHER) Chennai, India

Abstract : Secure Shell (SSH) is a popular target of unauthorized access and intrusion in Linux systems because of commonly used in critical infrastructure. Current intrusion detection systems are not capable of detecting real-time intrusion or having kernel visibility, which reduces their effectiveness. The work gives the possibility to introduce a kernel-integrated anomaly detection scheme to SSH intrusion protection based on eBPF and observe the entire system call in real-time via AuditD. It utilizes a hybrid model including Hidden Markov Models (HMM) together with Isolation Forest, which identifies behavior abnormalities in SSH sessions. The system was tested on the ADFA-LD system atom, UNM system call collections, and proprietary honeypot logs. The overall detection accuracy and F1-score of said approach were 96.4%, recall was 97.8%, and detection latency was on average 22.4 ms, with relatively low resource consumption:CPU overhead: 2.3%, RAM: 38.5 MB. Automatic countermeasures,

including quarantine sessions and dropping IPs, were inserted. The findings indicate a very effective and dynamic solution to the SSH anomaly detection functionality on Linux kernel systems.

Bridging the Cybersecurity Gap: An Intuitive Web Security Scanner for Developers and Novice

Tanvi Nilesh Rathod[1], Raj Jayesh Bhanushali[2], Jayesh Rajesh Thakar[3], Rudraksh Purushottam Guntuka[4], Pinki Vishwakarma[5]

1,2,3,4,5 Shah & Anchor Kutchhi Enginerring College, Mumbai, India

Abstract: In today's digital age, web applications have become nec- essary for businesses and individuals, but their growing complexity has also achieved top goals for cyber attacks. Many open source tools such as Owasp Zap, Nikto, and Wapiti exist to detect loopholes in websites; however, their use often requires significant technical expertise, making them inaccessible to beginners in cybersecurity. Traditional vulnerabil- ity scanners, although strong, bear steep, fragmented learning curves and limited users, especially for users without cyber security experience. In history, Vulnerability Assessment and Penetration Testing (VAPT) are performed manually by security experts using advanced tools, network knowledge, protocols, and security principles. Over time, automated tools have appeared, but they often require complicated configurations and de- liver complex results, limiting their scope to trained experts. The main issues today include the complexity of tools, limited knowledge of tool's functioning, and lack of understanding of the technicalities. WebShield bridges the gap between advanced and easy-to-use security tools by au- tomating the scanning process and translating complex outputs into sim- plified vulnerabilities evaluation reports, allowing users to secure their websites without deep cyber security expertise.

Database Vulnerabilities and Cyber Resilience in Critical Infrastructure: A Case Study of the 2025 UNFI Cyberattack

Kapil Chakravarthy Sanubala[1]

1 Cyber Security, Identity Access management, Independent Researcher, Senior Engineer Dallas, Texas, USA.

Abstract: The 2025 cyber-breach of United Natural Foods, Inc. (UNFI) brought to light the serious faults in the database and cyber-foundation the modern food complex relies on. With thousands of retail partners throughout North America, the distribution leader's North Amer- can operations are highly dependent on data systems that connect its inventory, logistics and vendor coordination across all supply chain areas. The assault, brought by a sophisticated ran- somware attack, left key databases in its lurch and resulted in widespread operational chaos that included pirouetted delivery schedules, loss of data, and lost ability to communicate with

suppliers. This paper analyzes the database level vulnerabilities used in the attack and how archi- tectural flaws and no layered cyber resilience led to the scale of damage. We examine the event forensically and use expert interviews to pinpoint critical failure points in authentication schemes, database separation, and incident response automation. The paper also reviews UNFI's post-breach remediation actions, and offers lessons learned for bolstering the cyberse- curity resiliency of important sectors of critical infrastructure. Our results highlight the critical structure and emphasize the necessity for rigorous data hardening, active monitoring, and cross- industry collaboration in preventing attacks to key services. This study adds to the growing literature on infrastructure cybersecurity and proposes actionable suggestions for policymakers and IT managers.

Power Analysis Vulnerability Assessment and Comparative Analysis with Simulator for Arduino Uno

Kajal Patel[1], Amit Rathod[2], Kalpesh Popat[3]

1 Associate Professor, Vishwakarma Government Engineering College, Ahmedabad
2 Assistant Professor, Vishwakarma Government Engineering College, Ahmedabad
3 Associate Professor, Marwadi University, Rajkot

Abstract: Side Channel Analysis and particularly the power analysis has been an open problem since it was first discovered. As of today, the world is moving towards the Internet of Things (IoT) and hence the devices are vulnerable to these attacks. The countermeasures are guarding, masking, and rekeying. Most of the countermeasures the researchers are proposing are related to masking and rekeying. However, their approach is generic algorithms due to various existing and new devices that come up, and their comparative analysis focuses mostly on mathematical leakage models. The devices are also ever evolving with new- er versions updates. Each different version of the device would contain different vulnerability. Therefore, the algorithms are not assessed on the implementation aspects. SILK simulator [5] is a useful tool to simulate the traces for the various Arduino family devices. They are configurable for the particular device and can be powerful tool to validate the proposed methods in the implementation sce- nario that would provide accurate effect and assessment of the approaches. It is also required to validate the simulations with the actual hardware devices as the actual environment would add its additional noise. In this paper, the authors have validated their proposed and published algorithm [1] on the SILK simula- tor and on the actual Arduino Uno device. The aim of the study is to check the actual vulnerability of the simulation and the actual device and compare them along with the assessment of earlier algorithm on the actual hardware environ- ment. A total of 10000 power traces were generated in simulator and by the ac- tual Arduino Uno device for 40 different keys for both the plain AES and modi-fied AES based on our previous work to check the time and efforts required to successfully recover the key using the Correlation Power Analysis (CPA) at- tack. The results show that our proposed published method has shown more re- sistance to the attack compared to the AES with difficult on the actual device compared to simulator. However, the simulators provide a better picture for al- gorithmic comparison than the mathematical model due to device specific con- figurations.

Enhancing Bitcoin Address Unlikability: Addressing Gaps in the Evicting-Filling Attack and Proposing a Holistic Defense Framework

Nitin Varshney[1], Harsh Nagar[2], Tirth Bhadeshiya[3]

1,2,3 Marwadi University, Rajkot, India

Abstract: Bitcoin's decentralized architecture protects users' privacy by leveraging pseudonyms at the data layer and mitigating unlikability at the network layer. The evicting-filling attack takes advantage of flaws in network processes, such as the common connection pool, which breaks this promise. This research overcomes the evicting-filling assault and finds various flaws such as its limited scalability, vulnerability to changes in the network in real time domain, and lack of full countermeasures. We recommend using the Adaptive Isolation and Randomization Defense (AIRD) framework to reduce the likelihood of addresses being used. It combines connection pool isolation, randomized eviction timing, and real-time network monitoring. Experimental results on Bitcoin Mainnet nodes demonstrate AIRD's efficacy, with a 98% reduction in successful address linking attempts compared to the baseline. Our findings broaden the attack's potential to new digital currencies like Cardano and Ethereum 2.0, and we suggest avenues for further investigation into creating an environment that protects users' privacy fully.

Cross-Country Cybersecurity and Trust Dynamics in Digital Payments: Policy, Threats, and Technology Perspectives

Vishal Ramaiya[1], Dr Pramod Goyal[2], Dr Neeraj Kumar Dubey[3]

1 Research scholar, Marwadi University, Rajkot, Gujarat, India
2 Professor Faculty of Management Studies, Marwadi University, Rajkot, Gujarat, India
3 Asso. Professor – ABS, Amity University MP, Gwalior

Abstract: The international implementation of digital payment systems has raised new cybersecurity challenges that differ from cultural, regulatory, and infrastructural contexts. This research discusses the relationship between cybersecurity threats, user trust, and regulatory interventions in various national contexts. Through case studies from India, the United States China, and the European Union, the article discusses how policy environments at regional levels and sociocultural forces shape trust in digital payment systems. Qualitative comparative analysis is employed to compare national-level strategies for digital payment safety, such as legal requirements, data protection systems, and organizational reactions to cyber threats. Strong data privacy laws are found to be linked to increased user confidence, and financial literacy is found to prevent phishing and fraud attacks. It also emphasizes the role of digital inclusion and cultural orientations to technology in determining the efficacy of cybersecurity governance. The research adds to the general debate on FinTech policy and cross-border financial regulation by highlighting the importance of context-based cybersecurity measures.

The article concludes with practical recommendations for regulators, digital payment providers, and policymakers to harmonize trust-building frameworks across jurisdictions.

Integrating Security Approaches for Hybrid Cloud Architectures in Modern Enterprises

Vivek Kumar Prasad[1], Chandan Trivedi[2], Rajan Datt[3], Mit Patel[4]

1,2,3,4 Nirma University, Ahmedabad, India

Abstract: The integration of hybrid cloud computing has become essential for organizations aiming to leverage the advantages of both cloud services and on-premises infrastructure. This study explores various strategies and challenges associated with connecting cloud platforms to local systems, with a focus on key aspects such as identity management, networking, data and application integration, and architectural design. It also addresses significant obstacles, including security concerns, interoperability issues, performance limitations, cost management, and the existing talent gap. Through real-world case studies, the research illustrates successful implementations, showcasing best practices and lessons learned. The conclusion offers insights into emerging trends and future directions in hybrid cloud integration.

Advanced Command and Control Framework for Covert Operations

Ashwin Anand[1], Dyanesh S[2], P. Jivan Prasad[3], Karaka Nitin[4],
Manbendra Satpathy[5], Amritha P.P[6]

1,2,3,4,5,6 TIFAC-CORE in Cyber Security, Amrita School of Engineering, Coimbatore,
Amrita Vishwa Vidyapeetham, India

Abstract: In today's cybersecurity situation, traditional defence mechanisms are often not sufficient for the development of threats such as zero-day attacks, brute force testing, and lateral movement technologies. In this article, the implementa tion of AI-powered Cyber Deception and Fake Data Injection Systems presents a new approach to cybersecurity. The proposed system uses Generative Adversarial Networks (GANs) and the Python Faker library to generate realistic but synthetic user information and network traffic. The goal is to confuse attackers, monitor their actions, and trigger warning messages with interactions with fake assets. The improves early detection and response. The system also contains adaptive deceptions that generates dynamically targeted fake answers based on attacker actions such as port scans and brute-force applications. Experimental verification within a simulated laboratory environment demonstrates the feasibility and effectiveness of the proposed system. The results show that integrating AI-drive Functions into SIEM tools, it can significantly improve and reduce the success rate of attackers. This work contributes to the growth areas of

intellectual deception and aggressive defence in cybersecurity. This study contributes to the knowledge base by incorporating GAN-generated synthetic data with a sophisticated deception logic in a tightly integrated SIEM platform. Unlike previous approaches that used static deception, our system dynamically adapts fake responses to attacker actions, enhancing realism and support for early threat detection.

Cyber Deception and Fake Data Injection System Using AI

Polisetti Sai Mounisha Devi[1], Shaik Abdul Muneer[2], Dr. Pankaj Mudholkar[3], Vinod Kumar Pal[4]

1,2,3,4 Marwadi University, Rajkot, Gujarat, India

Abstract: Abstract. In today's cybersecurity situation, traditional defence mechanisms are often not sufficient for the development of threats such as zero-day attacks, brute force testing, and lateral movement technologies. In this article, the implementa tion of AI-powered Cyber Deception and Fake Data Injection Systems presents a new approach to cybersecurity. The proposed system uses Generative Adversarial Networks (GANs) and the Python Faker library to generate realistic but synthetic user information and network traffic. The goal is to confuse attackers, monitor their actions, and trigger warning messages with interactions with fake assets. The improves early detection and response. The system also contains adaptive deceptions that generates dynamically targeted fake answers based on attacker actions such as port scans and brute-force applications. Experimental verification within a simulated laboratory environment demonstrates the feasibility and effectiveness of the proposed system. The results show that integrating AI-drive Functions into SIEM tools, it can significantly improve and reduce the success rate of attackers. This work contributes to the growth areas of intellectual deception and aggressive defence in cybersecurity. This study contributes to the knowledge base by incorporating GAN-generated synthetic data with a sophisticated deception logic in a tightly integrated SIEM platform. Unlike previous approaches that used static deception, our system dynamically adapts fake responses to attacker actions, enhancing realism and support for early threat detection.

Preserving Mental Health Data Privacy Using Federated Learning and Homomorphic Encryption

Abhay Kiran T, Deva Nandhan G, Sreehari D, V Vignesh,
Vishnu R[1] , Swapna M P[2]

1 Dept. of Computer Science and Engineering, Amrita School of Computing,
Amrita Vishwa Vidyapeetham, Amritapuri, India
2 Center for Cyber Security, Systems and Networks, Amrita Vishwa Vidyapeetham,
Amritapuri, India

Abstract: Mental health AI systems typically require sensitive personal data to be transmitted to remote servers, creating significant privacy risks that deter user adoption. We propose a privacy-preserving framework that combines Federated Learning (FL) with Homomorphic Encryption (HE) to enable effective mental health prediction while keeping personal data on user devices. Our approach utilizes the CKKS encryption scheme within a federated architecture to train neural networks on distributed mental health datasets without compromising individual privacy. Experimental evaluation on a mental health dataset with 50 simulated clients demonstrates that our method achieves 66.2% accuracy for depression prediction while providing provable privacy guarantees. The system introduces only 2.3 seconds of encryption overhead per client update and successfully resists membership inference, property inference, and model inversion attacks. This work provides a practical solution for deploying AI-powered mental health applications that comply with healthcare privacy regulations while maintaining clinical effectiveness.

A Novel Layered and Intelligent Approach to Defend Against Network Spoofing

Niraj Kumar Singh[1], Dr. Sunil Bajeja[2]

1,2 Marwadi University Rajkot, India

Abstract: Network Access Control (NAC) is a critical security framework by design that plays crucial roles in zero trust principal in this new security paradigm. It ensures that only authorized and authenticated devices (Endpoints), users, Application & Services, IoT & OT devices, virtual machines and cloud resources, service account, APIs gain access to network resources aligning with the principles of “never trust, always verify”. However recent advancements in offensive security techniques and tactics have exposed significant vulnerability to existing NAC implementation. Red Teamers or attackers can bypass NAC mechanisms through methods such as MAC spoofing, MAC & IP spoofing, session hijacking, certificates theft and EAP relay attacks, to gain unauthorized access to secure networks. Traditional mitigation approaches, including device profiling and cyber posture assessment have proven insufficient against these evolving threats. This research introduces a novel NAC architecture (Enhanced

NAC model – ENAC) that leverage adaptive authentication & cryptographic attestation to mitigate NAC bypass techniques and tactics. Our approach integrates real time behavioral analytics and continuous identify verification to dynamically detect and prevent unauthorized network access. By incorporating a multi-layered defense strategy, the proposed framework enhances the security posture of NAC solutions in Zero trust environments. We demonstrate that our architect significantly improves detection accuracy and response capability against Advance NAC evasion techniques through a security Comparative analysis and experimental evaluation. The research highlights the necessity of integrating intelligence driven security mechanisms into NAC solutions to address emerging attack vectors.

Graph Transformer with Explainable AI for Improved Cybersecurity by Detecting and Mitigating IoT Cyber Threats

Dr. K. Hemalatha[1]

1 Assistant Professor,Department of Computer Science, KG College of Arts and Science, Coimbatore, India

Abstract: The rapid growth of Internet of Things (IoT) devices has intensified cybersecurity risks due to their heterogeneous and resource-constrained nature. This paper proposes GTM-XAI, a Graph Transformer integrated with Explainable Artificial Intelligence (XAI), for accurate and interpretable IoT cyber threat detection. IoT communication patterns are modeled as dynamic graphs, and multi-head self-attention is applied to capture both local and global dependencies. To ensure transparency, SHapley Additive exPlanations (SHAP) values identify critical devices and communication links contributing to threat predictions, enabling targeted mitigation such as device isolation and link blocking. Experimental evaluation on Edge-IIoTset, ToN_IoT, and CIC-IoT2023 datasets shows detection accuracies of 98.5%, 98.86%, and 98.67%, respectively, outperforming conventional baselines while providing interpretable outputs that support real-time incident response. The results demonstrate that GTM-XAI combines advanced detection capabilities with explainability, making it a practical solution for enhancing IoT cybersecurity.

Adversarial-Resilient Federated Q-Learning for Scalable Intrusion Detection in WSNs

Muhammed Nifal V[1], Amritha P. P[1,2], M Sethumadhavan[3]

1,3 TIFAC-CORE in Cyber Security, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India
2CRRao AIMSCS, Hyderabad, India

Abstract: This paper focuses on a Multi-Agent Federated Q-Learning frame- work for enhanced intrusion detection in Wireless sensor networks. The proposed approach incorporates Federated Learning to enable decentralized, privacy-preserving collaboration among sensor nodes. Each sensor node locally builds and updates a Q-table based on observed state-action pairs and sends these updates to a gateway node. The gateway aggregates the received Q-tables, refines the global Q-table, and disseminates it back to all sensor nodes, ensuring synchronized and adap- tive defense mechanisms. This framework is implemented using a gateway node, three sensor node, and simulating a realistic WSN environment and presents a lightweight, scalable, and secure solution for intrusion detection in WSNs. Our system uses the WSN-DS dataset for evaluation, encompassing attack scenarios such as blackhole, grayhole, flooding, and TDMA and extended the dataset by incorporating replay and Sybil attacks. These new attack scenarios are synthesized using Generative Adversarial Networks to create a more comprehensive dataset. The model is then trained and tested to identify all six attack types, improving its robustness against a various cyber threat. Experimental results demonstrate the federated Q-Learning method achieves high detection accuracy while maintaining low overhead, making it usable for resource-constrained WSNs. This work extends an efficient and scalable method for collaborative intrusion detection, emphasizing both robustness and energy efficiency in distributed sensor networks.

Survey On Cyber Threat Detection Using Honeypot, Isolation Forest & Threat Intelligence

Mr. S Giridharan[1], Dr. M Senthil Kumar[2], A Abinav[3], S Aswin Raj[4], E Jayasurya[5]

1 Assistant Professor, Department of Cyber Security, SRM Valliammai Engineering College
2 Professor & Head, Department of Cyber Security, SRM Valliammai Engineering College
3,4,5 UG Scholar, Department of Cyber Security, SRM Valliammai Engineering College

Abstract: As cyber threats become complex and highly sophisticated, traditional security mechanisms often have a hard time detecting an thwarting novel attacks. This paper surveys the integration of honeypots, machine learning (Isolation Forest), and threat intelligence towards implementing a multi-layered approach to cybersecurity. Honeypots are deception-based mechanisms that attract and log attackers' activities, providing tremendous insight into the cyber threat landscape. Isolation Forest is a widely used anomaly detection algorithm applied to real-time threat recognition by capturing changes to data patterns with extremely

high computational efficiency. Along with considerably assisting in the identification and mitigation of cyber threats, threat intelligence uses knowledge-sharing frameworks and predictive analytics. The survey provides an insight into the way research exists on the three technologies and their efficacy in mitigating cyber threats, as well as the challenges of their implementation

---

Survey on Effectiveness of File IntegrityCheckers in ensuring Medical Records

Ms. K. R. Nandhashree[1], Dr. M. Senthil Kumar[2], M. Catherine Presenna[3],
J. Janani[4], K. Jothika[5]

1 Assistant Professor, Department of Cyber Security, SRM Valliammai Engineering College
2 Professor & Head, Department of Cyber Security,SRM Valliammai Engineering College
3 UG Scholar, Department of Cyber Security, SRM Valliammai Engineering College

Abstract: With the widespread development of digital healthcare systems, the protection of medical file integrity has become a major issue. Research on cryptographic hashing techniques such as BLAKE3 and SHA-3 for fast and secure file authentication, pydicom based metadata verification for ensuring the consistency of DICOM data, blockchain-based approaches for tamper-proof EHRs, federated learning for privacy- preserving data integrity verification, AI and machine learning-based anomaly detection, and lightweight cryptographic models for securing medical files. The survey shows the benefits of integrating these techniques to create a robust and scalable system for medical file integrity verification, including enhanced security, compliance, and patient trust in digital healthcare systems.

Survey on Secure File Integrity & Ownership System Using Blockchain & NFTs

Ms. T. Sathya[1], B. Prasanna[2], A. Sakthi[3], E. Vishwa[4]

1 Assistant Professor, Department of Cyber Security, SRM Valliammai Engineering College
2,3,4 UG Scholar, Department of Cyber Security, SRM Valliammai Engineering College

Abstract: Securing data today is a major priority since data can easily be used or accessed by unwanted parties. Because digital information storage and sharing are on the rise, there is a greater requirement for strong protection that allows access to information exclusively to authorized parties. Distributing data across decentralized nodes reduces single points of failure and prevents unauthorized modifications. The use of Merkle trees ensures that data in such systems is verified efficiently since any change in the data can be detected by looking at the root hash. NFTs play a crucial role in digital asset management and access control. NFTs help prove who the rightful owner of a certain data asset is and exclude those without permission from viewing it. Together, these technologies enhance data integrity, improve traceability, and

simplify user activity logging. This paper discusses the latest innovations in decentralized data systems that rely on blockchain, cryptographic hash functions, and NFTs for security, openness, and tamper-proofness in storing information online.

Secure EEG Report with Time-Lock Access and Blockchain: A Survey

K.R.Nandhashree[1], Dr. M. Senthil Kumar[2], Eric Jonathan[3], K.Harish[4], S.Lekha Sree[5]

1 Assistant Professor, Department of Cyber Security, SRM Valliammai Engineering College
2 Professor & Head, Department of Cyber Security, SRM Valliammai Engineering College
3 UG Scholar, Department of Cyber Security, SRM Valliammai Engineering College

Abstract: This research discusses how blockchain technology can be utilized to secure EEG medical reports. Because EEG data is very personal health information, efforts should be taken to ensure it does not fall into the wrong hands and that tampering is not done. Our model achieves this through the integration of a number of sophisticated security techniques. The reports are kept on IPFS, a peer-to-peer storage solution, while hashing is employed on the blockchain to ensure that data has not been altered. A time-lock component does not allow the reports to be accessed except for predefined periods, thereby providing more control over who can access the data and when. Through the examination of studies on secure sharing of healthcare information and privacy-oriented blockchain techniques, this research demonstrates how combining these methods provides an assured and secure means of dealing with EEG reports.

A Comparative Analysis of Data Mining Approaches for Phishing Email and Website Detection

Ms. Janish Macwan[1], Dr. Jaypalsinh Gohil[2]

1 PhD research scholar, Marwadi University, Rajkot
2 Associate Professor & Phd Supervisor, Marwadi University, Rajkot

Abstract: Phishing is still a big danger to cybersecurity, and it keeps changing on email, internet, SMS, and social media. This research systematically evaluates data mining (DM) methodologies for phishing detection in accordance with PRISMA 2020 recommendations. After going through 612 records from six databases, we discovered 65 studies that met our criteria. We look at several algorithms, datasets, feature engineering methods, and ways to measure performance. Ensemble models and Transformer-based designs regularly surpass conventional classifiers. Nonetheless, trade-offs among accuracy, interpretability, and resource efficiency continue to be paramount. This article outlines practical deployment issues,

identifies research gaps, and suggests future possibilities, serving as a thorough reference for cybersecurity academics and practitioners.

Optimizing Intrusion Detection with Bayesian Optimization in Reactive Intrusion Detection Systems (BO-RIDS) for Enhanced Security Performance

Dr. B. NARASIMHAN[1], Dr. J. Ramkumar[2], Dr. S. P. Priyadharshini[3], Dr. R. Karthikeyan[4]

1 Department of Computer Applications, Sri Ramakrishna College of Arts and Science, Tamil Nadu,India.
2 Department of Information Technology, Sri Krishna Arts and Science College, Tamil Nadu, India.
3 Department of Mathematics, Dr. N.G.P. Institute of Technology, Tamilnadu, India.
4 Department of Computer Technology, Sri Krishna Adithya College of Arts and Science, Tamil Nadu, India.

Abstract: Network security depends heavily on the “Intrusion Detection Systems” (IDS) because they provide real-time detection of security attacks. A reactive IDS serves two primary functions including intrusion detection and automated protection system activation for risk reduction. Traditional IDS systems face operational challenges during the process of combining accurate intrusion detection with reduced false alarms at shorter response times. The article presents BO-RIDS as an upgraded “Reactive Intrusion Detection System” (RIDS) that uses “Bayesian Optimization” (BO) technology to overcome preceding detection system challenges. Bayesian Optimization enables the system to progressively develop against new network threats thus improving detection abilities multiple times. The optimization process within determination changes detection boundaries as well as detection methods and reaction approaches to enhance intrusion detection performance. System adaptability to changing network attack protocols gives this method your security protection needs that can evolve based on new attack patterns.

Optimized Self-Adaptive Intrusion Detection System (SPIDS) for Enhanced Network Security

Dr. R. Karthikeyan[1], Dr. J. Ramkumar[2], Dr. S. P. Priyadharshini[3], Dr. B. Narasimhan[4]

1 Department of Computer Technology, Sri Krishna Adithya College of Arts and Science, Tamil Nadu, India.
2 Department of Information Technology, Sri Krishna Arts and Science College, Tamil Nadu, India.
3 Department of Mathematics, Dr. N.G.P. Institute of Technology, Tamilnadu, India.
4 Department of Computer Applications, Sri Ramakrishna College of Arts and Science, Tamil Nadu, India.

Abstract: The protection of networks from various cyber threats depends heavily on the "Intrusion Detection System" (IDS) due to continually increasing network complexity. Passive IDS observes network traffic for detection purposes while avoiding system changes making it an appropriate tool for vulnerability finding without system disruption. Multiple issues surface in existing systems because they need to balance detection accuracy with computing speed. The research presents an improved version of "Self-Adaptive Differential Evolution" framework (SADE) that optimizes Passive IDS functionality. Advances in optimization allow the system to modify its operation according to altering network conditions and security threats thus helping it identify threats effectively with limited false alarm occurrences. The proposed model optimizes its three core capabilities including feature selection together with parameter adjustment and real-time adaptation to boost its performance for intrusion detection. The solution provides both security boost and performance scalability for passive intrusion detection while increasing system effectiveness.

CyberBait: Strengthening Network Deception via Realistic SSH Honeypots

Dr. Rupali Vairagade[1], Dr. Nilakshi Jain[2], Ms. Archita Bharat Jain[3], Ms. Meghali Kalyankar[4]

1,2,3,4 Cybersecurity Department, Shah And Anchor kutchhi Engineering College, Chembur Mumbai, India

Abstract: Abstract—Secure Shell (SSH) remains a foundational protocol in modern network infrastructures, enabling encrypted and authenticated remote access [12]. However, its broad adoption has made it a frequent target for attackers employing brute-force scripts, reconnaissance tools, and vulnerability scanners to exploit exposed SSH endpoints [11]. While low-interaction honeypots like Kippo and Cowrie [8], [9] are commonly used to monitor such threats, their limited realism and shallow interaction models often fail to sustain engagement with sophisticated adversaries, reducing their effectiveness and making them easier to detect [10]. To address these limitations, we present *CyberBait*—a next- generation SSH honeypot

designed to simulate a highly interactive and convincing environment, capture attacker behaviour in real time, and enhance threat intelligence. CyberBait offers robust Linux terminal emulation, an extensive command set, and a structured virtual file system containing decoy files that resemble sensitive data like configuration backups and creden- tials. A key innovation is a covert self-reporting module that silently collects attacker metadata (IP, username, access time) and securely transmits it for analysis. CyberBait's performance was tested over 72 hours on a publicly accessible cloud host. We evaluated its effectiveness in capturing attacker Tactics, Techniques, and Procedures (TTPs), calculating Callback Success Rate (CSR), and assessing system resilience via response latency and throughput under heavy load. Additionally, a brute-force attack detection algorithm was evaluated using Precision, Recall,and F1 score. Results demonstrate CyberBait's strong adver- sary engagement, accurate intrusion logging, effective callback tracking, and stable performance, affirming its value in proactive cybersecurity defense.

Extending Decentralized Payment Gateways: Cross-Chain Interoperability and Advanced Analytics with StarkNet

Ashish Revar[1], Khooshi Sonkar[2], Dhaval Deshkar[1], Prof. Kalpesh Wandra[3], Dr. Kalpesh Popat[4]

1 Asst. Professor, SITAICS, Rashtriya Raksha University, Gujarat, India.
2 Research Scholar, SITAICS, Rashtriya Raksha University, Gujarat,India.
3 Pro Vice Chancellor, Rashtriya Raksha University, Gujarat, India.
4 Associate Professor, Faculty of Computer Applications, Marwadi University, Gujarat, India.

Abstract: When online transactions are involved, transferring money most of the time necessitates sharing personal details such as names, bank accounts, and credit card numbers. The main mode of the transactions is through centralized systems, anthey require a long period to settle. Emerging technologies innovate the market which necessitates a fast and secure payment system. The DeFi model relies on blockchain focusing on the distributive approach as its main tool. Blockchain is a digital application of allocation transactions by a decentralized system that is used for its security and transparency. DeFi employs the technology of blockchain and smart contracts to have financial services dispersed in a decentralized manner. This paper accepts a decentralized payment system utilizing Distributed Finance (DeFi) and blockchain. The system is composed of a frontend website and backend smart contracts, which perform the functions of user interface payment processing, and ledger updates. It integrates MetaMask, which is a cryptocurrency wallet, that stores user accounts and cryptographic keys, and also interacts with the website. Utilizing this approach, the site users can make the sending and receiving of payments super fast without the knowledge of the fact that the website interacts with the blockchain in the background through MetaMask. There's no need to wait for hours in line to have your transaction settled, and you don't have to disclose personal details. Blockchain does not have just one single node that controls everything because of the decentralized plan of the system, it is transparent, secure, and efficient (accessible). With this knowledge, this paper shows how comfortable DeFi and blockchain technologies are in developing better payment forms.

Taxonomy of Tools and Techniques for Cyber Forensic Investigations

Baysah Guwor[1], Sridaran Rajagopal[2] and S. Silvia Priscila[3]

1,2 Faculty of Computer Applications, Marwadi University, Rajkot.
3 Department of Computer Science, Bharath Institute of Higher Education and Research, Chennai, India.

Abstract: Cyber forensics is a critical aspect of cybersecurity, focusing on investigating and analyzing digital evidence to uncover cybercrimes. It plays a vital role in identifying cyber threats, understanding attack patterns, and supporting legal proceedings by ensuring the credibility of digital evidence. As cyber threats continue to evolve, the demand for advanced forensic tools and methodologies is increasing to enhance digital investigations. Awareness of forensic tools and techniques is essential for effective cyber investigations, as it enables investiga-tors to efficiently collect, analyze, and preserve digital evidence while maintaining its integrity for legal proceedings. While existing surveys have made valuable contributions in this area, they often have a limited focus to specific domain or technique. The proposed survey contributes to existing knowledge by identifying cyber forensics tools and techniques in current research, highlighting the author's contributions and areas for improvement. This survey also provides an integrated taxonomy of tools and techniques that spans the end-to-end cyber forensic pro-cesses, including data recovery, acquisition, examination & analysis, and evidence preservation. The taxonomy is further supported with emerging trends, challenges, recommendations and future research areas, offering deeper insights into the state of the art. This survey will benefit cyber forensic investigators, researchers, law enforcement agencies, and cybersecurity professionals by providing a structured reference to various forensic tools, methodologies, and emerging challenges.

Unveiling Digital Footprints: Development and Application of the Web Artifact Analyzer (WAA) for Web Browser Forensics

Enoch Success Boakai[1], Andrew J. Diggs[2], Sunil Lalchand Bajeja[3], Pankaj Mudholkar[4]

1,2,3,4 Faculty of Computer Applications, Marwadi University, Rajkot, Gujarat.

Abstract: Modern web browsers store extensive digital footprints that can be critical in forensic investigations. However, efficiently retrieving and analyzing these artifacts remains a significant challenge for security analysts, digital foren-sic investigators, and incident responders due to the diversity and volume of browser data. To address this problem, the Web Artifact Analyzer (WAA) is in-troduced, a specialized forensic tool developed to systematically extract and an-alyze a wide range of web-based artifacts, including auto-filled credentials, browsing history, cookies, cached web data, and other session-related infor-mation. WAA supports diverse browsers and offers an efficient approach to un-covering sensitive data from compromised or targeted systems. In addition to browser data, it extends its capabilities to

collect essential system-level metadata, such as device models, MAC addresses, and operating system details, providing investigators with a holistic view of the target environment. Designed for acces-sibility, WAA's intuitive interface supports both experts and non-expert users. This work presents the design and implementation of WAA, demonstrating its cross-platform applicability and evaluating its accuracy and effectiveness across core forensic operations through real-world test cases. The tool's performance was rigorously evaluated across multiple browsers and operating systems, achieving high accuracy in data extraction, analysis, hashing, and encryption/de-cryption functions. Key modules such as Browsing History, Download History, Cookies, and Credentials consistently achieved pass rates of 95–100%, demon-strating the tool's reliability and efficiency. By accelerating the acquisition and analysis of diverse digital artifacts, WAA enhances the speed, precision, and depth of digital forensic examinations.

Cybersecurity Challenges in IoT-Based Healthcare Monitoring Systems: A Comprehensive Review and Framework for Patient Data Protection

Sashidhar Siddamsetty[1], Ashish Dhone[2]

1 Cyber Security, Identity Access management, Independent Researcher
Austin, Texas, USA.
2 Offensive Security Lead, Globally Ranked Ethical Hacker, Award-Winning Bug Bounty Hunter & Most Valuable Security Researcher, Pune, India

Abstract: Inclusion of the Internet of Things (IoT) based technologies in healthcare systems has brought a tremendous change in the real time monitoring and diagnosis of patients. This has however come with significant cybersecurity challenges which are compromising the confidentiality, integrity and availability of patients' sensitive data. This paper provides a comprehensive survey on various existing IoT-enabled healthcare monitoring systems and examines the prevalent security challenges they encounter such as device level threats, network attacks, application-level vulnerabilities, and human-centric risks. To address these challenges, we propose a layered patient data protection approach which includes secure device provisioning, end-to-end encryption, AI/ML based anomaly detection, block motion for data integrity and identity and access management (IAM). We provide a comparison of the related work which shows the improvement of our approach in scalability, latency, detection rate, and privacy preservation. The framework is also validated with real-world examples of the healthcare data breaches, which demonstrates the practical relevance and feasibility of our approach. The objective of this effort is to fill an existing void in the Iot healthcare cybersecurity space and help guide secure IOT deployment in digital healthcare ecosystems.

Game Theory and Optimization Techniques for Electric Vehicle Charging: A Comprehensive Survey

Moksh Agrawal[1], Smita Agrawal[2], Riya Kakkar[3], Sudeep Tanwar[2]

1 Sarvajanik College of Engineering and Technology, Surat
2 CSE Department, Institute of Technology, Nirma University,
3 Amity University, Jaipur

Abstract: This survey examines game theory-based approaches and optimization techniques for electric vehicle (EV) charging systems. We analyze various frameworks, including coalition, Stackelberg, and non cooperative game theory, alongside nature-inspired optimization algorithms like particle swarm optimization and genetic algorithms. The survey explores how these frameworks address key challenges such as optimal station placement, dynamic pricing, and grid load balancing. A key finding is that while individual methods offer robust theoretical models, hybrid approaches that combine game theory with optimization algorithms consistently outperform single-method solutions in practical applications. We conclude by identifying critical research gaps, including the need for highly scalable solutions to manage large EV fleets and the seamless integration of renewable energy sources into the charging infrastructure, highlighting these as crucial directions for future research.

Digital Transformation of Vertical Centrifugal Casting System: A Bibliometric Analysis, Methodology, Demonstration and Blueprint for Future

Sumit Ranoliya[1], Dhaval Anadkat[2], Dr Amit Sata[3]

1 Undergraduate Student, Department of Mechanical Engineering Marwadi University, Rajkot, India
2 Research Scholar, Department of Mechanical Engineering Marwadi University, Rajkot, India
3 Professor, Department of Mechanical Engineering, Marwadi University, Rajkot, India

Abstract : The Industrial Internet of Things (IIoT) is rapidly transforming the manufacturing industries by enhancing productivity and enabling real-time data monitoring and control, intelligent process control and digital connectivity across the systems. This work is focused on bibliometric analysis of the term "Industrial internet of Things" with emphasis on Manufacturing domain. This study further delves into casting and one of the special process Vertical Centrifugal Casting (VCC) used for manufacturing cylindrical and hollow cylindrical casting. Using comprehensive datasets extracted from two leading academic databases: Scopus® and Web of Science® for the period 2015–2025, a total of 25,628 non-duplicate records were analysed using RStudio®. The analysis explores the various parameters such as publication trends, most cited countries, top contributing institutions,

keyword co-occurrence networks, collaboration patterns, and author productivity metrics. The results indicate the exponential growth in the IIoT-related researches in recent few years from the countries like China, India and USA. This research aligns with Digital Twins, Quality Prognosis, Predictive Maintenance, Smart Foundries and immersive technologies. In parallel, to support the bibliometric insights with a practical perspective, a prototype of IIoT integrated VCC setup was developed and demonstrated using embedded sensors, a NodeMCU microcontroller, and a custom mobile application for remote monitoring and control. This combination of bibliometric mapping and experimental implementation provides a holistic view of the current research landscape and technological direction of IIoT in advanced manufacturing, laying the foundation for future innovation in intelligent, data driven casting systems.

Implementation of Web Scraping on Hindusthan Times TTC: A Flask-based News Aggregator System

Bhuvaneswari Yennapusala Sohith Bukka Priyanka Kumari[1]

1 Computer Engineering-AI Department, Marwadi University, Rajkot, Gujarat, India

Abstract: Today, with so many news sources available online, users often feel overwhelmed when trying to find consistent and relevant information across different topics. The experience tends to become fragmented, with scattered articles, poor formatting, and no convenient way to access everything in one place, making it harder for people to stay informed and retain what they read. To address this issue, we used Flask to create a basic news aggregator specifically for the Hindustan Times TTC portal. The system automatically retrieves live news headlines from categories like politics, sports, technology, and entertainment using Python tools like BeautifulSoup and regular expressions[1], [2].Then, it presents them all on one platform after organizing them thoroughly. Because the application is built using a modular Flask architecture [3], it is easy to add new aspects of functionality, such as category filtering, theme toggling (light to dark), and bookmarking articles within a session. We focused on creating a system that is scalable, efficient, and easy to use, drawing on earlier research on regex-based scraping methods[4].Inspired by previous research on regex-based scraping methods we placed strong emphasis on building a system that is scalable, efficient, and user-friendly. In addition, we carefully considered the ethical implications of web scraping, particularly in cases where public APIs are not available.Through the design of a responsible scraper and an efficient system, we developed a lightweight and centralized solution for curated news access without incurring expensive data services costs. This means that the system is valuable beyond low-cost news access since it can also be used for personal media tracking, educative purposes, and academic research.

Navigating Fog Federation: Classifying Current Research and Identifying Challenges.

Dhairya Patel[1], Shaifali Malukani[2]

1,2 Department of Computer Engineering, Dharmsinh Desai University, Nadiad, India

Abstract: Fog computing has gained significant attention for its potential to enhance resource management and service delivery by bringing computation closer to the network edge. While numerous surveys have explored various aspects of fog computing, literature related to fog federation shows a significant gap. Fog federation is a crucial extension that enables collaboration and resource sharing across multiple fog environments, enhancing scalability, service availability, and resource optimization. This paper provides a comprehensive survey of the existing work on fog federation, classifying the contributions from its inception to the present. We analyse the various approaches, architectures, and methodologies proposed for fog federation and identify the primary challenges addressed in this field. In addition, we explore the simulation tools and platforms utilized in evaluating fog federation systems. Our survey uniquely contributes to the literature by addressing the specific topic of fog federation, offering insights into the current state of the art and highlighting open research gaps and future directions.

Harnessing Smart Computing and Social Media Intelligence for Personalized Digital Marketing in Online Fashion Retail: Enhancing Consumer Experience and Business Performance

Akshita Ghodadra[1], Dr.Niharika Bajeja [2]

1, 2 Marwadi University, Rajkot Morbi highway, Rajkot-360007

Abstract: The research addresses the factor of smart computing and speaking smart ideas on consumer behavior in online fashion retailers in the Saurashtra region of India. Nevertheless, the joint role of factors involving interactivity, in formativeness, performance expectancy, hedonic motivation, trust, habit and cutural influence in defining purchase intention has been largely unexplored despite the conduction of many studies as newer technologies have emerged and presented a new way of doing business that has affected digital retail significantly. Based on a survey sample of 535 active social media shoppers, among which a structural equation modeling (SEM) process was adopted, the results indicate that interactivity, in formativeness, and perceived relevance have a substantial effect on purchase intention, whereas habit has a little effect that could only be amplified by relevance and trust. The research can be also seen as an extension of TAM and UTAUT2 and adding the cultural and personalization aspects. Practical implications highlight the value of AI-based personalization, culturally responsive advertisements, interactive campaigns, as well as boosting consumer engagement and brand loyalty.

Exploring User Intentions to Adopt Blockchain-Enabled Decentralized Finance (DeFi) in the Health Insurance Sector

Susana D[1], Srividya V[2], Abirami S[3]

1,2,3 PSG Institute of Management, PSG College of Technology, Coimbatore, India

Abstract: Blockchain technology is revolutionising the insurance sector by addressing challenges such as fraud, data security, and inefficiencies in claims processing. Blockchain through smart contracts can automate claim settlements, reduce administrative delays, and eliminate intermediaries. Decentralised Finance (DeFi) operating on blockchain networks has been implemented in the financial services sector and also in other sectors such as insurance, real estate and supply chain. With its wide acceptance in the finance and insurance sectors, the benefits of this technology can be leveraged to offer end-to-end solutions in the health insurance sector where transparency, data security and efficiency are essential. It is vital to examine the extant of global research and to understand the acceptance by consumers for its feasibility of its implementation in the Indian context. Bibliometric analysis using PRISMA framework in VOS viewer is carried out in this study to examine the extent of global research of blockchain and DeFi in the health insurance sector. The intention to adopt DeFi by consumers for their health insurance services is examined by conducting an online survey using a structured questionnaire. The extended model of Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) with added variables transparency and accessibility were adopted in this study to identify the key variables influencing the behavioural intention to adopt DeFi and Structural Equation Modelling was employed. The findings from bibliometric analysis revealed that DeFi enhances security and efficiency, however interoperability issues, legal difficulties, and data privacy concerns are areas of concern for adoption. The SEM analysis results showed that Performance Expectancy, Price Value, Habit, Accessibility, and Transparency were the key determinants influencing the behavioural intention to adopt DeFi in the health insurance sector. The findings reveal that DeFi adoption in the health insurance sector promises a safer, transparent and effective system, however attention on regulations, and focus to AI driven advancements needs to be addressed.

Cubic Smooth Spline and Weight Composite Regressive Human Activity Recognition For Speciallyabled Persons

R. Maneendhar[1], D. Kavitha[2]

1 Research Scholar, Assistant Professor, Department of Information Technology, KG College of Arts and Science (Autonomous), (Affiliated to Bharathiar University), Coimbatore, TamilNadu, India.

2 Associate Professor,Department of Computer Applications, KG College of Arts and Science (Autonomous), (Affiliated to Bharathiar University), Coimbatore, Tamil Nadu, India.

Abstract: Elderly and specially-abled individuals can considerably gain from Human Activity Recognition (HAR) systems that have of late recently developed notably owing to the homogenization of the Internet of Things (IoT) and Artificial Intelligence (AI). HAR systems provisioned with severalsensors contribute data to homogenization of AI and machine learning (ML) is especially crucial in case of tracking activity levels, such as falling, freezing, stumbling and so on to promote healthy lifestyle. These activities pose significant issues for specially-abled individuals and affect both mobility and security. To address these issues, this study introduces a machine learning method called, Cubic Smooth Spline and Weight Composite Regression (CSS-WCR) Human Activity Recognition for specially-abled individuals to track activity levels. These acts of tracking are still very demanding for the mobility and accessibility of people with special needs. Using pre-processing and feature selection, it is intended to enhance the accuracy and precision of human activity recognition. The proposed CSS-WCR method is split into two processes, namely, pre-processing and feature selection. Initially, sensors are positioned on different parts of the human body to collect the person information. Using Cubic Smooth Spline Data Pre-processing algorithm and Weight Composite Regressive Feature Selection model as the initial features to recognize human activity behavioral patterns among participants are observed. The Cubic Smooth Spline Data Pre-processing algorithm is carried out to remove the noisy data from input sample data points, therefore minimizing processing time and reducing false negative rate extensively. Following which, Weight Composite Regressive Feature Selection is carried out to select the relevant features from pre-processed sample data points with improved precision and accuracy. The usefulness of this study is to improve fitness tracking of the disabled participants by promoting healthy lifestyle and monitoring progress in fitness programs. Besides extending the technical development of HAR and machine learning, this work has inferences for real-life problems of accessibility in monitoring activity levels and physiological data to promote a healthy lifestyle.

Cloud-Based Optimization for Smart Scheduling of Energy Distribution in modern Power Grids

Janani. S[1], V.Sumalatha[2]

1 Research Scholar, Department of Computer Science, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu, India.
2 Professor, Department of Computer Applications, Vels Institute of Science, Technology & Advanced Studies, Chennai, Tamil Nadu, India.

Abstract : This study outlines a cloud-based optimization framework for the scheduling of smart energy distribution, supported by real-time energy data from smart meters, IoT sensors, and SCADA systems. The framework uses on board preprocessing techniques to eliminate noise, synchronize, and extract features from diverse energy datasets. The actual optimization models can be run on scalable cloud-based platforms. The authors use Mixed Integer Linear Programming (MILP) for day-ahead and intra-day scheduling optimization and Reinforcement Learning (RL) for real-time adaptive control. The intelligent scheduler uses IoT messaging protocols according to NIST standards for secure updates to grid conditions, to dynamically monitor grid states. The scheduler will push updated schedules to grid devices to align energy flow with customer demand-dispatch control. The relevant utility dashboard monitors energy utilization efficiency, cost-reduction, grid stability, scheduling latency and CO_2 emission reductions. Comparison with contemporary control techniques, like time-based, rule-based, heuristic, and edge-based scheduling methods proved that day ahead and hour ahead smart scheduling in a cloud supported optimization solution is efficient and effective compared to traditional scheduling methods. This research has confirmed that cloud optimization of energy efficiency and grid resiliency can be achieved while reducing operational costs and carbon footprint emissions, representing a viable, multi-industry solution to the future smart grid complex system.

Enhanced Time Stamp Virtualized Load Balancer in Cloud Computing Web Server

Daniel Raja Singh[1], Dr. R. Durga[2]

1 Research Scholar, Department of Computer Science, VISTAS, Chennai.
2 Professor, Department of Advanced Computing & Analytics, VISTAS, Chennai.

Abstract: Cloud computing on the Internet is significant because it allows for managing data and applications over the Internet without needing personal devices. Users' jobs are scheduled to run on cloud resources to improve efficiency. The range of energy consumption and efficiency relative to the allocated resources should be considered. Allocating resources, such as CPU, memory, and storage, to various tasks or processes is done through task scheduling. Load balancing divides incoming traffic or workload among several servers or resources to prevent any resource from becoming overburdened. Existing approaches have

drawbacks, including difficulty distributing workloads evenly among servers, workload latency, and time-consuming task scheduling. To overcome the issue, the proposed method called the Demand Aware Elastic Load-Priority Queuing Algorithm (DAEL-PQA), allocates the task based on the workload priority. Focuses on task scheduling using a Time Stamp Virtualized load balancer to optimize energy and scheduling time. First Timeline Job Completion Behaviour Rate (TJCBR) allocates the resource task based on the user behavior and feedback rate for the processing timeline. The second step is the Multi-Tenant Spider-Ant Colony Feature Scaling Rate (MT_SACFSR), which selects feature weight and estimates the scaling feature rate for multiple tasks. Demand Aware Elastic Load-Priority Queuing Algorithm is used to analyze a Load Request priority allocation. The final step is the Energy Efficient Distributed Task Scheduling Technique (EEDTST) to optimize the task scheduling level energy in the cloud web server and respond to cloud user requests. The outcomes were finally contrasted to discovered that the proposed algorithm (DAEL-PQA) provides an optimal balance result.

Blockchain and Machine Learning: Revolutionizing Secure Cloud Storage in IoT-Driven Healthcare Systems

Dr.S. Sengamala Barani[1], Dr.P.T. Kasthuri Bai[2]

1 Assistant Professor, Department of Computer Applications, SRM Institute of Science and Technologies, Vadapalani campus, Chennai.
2 Associate Professor, Department of Computer Science, Thiruthangal Nadar College, Chennai.

Abstract: When it comes to healthcare management driven by the Internet of Things (IoT), a revolutionary solution for safe and effective cloud storage has emerged with the combination of blockchain and machine learning (ML). This article delves into the important issues surrounding the privacy, security, scalability, and real-time processing of data that are intrinsic to healthcare systems that use the Internet of Things. A hybrid framework is proposed, combining blockchain's decentralized and tamper-proof architecture with ML's capability for real-time anomaly detection and predictive analytics. The proposed solution ensures robust data security, enhances system scalability, and provides intelligent insights for improved healthcare delivery. Experimental evaluations demonstrate the effectiveness of the framework in mitigating cyber threats, ensuring data integrity, and optimizing performance in IoT healthcare environments. Blockchain and ML have the ability to revolutionise safe cloud storage, according to this research. This might lead to improvements in healthcare IoT systems.

A Novel Approach for De-Biasing and Enhanced Hallucination Mitigation In LLM

M.K. Shamseera[1], Dr. R. Durga[2]

1,2 Department of Advanced Computing and Analytics, VISTAS, Chennai

Abstract: Hallucination in large language models refers to the typical mistakes we encounter when relying on AI systems, such as ChatGPT-like models, in our daily lives, a situation where the model produces inaccurate, illogical, or fake text. This happens because large language models (LLMs), which produce text based on patterns, are neither databases nor search engines and associations discovered in their training data instead of referencing particular references. Resolving hallucinations is crucial to promoting constructive human-AI interactions and increasing confidence in AI-generated material. Monitoring hallucinations is undoubtedly challenging, but it can be a game-changer as it enhances data verification at the source level and beyond.

Steganography Image Security Using Enhanced Hyperactive Cryptography Model

Sreena G Nair[1], Dr. K. Rohini[2]

1 Research Scholar, Department of Computer Science, VISTAS, Chennai.
2 Department of Computer Science, VISTAS, Chennai.

Abstract: Steganographic image security technology can be used to conceal sensitive data within digital images without any visible alteration, thereby ensuring the confidentiality of sensitive data. In the proposed work process, encryption encrypts the message, converts it to ciphertext, and decryption recovers the original message through insecure key verification. Traditional encryption and decryption methods suffer from poor key management, susceptibility to brute-force attacks, or vulnerability to steganalysis. To address these threats, the system employs an enhanced key verification algorithm, the Enhanced Hyperactive Encryption Method (EHACM), which dynamically generates encryption keys and improves their resistance to attacks. The message payload is encrypted and embedded in the least significant bits of the ciphertext image, called Secret Message Least Significant Bits (SM-LSBs). This payload capacity is powerful in terms of invisibility. Keyed Elliptic Curve Cryptography (K-ECC) is used to provide secure key exchange, while Elliptic Curve Diffie Hellman (ECDH) is used to give a strong shared secret. This model integrates EHACM, SM-LSB, K-ECC and ECDH to achieve improved confidentiality, resilience, secure recovery and overall image security in steganography.

A Comprehensive Study and Comparison on various methods available for Applications Deployment on Cloud Computing Platform

Mr. Hardik Chavda [1], Dr. Ashwin Dobariya [2]

1,2 Faculty of Computer Applications, Marwadi University, Rajkot, Gujarat, India

Abstract: Cloud Computing Deployment Methods examines the increasing demand for cloud platform while considering various methodologies. Cloud technology has emerged as a significant advantage for developers aiming to expedite application development with advanced technologies. With each passing minute, the volume of information on the cloud escalates rapidly. Cloud computing platform facilitates the processing and dissemination of information globally. The advent of this technology has expanded the potential for building and delivering internet-based apps. With the emergence of new techniques for fulfilling requirements, the bulk of the community adopted cloud-based application deployment. However, this technique is neither cost-effective nor technically straightforward to comprehend. The study elucidates the systematic comparison, performance benchmarks, obstacles, for applications of available method, leveraging recent research findings to provide insights into their appropriateness for various application contexts.

Towards Low-Latency and Energy Efficient IoT: A MAC Layer Perspective Across Emerging Wireless Technologies

Ati Garg[1], Utkarsh Agarwal[2]

1 Lovely Professional University, Phagwara Punjab 144411, India
2 Xebia India, Gurugram 122005, India

Abstract: The proliferation of Internet of Things (IoT) devices in mission-critical applications has amplified the need for wireless communication protocols that can deliver ultra-low latency, high reliability, and energy efficiency. Among the most influential contributors to network performance is the Medium Access Control (MAC) layer, which orchestrates how devices access shared wireless medi ums. This paper presents a comparative analysis of four key communication technologies—IEEE 802.11ah (WiFi HaLow), LoRaWAN, Ultra-Reliable Low La tency Communication (URLLC in 5G), and WiFi 7 (IEEE 802.11be)—with a focus on MAC layer innovations that reduce latency and energy consumption for real-time IoT deployments. Each technology provides unique advantages: 802.11ah offers low-power long-range connectivity with features like Target Wake Time (TWT) and Re stricted Access Window (RAW); LoRaWAN supports energy-efficient, long-dis tance transmissions with star topologies and class-based operations; URLLC, a 5G innovation, focuses on ultra-low latency and high reliability through features such as grant-free transmissions and intelligent scheduling; and WiFi 7 enhances throughput and latency handling through multi-link operation and coordinated MAC schemes. The study identifies

common MAC challenges and trends, including conten tion management, QoS differentiation, and jitter control. It highlights the poten tial for AI-driven, cross-layer MAC frameworks to enhance scalability, adapta bility, and efficiency in future IoT deployments.

Forecasting CDR to Diagnose Glaucoma using ResNet-50 Features and XGBoost classifier from Retinal Fundus Images

Dr. Kartik Thakkar[1], Dr. Ravi Gulati[2]

1 Smt. Tanuben & Dr. Manubhai Trivedi College of Information Science, affiliated to Veer Narmad South Gujarat University, Surat, India,
2 Dept. of Computer Science, Veer Narmad South Gujarat University, Surat, India,

Abstract: Glaucoma is a disease which can cause permanent blindness. It can be detected using Fundus Image features like Optic Cup (OC), Optic Disc (OD), Fovea, Colour Intensity, Blood Vessels (BV) and Optic Nerve Head (ONH). OC and OD are used to calculate Cup-to-Disc Ratio (CDR), which is a significant feature for Glaucoma Diagnosis. To avoid vision loss, accurate and early diagno sis is necessary. This study presents an automated approach to forecast CDR to diagnose Glaucoma using combination of ResNet-50 features and CDR with XGBoost classifier. ResNet-50, a pre-trained Convolutional Neural Network (CNN), is utilized for feature extraction, capturing high-level spatial and struc tural information from the images. The extracted features are then fed into the XGBoost classifier, a robust and efficient machine learning model, to predict CDR and classify patients into 3 different classes – Early Stage, Moderate Stage and Late Stage. The proposed model was experimented on SIGF retinal fundus image datasets, achieving high accuracy, sensitivity, and specificity. The result demonstrates the effectiveness of combination of manual feature with ResNet-50 features using XGBoost classifier for glaucoma forecasting.

Learning Professional Digital Wireless Communication Through Simulink: A Project-Based Educational Approach

Dr. Vivekanand Joshi[1], Dr. Gayatri Ambadkar[2], Dr. Dipti Sakhare[3]

1, 2, 3 MIT Academy of Engineering, Alandi, Pune,412105, INDIA

Abstract: This paper presents educational research in the field of Electronics and Telecom munication Engineering, focusing on the teaching and assessment of Digital Wireless Communication Systems. The study is structured around the simulation-based learning of a professional grade digital wireless communication framework, modelled on the architecture of Digital Mobile Radio (DMR). As part of a reformed engineering examination, groups of second-year undergraduate students were assigned unique problem statements, each culminating in the design and simulation of an end-to-end digital wireless communication system for both voice and data using MATLAB Simulink. Real-time voice signals, captured

from speakers of varying gender, age (20–50 years), and linguistic backgrounds (Marathi, Hindi, English), were used as input. Each group implemented distinct combinations of source coding, channel coding, and modulation techniques to ensure project uniqueness. The communication link was divided into separate voice and data paths, and the systems were evaluated using a mix of objective and subjective performance metrics including Bit Error Rate (BER), Mean Opinion Score (MOS), Perceptual Evaluation of Speech Quality (PESQ), data rate, delay and throughput. This examination reformation was carried out for 85 student groups with 4 students per group. The primary goal of this approach was to deepen conceptual understanding through project-based learning (PBL), while simultaneously aligning with Outcome-Based Education (OBE) principles. The results indicate improved student engagement, stronger practical skill acquisition, and insightful comparative analyses of digital communication techniques. Feedback from students, external examiners, and industry professionals strongly supports the effectiveness and relevance of this examination reform. The study thus advocates for the integration of simulation-based, problem-driven learning methodologies as powerful pedagogical tools in engineering education.

AI-Driven Framework Development for Parks and Waterfronts Quality Assessment

Mary John[1], Sherzod Turaev[2], Elke Neumann[3]

1 ASD, Abu Dhabi Polytechnic, Abu Dhabi, United Arab Emirates.
2 Department of Computer Science and Software Engineering, College of Information Technology, United Arab Emirates University, Al Ain, United Arab Emirates.
3 Department of Integrative Agriculture, College of Agriculture and Veterinary Medicine, United Arab Emirates University, Al Ain, United Arab Emirates

Abstract: Parks and waterfronts quality assessment lacks systematic methodologies that integrate empirical research findings into practical evaluation frame works. Current approaches remain fragmented, limiting comprehensive evaluation and evidence-based decision-making for these critical urban spaces. This study develops an AI-driven framework for parks and waterfronts quality assessment through algorithmic integration of empirical research findings. Using a 5- phase methodology, we transform quality factors extracted from peer-reviewed studies focused specifically on parks and waterfronts into a validated hierarchical taxonomy. The methodology combines semantic analysis, algorithmic clustering, and domain knowledge integration to address terminological variations and functional relationships. The resulting framework organizes unique quality factors across main categories and subcategories, providing systematic consistency in factor organization and theoretical alignment with established parks and water fronts research. This research demonstrates how AI algorithms can transform fragmented empirical research into practical assessment frameworks, supporting evidence-based policy development, design quality evaluation, and systematic understanding of what creates successful parks and waterfronts.

Adaptive Enhancement of Transmission Control Protocol in Wireless Networks with Particle Swarm Optimization

Himanshu Maniar[1], Hardik Molia[2], Kalpesh Popat[3]

1 Bhagwan Mahavir College of Computer Application, Bhagwan Mahavir University-Surat, Gujarat, India
2 Computer Engineering Department, Government Engineering College – Bhavnagar, Gujarat, India
3 Faculty of Computer Application, Marwadi University-Rajkot, Gujarat, India.

Abstract: Conventional TCP variants do not perform optimally in wireless networks because they assume that any packet loss is primarily due to congestion. As a result, they reduce the transmission rate whenever packet loss occurs, even when it is caused by transmission issues or route failures instead of congestion. These TCP variants are static rule-based and do not have capability to fine-tune their decision making policies dynamically. Over the years, wireless networks are being deployed rapidly in real-world applications. At the same time, networks are becoming more dynamic and diverse in terms of infrastructure and traffic. Researchers have identified necessity for developing more adaptive and generalize TCP to enhance performance under dynamic conditions of networks to detect and handle losses other than congestion losses. Machine Learning based solutions are proposed for TCP protocol for intelligent decision making. In general, ML based TCP variants remain effective but difficult to deploy for resource-constrained wireless networks due to intense computation requirements. PSO (Particle Swarm Optimization) is a promising alternative to ML to adjust TCP parameters such as Cwnd-Congestion Window (transmission rate) dynamically by simulating the social behavior of swarming particles. The algorithm's global search capabilities explore wide range of configurations to converge on optimal solution without need for extensive data for training. This research work proposes AETCP-PSO (Adaptive Enhancement of TCP based on PSO) to set transmission rate dynamically and optimally. The solution is implemented in Network Simulator 3.28 and has been evaluated with large number of wireless network topologies that are different in terms of connections and traffic patterns. Performance evaluation is performed with end to end transport layer measurements which are average throughput and average packet delivery ratio. A significant performance improvement has been observed for AETCP-PSO over TCP-Westwood+.

Detecting Network Attacks Using Decision Tree Classifier

Sujata N. Bhosle[1], Jayshri Pagare[2]

1,2 JNEC, MGM University, M.S., India

Abstract: Network Traffic Classification is the crucial area in the field of smart city. As in the smart city a lot of data flow is generated using IoT systems. These net-flows need to be categories in normal and attack category in order to deal with the network attacks. In this paper, we have used the recent NF-TON-IOT-V2 dataset which contains recent attacks. NF-

TON-IOT-V2 is the net-flow adaptation of the original TON-IOT dataset. Our research is intended to classify the flows in the Benign and Attack category. To do this intended task, we have used binary classification and implemented a decision tree classifier. Our proposed model gives 99.31% accuracy.

Secure VLSI System Design Through Verilog-Based Simulation and RTL Realization of SPECK Algorithm for Enhanced Cryptographic Reliability

Koduri Sreelakshmi[1], Padmakant Umakant Dhage[2], M. Lalitha[3], Arun Raj S.R.[4], K. Avinash Babu[5], Manjunath T.C.[6]

1 Sr. Assistant Professor, Department of ECE, GMR Institute of Technology, Rajam, Andhra Pradesh, India.
2 Assistant Professor, Department of E&TC, Walchand Institute of Technology, Solapur, Maharashtra, India
3 Sr. Assistant Professor, Department of Humanities and Sciences, CVR College of Engineering, Telangana, India
4 Assistant Professor, Department of Electronics and Communication Engineering, University B.D.T College of Engineering, Davanagere, Karnataka, India
5 Assistant Professor, Dept. of ECE, University College of Engineering and Technology, Mahatma Gandhi University, Nalgonda, Telangana, India
6 Professor, CSE (IC, CS & BCT) Dept., Dean Research (R & D), Rajarajeswari College of Engineering, Bangalore, Karnataka

Abstract: Cryptography is essential for protecting sensitive information, especially in technologies like IoT devices, embedded systems, and wireless sensor networks. Among the lightweight encryption methods, the Speck algorithm— introduced by the NSA—has gained attention for its ability to balance strong security with high efficiency. This research work is centered on the design, simulation, and hardware implementation of the Speck algorithm using Verilog at the RTL (Register Transfer Level). The main goal is to create effective Verilog code, validate its accuracy through simulations, and ensure the design works reliably. The implementation covers key expansion, encryption, and decryption processes, with an emphasis on optimizing performance and reducing hardware area. To confirm the correctness of the design, simulations were carried out with a series of test cases, making sure that both encryption and decryption function as expected. The outcome of this work contributes to the broader field of hardware based security, offering a compact, efficient, and scalable solution. Such an im plementation makes the Speck algorithm well-suited for IoT and embedded sys tem applications, where lightweight yet secure cryptography is crucial. Simulation results shows the power of the method developed & presented here.

Harnessing the Power of LSTM and GRU in Long-Term Time Series Forecasting

Dr. Riaz K. Israni[1], Bhagyashree Rajeshkumar Shah[2], Poonam Nanjibhai Parmar[3], Yuvraj Kaushik Jani[4], Deepali Vishnu Bavlecha[5], Jatin Sureshchandra Agravat[6]

1,6 School of Engineering, R K University, Rajkot, Gujarat, India
2 PIET, Parul University, Vadodara, Gujarat, India
3,5 Government Engineering College Rajkot, Gujarat, India
4 Unitedworld Institute of Technology, Karnavati University, Gandhinagar, Gujarat, India

Abstract: This study conducts a rigorous comparative analysis of Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) deep learning architectures for solar power production forecasting through a data-driven approach. A comprehensive dataset spanning three years, comprising 26,280 hourly observations, was utilized, integrating key meteorological variables such as temperature, humidity, wind speed, and solar irradiance. LSTM models were implemented in TensorFlow, while GRU models were developed in PyTorch, both employing an identical three-layer structure with 128 hidden units. For benchmarking, their performance was compared against conventional forecasting methods, including ARIMA and Support Vector Regression (SVR). The study underscores GRU's superiority in computational efficiency, achieving a notable reduction in training time and memory usage while maintaining prediction accuracy on par with LSTM. Both models successfully captured short-term fluctuations driven by cloud dynamics as well as long-term seasonal patterns, with GRU exhibiting greater adaptability under rapid weather transitions. Moreover, the PyTorch implementation demonstrated higher GPU utilization than TensorFlow, reinforcing its practical advantage in large-scale deployments. Overall, the findings position GRU as the more efficient and scalable architecture for real-time solar forecasting, delivering high accuracy in day-ahead predictions and substantially outperforming conventional forecasting approaches. These insights provide renewable energy operators with clear guidance on selecting advanced deep learning frameworks to improve forecasting reliability, grid stability, and operational efficiency.

A Decade of Research on Circular Economy & AI Driven Financial Performance: A Bibliometric Perspective

Kamani Sneha[1], Dr. Bhumi Vyas[2], Dr.Meeta Joshi[3]

1,2,3 Faculty of Management Studies, Marwadi University, Rajkot.

Abstract: The bibliometric tool Bibliography within the R package enables complete content analysis on Circular Economy (CE) and Artificial Intelligence (AI) integration from citation and co-citation viewpoints. The researchers conducted systematic database extraction in Scopus and continued with appropriate checks to obtain 438 research papers. Researchers found that only about three papers were published in 2016–17, yet the topic surged to more

than 200 in 2024–25 as academic interest in the field increased substantially during the past ten years. The sequence of thematic developments throughout it observes AI's ascending influence on CE practices, including predictive maintenance, resource optimisation, and waste reduction methods. Sustainable production intersects with green innovation and AI-driven circular business models as key thematic domains. The co occurrence analysis demonstrates how industries attracted by practical solutions now replace theoretical models as their primary focus. Research contributions in this field mainly originate from three nations: the United Kingdom, China and India. Politecnico di Milano leads this research with strong support from the Norwegian University of Science and Technology and the University of Cambridge. This research outlines three new directions for digital sustainability which include blockchain-based circular systems and artificial intelligence support for climate action and ESG (Environmental Social Governance) goals. The data demonstrates AI's rising importance as a reactive tool for quickening circular value chain transformations.

Conversion of Printed Braille Numerals into Gujarati Digital Text for Blind People

Dr. Nikisha Jariwala[1], Dr. Kalpesh Popat[2]

1 Smt. Tanuben & Dr. Manubhai Trivedi College of Information Science, affiliated to Veer Narmad South Gujarat University, Surat, Gujarat, India
2 Faculty of Computer Applications, Marwadi University, Rajkot, Gujarat, India

Abstract: There have been several developments in the field of ICT (Information and Communication Technology) in this digital age. To make a significant and pertinent contribution to the society, everyone has to keep up with the latest advancements. People with visual impairments lag behind in this field because of their inherent limitations. Technology must be upgraded, for differently-able people to get involved as an active member of their communities. One way to reduce this increasing gap and counter this trend is to design a system that is cost-effective for them and enables them to freely and broadly interact through the internet or other information infrastructure. Braille is a script used by people who are visually challenged or blind to write and read. Old Braille writings and docu ments must be preserved. Tangible Braille requires a lot of room for storage and upkeep because it is large and heavy. Documents that are only available as physical form could be easily lost. Preservation, distribution, and hard copy duplication will all benefit from automated Braille reading and digitization. A proposed method for converting printed Braille numerals into digital text is presented in this paper. Braille cells written on paper are recognized using Template Matching and Image Processing techniques. The transformation table and character map ping approach are used to establish rules for converting detected Gujarati numerals (Aakada) Braille cells into digital text. After conversion digital text is saved in a text file that can further be used. The model's accurate translation of printed Braille Gujarati numerals (Aakada) to digital text yields good results.

Examining the influence of scrum components on software quality: Insights from the Indian IT sector

Mr. Sivaram S[1], Dr. Vijaya Vardhan Manchala[2]

1 MBA student, PSG Institute of Management, PSG College of Technology, Coimbatore, India
2 Assistant Professor, PSG Institute of Management, PSG College of Technology, Coimbatore, India

Abstract: This research examines the influence of Scrum components (i.e., artifacts, roles, and events) on software quality characteristics (i.e., reliability, maintainability, performance efficiency, and functional suitability) in the Indian IT industry. The research adopted a quantitative research strategy, and the data were gathered from a total of 308 Indian IT practitioners engaged in Scrum-based projects by using structured questionnaire. The study performed correlation and regression analysis. Results indicate that all Scrum elements have a significant impact on software quality, with artifacts having the highest impact, followed by roles and events. The research is, however, confined to the Indian IT industry, which may limit generalizability. Organizational implications are that Indian IT companies should emphasize artifact improvement, implement role-specific training (e.g., certifications for Product Owners/Scrum Masters), and implement disciplined Scrum events to enhance quality. This research fills a critical gap by empirically associating Scrum elements with ISO/IEC 25010 defined software quality characteristics, providing actionable recommendations for optimizing Scrum frameworks in high-stress, client-centric environments.

Digital Wallet Adoption in Rural India: Advancing Financial Literacy and Inclusion through Smart Computing

Vishal Ramaiya[1], Dr Pramod Goyal[2], Dr Neeraj Kumar Dubey[3]

1 Research scholar, Faculty of Management Studies, Marwadi University, Rajkot,
2 Professor Faculty of Management Studies, Marwadi University, Rajkot, Gujarat, India
3 Asso. Professor – ABS, Amity University MP, Gwalior

Abstract: The present research aims to explore the adoption of digital wallets in rural Rajkot, Gujarat, and their contribution to promoting financial literacy and inclusion. Despite the encouragement for a cashless economy at the national level, rural regions continue to encounter challenges in terms of low awareness, poor infrastructure, and knowledge gaps. Primary data were obtained from 107 respondents in the form of structured surveys and interviews, complemented by secondary data in the form of RBI and MeitY reports. Descriptive statistics and chi-square analysis were used to explore associations between demographic characteristics and usage behavior. The results indicate that educated and younger respondents are more apt to use digital wallets, and occupation has a great impact on

usage frequency. The major obstacles are unreliable connectivity, ignorance of the service, and inadequate customer support. The report points towards good consumer experiences and increasing acceptance of digital wallets, while calling for better infrastructure and more focused literacy initiatives. Policy actions include offline payment integration, merchant incentives, and region-specific financial literacy schemes to narrow the rural-urban digital divide.

Real-Time Rice Crop Health Assessment System with IoT-Powered Soil Sensing and Cloud-Centric Data Logging

Anamika Dhawan[1], Pankaj Mudholkar[2]

1,2 Marwadi University, Rajkot, India

Abstract: An integrated Internet of Things (IoT) sensor system for real-time diagnosis of rice crop diseases addresses the essential need for improved food security in the phase of diminishing agricultural GDP contributions and rising global rice demand. The proposed system collects data of various soil parameter sensing with NPK, DHT11, and soil moisture sensors coupled to a Raspberry Pi. Field trials conducted on rice farms proved successful real-time monitoring of soil nutrients, moisture, and microclimate conditions, with data effortlessly trans mitted to cloud storage. The proposed work seeks to support sustainable agriculture, lessen crop losses, and help achieve SDG 2: Zero Hunger.

Revolutionizing Sustainable Agriculture with SoilFeX: A Multi-Modal Soil Feature Extraction Approach

R. Jeyashree[1] and Dr. A. Poongodi[2]

1 Department of Computer Science,
VISTAS, Chennai
2 Department of Computer Application - PG,
VISTAS, Chennai

Abstract: Soil health prediction is the important for the agriculture and it is directly impact on choice of the crop, productivity and environmental sustainability. large-scale agriculture or real-time applications, conventional laboratory-based soil testing is time-consuming, labour-intensive, and costly. To focus the limitations this research proposed SoilFeX (Soil Feature Extractor). This is a holistic and multi-modal image-based algorithm focused on soil feature extraction automation through advanced image processing methods. This method is having series of components such as Multi-Scale-Directional-Gray-Level-Co-occurrence-Matrix (MSD-GLCM) for texture analysis, Multi-Scale Rotation-Invariant Local Binary-Patterns (MS-RI-LBP) for structural feature analysis, and Color-Auto-Correlogram (CAC)

for spatial color assessment. It also extracts spectral features such as the Fourier Transform, Soil Moisture Index (SMI), and Normalized Difference Nitrogen Index (NDNI) to measure water content and nitrogen presence in the soil. This model also allowing holistic assessment of soil health based on regression integrates these characteristics to predict soil pH.

Temporal Deep Learning Architectures for Predicting Underwater Acoustic Channel Variability

Abdul Khadar Vaddatti[1] and S. Silvia Priscila[2]

1,2 Bharat Institute of Higher Education and Research,
Chennai, Tamil Nadu, India

Abstract: The characteristics of underwater wireless communication (UWC) systems show the considerable challenges presented by the highly variable and unpredictable nature of underwater acoustic channels which includes multipath propagation, Doppler shifts and environmental changes. Reliable and efficient communication systems depend on accurate predictions of the channel state. This study proposes a deep learning (DL) architecture that incorporates Convo-lutional Neural Networks (CNN) together with Bidirectional Long Short-Term Memory (BiLSTM) with self-attention. The architecture was designed to be trained on multiple tasks. The resulting architecture produced an MSE of 0.022 and prediction accuracy of 92.5%, and achieved a model generalization score of 0.89. Compared to the traditional methods stand-alone baselines, the proposed architecture was superior during evaluation and provides a computationally efficient model with diminished training time and energy consumption. This paper presented an architecture developed as a practical and efficient solution to predicting underwater channels for real-time conditions to provide adaptive communication in extreme underwater conditions.

Deep Learning-Assisted Adaptive Resource Allocation in Underwater Wireless Networks

Abdul Khadar Vaddatti[1] and S. Silvia Priscila[2]

1,2 Bharat Institute of Higher Education and Research,
Chennai, Tamil Nadu, India

Abstract: Underwater wireless communication is subject to considerable limi-tations, caused by variable channels, latency, and low bandwidth. Classical re-source allocation methods are inadequate to accommodate these rapidly chang-ing circumstances. This work proposes a Deep Learning–Assisted Adaptive Re-source Allocation (DL-ARA), which combines a hybrid CNN-LSTM model with a multi-step prediction factor for the channel, along with meta-reinforcement learning algorithms, specifically Soft Actor-Critic (SAC) and Model-

Agnostic Meta-Learning (MAML). The link quality, node energy, and state of the queue predicted values are used to dynamically allocate the power, bandwidth, and time slots. In experiments, DL-ARA achieved a maximum throughput of 85.3 kbps, energy consumption of approximately 1.8×10^{-3} J/bit, and a packet error rate of 4.7%, significantly exceeding the baselines of static water-filling and standard DRL. Adaptation time was reduced from 12.0 s (DQN) to 3.2 s. Overall, these results show that DL-ARA offered a robust, en-ergy-efficient, and low latency solution, establishing DL-ARA as a strong can-didate for future real-time underwater communication systems.

Smart Digital Payments: A Comprehensive Literature Review and Research Analysis

Hetvi Thaker[1] and Niharika Bajeja[2]

1,2 Marwadi University, Rajkot, Gujarat.

Abstract: Development of smart digital payment technologies at an incredibly fast pace has redefined the way consumers feel about it and altered financial ecosystem, especially in the post-COVID-19 world. Although this field has grown somewhat, adoption research is not systematic and not synthesized. In this study, this gap is bridged by using systematic literature review (SLR) on digital payment acceptance. Adopting PRISMA-based guidelines, the review combines quantitative bibliometric study on adopting patterns with qualitative studies performed based on their themes to capture both theoretical and practical trends that shape adoption. It has been built on classical adoption models such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Diffusion of Innovation Theory (DOI). Three years of IEEE Xplore, ScienceDirect, MDPI, ResearchGate and Google Scholar were searched using snowball sampling and the Boolean logic of search. Among the main trends to note, there is an increase in the importance of mobile wallets, contactless payments, AI-based fraud protection, and digital payment cross-sector integration. Adoption drivers, barriers, and emerging trajectories are discussed in the findings as they are brought up-to-date on smart payment technologies. The research value is in the advancement of the future fintech development, policy creation, and consumer confidence plans.

AI, Ethics, and Consumer Trust: Towards Responsible Personalization in Digital Marketing

Pratik Shukla[1], Prof (Dr.) Pramod Goyal[2]

1,2 FMS, Marwadi University, Rajkot

Abstract: The rapid adoption of AI-driven personalized marketing has transformed how businesses engage with consumers. While personalization enhances customer experience and business performance, it also raises critical ethical concerns related to privacy, transparency, consent, and algorithmic manipulation. This study explores these issues in the context of the Indian digital landscape by analyzing three real-world case studies involving fake dating profiles, cloned government websites, and intrusive mobile application interfaces. Through thematic interpretation and conceptual modeling, the research highlights how unethical personalization practices negatively impact consumer trust and digital well-being. The paper proposes a strategic conceptual model that integrates ethical AI design, user privacy, regulatory enforcement, and transparency as foundational elements leading to trustworthy personalization It also attempts to make a comparison metrics for ethical concern and risk in a tabulation form. The findings emphasize the urgent need for ethical frameworks and user-centric design in AI-powered marketing strategies. This study contributes to academic discourse on responsible digital marketing and lays the groundwork for future empirical validation.

Deploying Generative-AI-Powered Multimodal Intelligence for Bespoke English Language Instruction: A Cross-Disciplinary Case Study in 21st-Century Higher Education

Solomon Paul Raj D[1], Anuradha.G[2], Daniel Xerri[3], Steffi R[4],
Kavitha.V[5], Dayana Mathew[6]

1 Department of English, Sri Krishna Arts and Science College, Coimbatore, Tamil Nadu, India
2 Department of English, Sona College of Arts and Science, Salem
3 Centre for Academic Literacies and English Communication Skills, University of Malta,
4 Department of English (Aided), Nirmala College for Women, Coimbatore, Tamil Nadu, India
5 Department of Career Development Centre, SRM Institute of Science and Technology, Kattankulathur, Chennai
6 Department of English, SRM TRP Engineering College, Trichy, Tamil Nadu, India.

Abstract : This study examines the use of generative artificial intelligence and multimodal analytics to create a more personalised experience of English language instruction for the pertinent diverse learners in higher education institutions. Using a large major research university as the site of an extensive case study, and with a sizeable contingent of disciplinary English as a Second Language (ESL) instructors, who worked at the behest of the principal

investigator, unquestioningly, for 12 months, the discipline-agnostic experimental classroom was populated with upward of 200 ESL students, each of whom was subject to varying degrees and types of private AI supervision. The study makes a substantial contribution to research on educational technologies by establishing a robust framework for integrating multimodal AI into education. It is clear that the comfortable pedagogical fit of AI in language education is the result of: (1) fostering instructor agency through careful and inclusive planning; (2) placing personnel training at the center of implementation efforts; (3) enacting strong support throughout all levels of the institution; and (4) keeping the ethics of AI use at the forefront of decision-making.

AI-Driven Mental Health Surveillance and Positive Feed Curation Using Social Media Data

Narendra Rathnaraj[1], Nithish Kumar[2]

1 Assistant Professor, PSG Institute of Management, PSG College of Technology, Coimbatore, Tamil Nadu, India

2 PSG Institute of Management, PSG College of Technology, Coimbatore, Tamil Nadu, India

Abstract: Mental health challenges, including stress, anxiety, and emotional distress, are increasingly visible among social media users who share their thoughts and activities online. This paper presents an AI-based framework for detecting stress and suicidal ideation by analyzing multimodal social media activity, including posts, likes, shares, comments, and temporal engagement patterns. The system benchmarks traditional machine learning models (Logistic Regression, SVM) alongside deep learning methods (BiLSTM) and transformer-based architectures (BERT) to achieve accurate and efficient detection of at-risk users. Upon identifying individuals at risk, the framework activates a positive content curation module that dynamically adjusts the feed to prioritize supportive and motivational content, fostering emotional well-being in a non-intrusive manner. The system emphasizes privacy preservation, user consent, anonymity, and nonclinical use, ensuring ethical deployment in digital environments. Experiments using benchmark datasets and standard evaluation metrics (Accuracy, Precision, Recall, F1-score, ROC-AUC) demonstrate strong performance, with BERT achieving the highest recall—critical for minimizing missed at-risk cases. Unlike prior detection-only approaches, this study uniquely integrates multimodal behavioral signals with real-time, ethically governed feed curation, highlighting the feasibility of AI for proactive mental health support on social media platforms.

An Empirical Study on the Relevance of Enabler Factors on the Adoption of Cryptocurrency in India

Firdaus Bashir[1], Viswanath Ananth[2], V. Santhi[3], V. Devi Priya[4]

1 PSG Institute of Management, PSG College of Technology, Coimbatore, India
2 Aimer Business School, Kozhikode, Kerala
3,4 Department of Management Studies, KSR College of Engineering, Namakkal, India

Abstract: The study aims to explore a set of factors that can influence the seamless adoption of cryptocurrency, the digitised money which is accessible as cryptographic codes. The factors considered in this study are technological infrastructure, laws and regulations, governmental support, public awareness, social and cultural influences and global connectedness.In this survey method primary data was collected using a snowball sampling technique. From among the 100-questionnaire distributed, 85 of the them were further processed for statistical analysis consisting of descriptive statistics. This aided in condensing the data into mean, standard values and the mean rank for each select factors. Freidman's test was employed to rank these factors according to the order of relevance on the seamless adoption of cryptocurrency. The findings of the studyhighlighted law and regulations as the most significant factor followed by governmental support. Global connectedness was identified as the least impactful factor among the others. The smooth and wider adoption of cryptocurrency across sectors hinges on the confluence of the multiple factors selected for the study. The research employed technology acceptance model as the underpinning theory to empirically examine the factors influencing cryptocurrency adoption. This innovative approach addresses a research gap present in a niche yet rapidly expanding realm of digital currency. The approach is relevant amid the collective interest in cryptocurrencies from institutions, governments and individuals. This exhibites the prominence of the ongoing research in the rapidly evolving financial domain.

Optimizing Software Engineering Project Plan Using Genetic Algorithm and AI

K.M. Harini Kannamma[1], G.S.R. Emil Selvan[2], M.P. Ramkumar[3], Sridaran Rajagopal[4]

1,2,3 Department of Computer Science and Engineering, Thiagarajar College of Engineering, Madurai, India
4 Faculty of Computer Applications and Academic Affairs Marwadi University, Rajkot, India

Abstract: The Global Software Engineering (GSE) team works across geography. Project planning is one important phase before starting with the actual work, for any type of project. Planning involves discussion with multiple stakeholder before the plan to put up in the plan sheet. In today's working environment with respect to the industry most of the time the planning will go through the change due to several factors like talent availability, technical competencies, requirement understanding, etc. it is very important to maintain the project plan

as it directly links with the project success. Currently the plan is majorly maintained by excel or some planning tool available in the market. Still there is much manual effort involved to maintain the plan. The impact is due to any reason of delay, the plan affects, the changes are not covered completely. In this work trying to apply the Plan Assess React (PAR) approach that reviewing the plan periodically with proper findings and solutioning effectively. So, in this work the intend to address the optimization of the tactical planning for the fast-growing software industry using the Plan Assess React (PAR) approach using Genetic Algorithm with an AI inclusive. This is going to help in validating the plan with each check activity progress, on any change occurs update and maintain successfully. To bring the optimization as the work focus on, the approach used here is the Genetic algorithm as it is a proven study and very helpful to give the near real time optimal solution. Also, the AI is used here in the methodology to apply technology advancement for the automation and reduce the manual work as well. Based on the study the merge of Genetic algorithm with an AI is a good fit-in for the result of optimization. Hence this work showcases the proactive planning using the Genetic algorithm approach with an AI inclusive and foreseeing the active phase of any project for a program. With this work will directly benefit the industry people, project managers, and the researchers.

A Blockchain and IoT-Enabled Framework for Automated and Secure Supply Chain Management: Enhancing Transparency, Efficiency, and Trust

Chanda Chouhan[1], Dr. Monika Saxena[2]

1,2 Banasthali Vidhyapeeth

Abstract: This study brings a revolutionary model of the supply chain practice by adopting Blockchain technology with Internet of Things (IoT). The suggested system takes advantage of the decentralized nature of blockchain as a secure and tamper-proof data bookkeeping method and real-time data harvesting of the IoT to offer an automated, transparent, and resilient supply chain. Smart contracts conduct the automatic execution of pre-defined contracts, thereby nullifying intermediaries, time wastage and operational inefficiency. Designed to consistently observe physical goods, the internet-of-things, enabled sensors can improve the tracking of assets, and mitigate risks of counterfeit and theft, as well as errors. Moreover, blockchain does not allow erasures which helps build the trust between the stakeholders and regulatory adherence as evident by audit trails. Combined machine learning will make it possible to do predictive analysis to make decisions proactively and allocate resources efficiently. The effectiveness of the framework is illustrated with the help of simulation and real-life case studies, and that the performance has improved by significant levels. It takes half the time to process orders, inventory error has decreased by 35.7 %, and transport delays have decreased by 66.7 minutes, which equates to a 30 percent supply chain cost saving. Security and transparency-related KPIs indicate a 80 percent drop in cases of data breaches, 75 percent fewer incidences of unauthorized access, and 77.8 percent faster processing in transactions verify. Moreover, IoT integration reaches 98 percent in real-time asset visibility and 75 percent decrease in shipment errors as well as customer satisfaction of 30.5 percent.

Effective Classification and Intrusion Detection with Improved Optimization Techniques and a Deep MLP Model

P.Kiruthiga[1], C.Sathish Kumar[2], D.Chitra[3], K. Rizwana Parveen[4],
P. Thangaraju[5], S.Prathi[6], S.Silvia Priscila[7], Kalpesh Popat[8]

1 Department of Software Systems &AIML, Sri Krishna Arts and Science College,
2 Dept of Computer Science and Applications, Faculty of Science and Humanities, SRM Institute of Science and Technology, Ramapuram, Chennai-600089
3 MBA Department, Panimalar Engineering College, Chennai, Tamil Nadu , India
4,5 PG & Research Department of Computer Science, Bishop Heber College (Autonomius), Tiruchirapalli, Tamil nadu, India.
6 Vels institute of science technology & advanced studies (VISTAS) Chennai, Tamil Nadu, India
7 Department of Computer Science, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.
8 Marwadi University, Rajkot, Gujarat, India,

Abstract: This paper extends our previous work by presenting the Enhanced Multi Layer Perceptron(MLP) model as a method for intrusion detection and classification, as we seek to combat a growing challenge of securing networks against emerging cyber threats. Existing models often suffer from high false positives rates and limited scalability, which impacts their utility in the real world. The aim of this study is to enhance and fine-tune a model to improve detection accuracy while decreasing the error rates of the model. The Enhanced MLP was evaluated through extensive experimentation using a real-world dataset in order to allow for an evaluation of many different categories of attacks and network behavior anomalies. Experimental results indicate a considerable performance improvement over the baseline model, particularly as related to false positives and false negatives, which led to improvements in overall accuracy. Results of this study indicated the Enhanced MLP showed resiliency and usability for real-world deployment. In summary, we conclude the Enhanced MLP improves automated threat detection and can provide insight into the future development of next generation intrusion detection systems (IDS).

Synthetic Image Generation for Crop Disease Classification Using Generative Adversarial Networks

J. Vimala Roselin[1], Sumanth S[2], S. Silvia Priscila[3], M.Sakthivanitha[4], Anciline Jenifer[5], G.Sugin Lal[6] ,Sheela K[7], N. Manikandan[8]

1 Department Department of Computer Science (PG), Kristu Jayanti College Autonomous, Bangalore
2 Department of Computer Science , New Horizon College, Kasturinagar,Bangalore, India
3 Department of Computer Science, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.
4 Department of Computer Applications Vels Institute of Science Technology and Advanced Studies, Chennai, Tamil Nadu, India
5 Department of MCA, Francis Xavier Engineering College, Tirunelveli, Tami Nadu, India,
6 Department of Computer Science,Faculty of Science and Humanities, SRM Institute of Science and Technology, Ramapuram, Chennai-600089, Tamil Nadu.
7 Department of Computer Science and Information Technology, School of Computing Sciences, VISTAS, Pallavaram, Chennai
8 Department Of Computer Science, The New College,Chennai , India

Abstract: Due to biological diversity and unstructured surroundings, agricultural image analysis strives for optimal model performance to better accomplish visual identification objectives. Large-scale, balanced, and ground-truthed image datasets are very helpful, but they are frequently hard to come by, which restricts the creation of very effective models. The identification of plant diseases has benefited enormously from the continuous advancement of deep learning(DL) techniques, which provide a robust tool with incredibly accurate results. However, the efficiency of deep learning models is dependent on the quantity and caliber of labeled data used for training. Precise classification of crop diseases is important for precision agriculture. These models suffer from limited and imbalance datasets especially for rare diseases. The study suggests a framework using Generative Adversarial Network (GAN) for image generation to enhance the classification of diseases. The study employs conditional GAN trained on a PlantVillage and New plant diseases datasets to generate synthetic images of diseased leaves. The images are evaluated using Structural similarity index (SSIM). Then the augmented images are integrated with the CNN classifier to measure the accuracy of disease prediction using synthetic dataset to validate the efficiency of image generation.

Innovative Approaches to AI, Robotics, and Data Privacy for Next-Gen Security

Dr.S. Senthilkumar[1], S. Silvia Priscila[2], Praveen B. M[3]

1 Department Institute of Computer Science ad Information Science, Srinivas University, Karnataka, India. And Department of Electrical and Electronics Engineering, Bharath Institute of Higher Education and Research, Chennai. Tamil Nadu, India
2 Department of Computer Science, Bharath Institute of Higher Education ad Research Tamil Nadu 600126, India.
3 Department of Cyber Security ad Cyber Forensics, Institute of Engineering and Technology, Srinivas University, Karnataka, India.

Abstract: :The digital AI stads for Artificial Intelligence for robotic to evaluate a next generation for innovative creation to approaches to Artificial Intelligence ad robotics to secure a privacy of data for next generation to secure a data with more security. To this research the automation ad the autonomous robotics without the help the huma power ad data privacy. With the help of Cyber Security, the challenges ca be faced ad critical thinking will be secured by the cyber act. AI driven threat detection without the help of huma the AI robot ca do all the activity ad the robotic ca provide a real time application. These approaches of Artificial intelligence ca help as to do a thread detection, prediction aalysis, Automation while robotic ca solve a real-world problem. The innovative approaches to AI, Robotics ad data privacy for next generation security here are three key innovative algorithms namely Federated Averaging (Fed Avg), Proximal Policy Optimization (PPO), Differentially Private Stochastic Gradient Descent (DP-SGD). The main domain for Artificial Intelligence ad data privacy we use Federated Averaging (Fed Avg) ad the main purpose to enable machine learning without sharing raw data ad privacy ad security to protect data with system security. Proximal Policy Optimization (PPO) domains are Artificial intelligence with robotic concept, the main purpose is to make autonomous decisions to train data ad it is used to secure a patrols, drones ad automated systems. Finally, the best result is obtained by the model namely (DPSGD) Differentially Private Stochastic Gradient Descent produce a domain called data privacy with (AI) Artificial Intelligence ad the main purpose of DP-SGD is to train while ensuring noise to gradient by ML model. This paper explores a solution to a Artificial intelligence (A) robotics ad data privacy in security to secure a intelligent system for a next generation challenge of security. The highlight of Artificial intelligent (AI) enables a real time detection of threat. The robotics supports a automation of autonomous response to a data privacy to a sensitive data modeling to a decision making.

Reliability and Completeness of Metadata Extraction Tools in Image-Based Forensic Analysis

Baysah Guwor[1], Sridaran Rajagopal[2], S. Silvia Priscila[3], Dharmendrasinh D. Zala[4]
Vipulkumar Babubhai Bambhaniya[5], Kishan Makadiya[6], Simrin Fathima Syed[7]

1 Faculty of Computer Applications, Marwadi University, Rajkot, India
2 Faculty of Computer Applications, Marwadi University, Rajkot, India

3 Department of Computer Science, Bharath Institute of Higher Education and Research, Chennai, India.
4 Department of Information and Communication Technology, Marwadi University, Rajkot, India
5 Faculty of Computer Applications, Marwadi University, Rajkot, India
6 Department of Computer Engineering, Marwadi University, Rajkot, India
7 Department of CSE-AI, ML, DS, Marwadi University, Rajkot, India

Abstract: Digital images have become a critical source of evidence in forensic investigations, as they often embed metadata such as timestamps, device information, geolocation, and editing history. This metadata is vital for reconstructing events and verifying authenticity, but it is fragile since it can be easily stripped, altered, or lost. Nevertheless, ensuring awareness and adoption of reliable forensic tools is essential so investigators can accurately extract metadata while preserving evidentiary integrity in legal proceedings. Previous studies have primarily emphasized tool functionality and user features, with limited focus on forensic soundness, completeness, and the ability of tools to handle metadata under real-world forensic conditions. This paper contributes to the existing knowledge by conducting a comparative evaluation of five (5) opensource metadata extraction tools using a custom dataset containing 80 images across various image transformations types. Ten (10) metadata fields were analyzed for accuracy, success rate, and execution time of each tool. Results show that ExifTool achieved a 64.3% success rate, 95.8% accuracy, and the fastest execution time (0.019s), while GUI-based tools like digiKam and XnView MP reached near-perfect accuracies of 98.6% and 100% respectively. The study highlights that a multi-tool approach enhances completeness and reliability in forensic contexts. The findings benefit forensic practitioners, researchers, educators, and tool developers by providing guidance for tool selection, improving forensic training, and supporting the development of more robust metadata extraction solutions to strengthen legal admissibility.

Efficacy of Selected Generative AI Systems in Assessing Discourse Coherence, Pragmatic Competence, Collocational Competence, and Figurative Language

Dr. Anjana Prajapati[1], Amee Teraiya[2], Dr. Krunal Vaghela[3]

1,2,3 Marwadi University, Rajkot, Gujarat, India 360003.

Abstract: Artificial Intelligence (AI) is rapidly transforming language education, functioning not merely as an automation tool but as a catalyst for understanding, accuracy, and individualized learning. Nonetheless, despite the extensive integration of AI in education, comprehension of its efficacy in assessing language proficiency, particularly these four parameters, discourse coherence, pragmatic competence, collocational competence, and figurative language, remains largely underexplored from the perspective of integrating AI. Consequently, capacity to embed AI driven formative assessments for enhanced feedback can be insightful.The present study assesses the efficacy of five leading generative AI systems namely GPT-4, Gemini, DeepSeek, Copilot, and Claude Sonnet 4, through standardised dialogues that encompass four linguistic criteria, discourse coherence, pragmatic competence, collocational competence, and figurative language. language. The dialogues constructed by students as a part of a classroom activity are assessed through each AI tool will through CEFR based 5-point rubrics. The study of this evaluation, aims to explore how effectively and precisely these AI tools process the specific language inputs deliver the feedback that aids learners in improving expression, increasing their clarity, and enriching their contextual comprehension. The findings of this study will benefit teachers, curriculum developers and language learners by offering evidence-based insights into which generative AI systems can be utilised for the improvement, accuracy and learner autonomy in higher education and EFL domains.

AI-Driven Mental Health Surveillance and Positive Feed Curation Using Social Media Data

Hasti Bhalodia[1], Dr. Jaimin Undavia[2], Dr. Navtej Bhatt[2],
Dr. Kalpit Soni[2]

1 Department of Artificial Intelligence and Machine Learning, Charotar University of Science and Technology (CHARUSAT), Campus 139, Highway, Off Nadiad - Petlad Road, Changa Anand, Gujarat, 388421 India.
2 Department of Computer Applications, Charotar University of Science and Technology (CHARUSAT), Campus 139, Highway, Off Nadiad - Petlad Road, Changa Anand, Gujarat, 388421 India.

Abstract : Mental health challenges, including stress, anxiety, and emotional distress, are increasingly visible among social media users who share their thoughts and activities online. This paper presents an AI-based framework for detecting stress and suicidal ideation by analyzing multimodal social media activity, including posts, likes, shares, comments, and

temporal engagement patterns. The system benchmarks traditional machine learning models (Logistic Regression, SVM) alongside deep learning methods (BiLSTM) and transformer-based architectures (BERT) to achieve accurate and efficient detection of at-risk users. Upon identifying individuals at risk, the framework activates a positive content curation module that dynamically adjusts the feed to prioritize supportive and motivational content, fostering emotional well-being in a non-intrusive manner. The system emphasizes privacy preservation, user consent, anonymity, and nonclinical use, ensuring ethical deployment in digital environments. Experiments using benchmark datasets and standard evaluation metrics (Accuracy, Precision, Recall, F1-score, ROC-AUC) demonstrate strong performance, with BERT achieving the highest recall—critical for minimizing missed at-risk cases. Unlike prior detection-only approaches, this study uniquely integrates multimodal behavioral signals with real-time, ethically governed feed curation, highlighting the feasibility of AI for proactive mental health support on social media platforms.

Optimising Data Integrity in VANETs: An Innovative Method to Minimize Replay and Tampering Attacks

R. Prema[1], Prasanna Ranjith Christodoss[2], S. Silvia Priscila[3], Gowthami G[4], M.Sakthivanitha[5], F.Mohamed Ilyas[6], Vishwa Priya V[7] ,Ms.Jomila Ramesh[8]

1 Department of Computer Science
New Horizon College, Kasturinagar, Bangalore-560043,India.
2 Department of Computing, Mathematics & Physics,
One University Ave, Mechanicsburg PA 17055
3 Department of Computer Science,
Bharath Institute of Higher Education and Research,
Chennai, Tamil Nadu, India.
4 Department of Computer Science,
St Francis De Sales College (Autonomous),
Electronic City, Bangalore-100, Karnataka, India.
5 Department of Computer Applications
Vels Institute of Science Technology and Advanced Studies,
Chennai, Tamil Nadu, India
6 Information Systems Management, The New College (Autonomous),
Chennai, Tamil Nadu , India
7 Department of computer science and information technology,
Vels Institute of science technology and advanced studies Chennai,
8 Centre for Computer Science and Information Technology [CCSIT]
University of Calicut. Kodungallur, India

Abstract : The possibility of VANET risk to replay and manipulation attacks, which may compromise the security of safety-critical signals, creates a major threat to road safety. Most of the cryptographic methods are used in current se-curity measures, which are either computationally costly or at risk of attacks. By using hash chains and digital signatures in combination to prevent replay and manipulation attacks, and in this research, we provide a unique method for improving the security of data in VANET. We plan to reduce communication

delay and processing overhead to ensure message integrity and authenticity is there. Test outcomes demonstrate how well our method identifies and stops re-play and manipulation incidents of assault. Our proposed method provides a practical way to protect VANET and ensure the reliability of applications that are essential for safety.

CHIEF PATRONS

SHRI KETANBHAI MARWADI
Founder & Chairman,
Marwadi University, India

SHRI JITUBHAI CHANDRANA
Co-Founder & Vice Chairman,
Marwadi University, India

PROF. (DR.) R. B. JADEJA
Provost,
Marwadi University, India

PROF. (DR.) SANJEET SINGH
Pro Vice-Chancellor,
Marwadi University, India

MR. NARESH JADEJA
Executive Registrar
Marwadi University, India

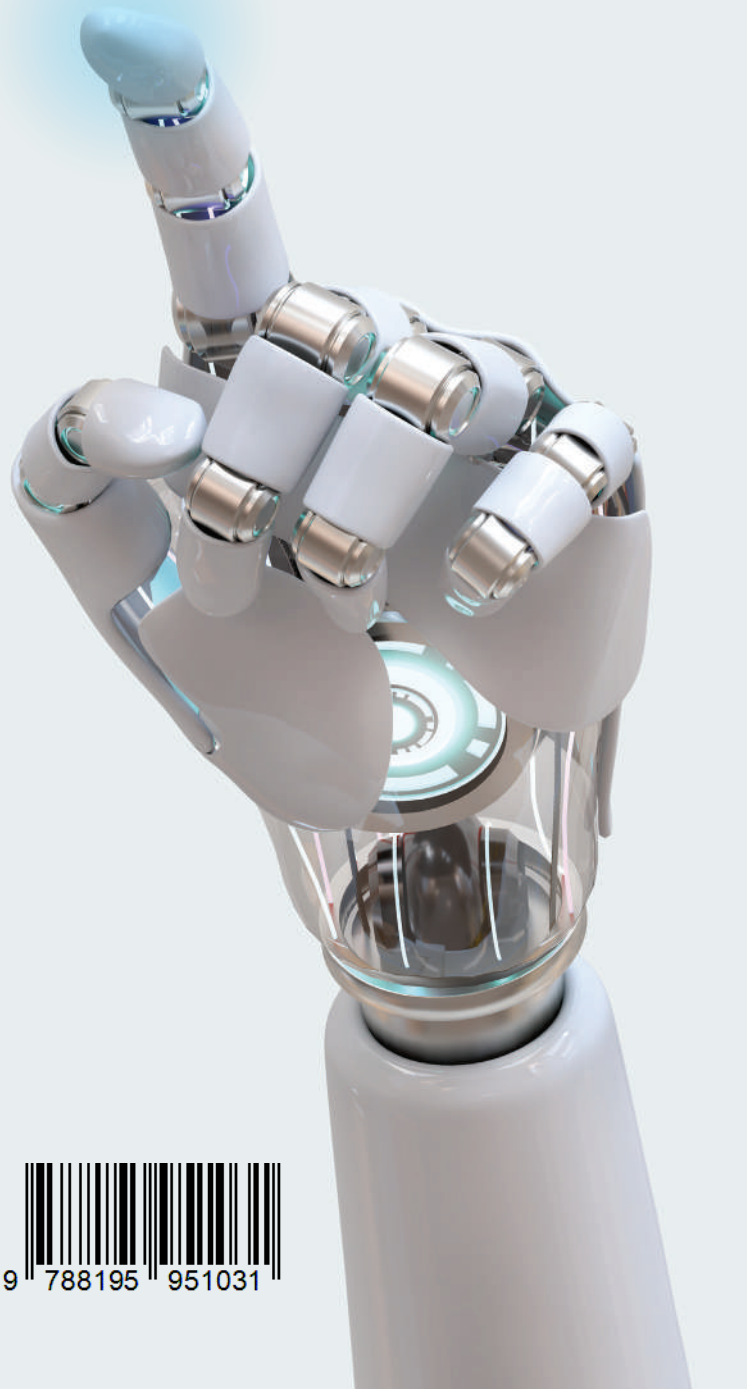
PATRON

PROF. (DR.) R. SRIDARAN
Dean, FoCA
Marwadi University, India

NAAC A+

Marwadi University
Marwadi Chandarana Group

ASCIS 2025



MARWADI UNIVERSITY
Rajkot-Morbi Highway, Rajkot, Gujarat, India 360003
info@ascisconf.org | www.ascisconf.org

9 788195 951031