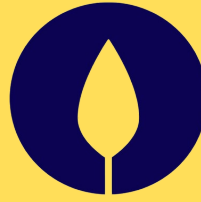


International Conference on AI and Sustainable Business Practices AISBP-2026

(Virtual Mode)

16(Saturday) - 17(Sunday), May 2026



EDITORS

Dr.S.Balamuralitharan

Dr. Sindhura Kannappan

Dr. K. Sujith

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May 16–17, 2026

Editors

Dr.S. Balamuralitharan

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International Conference AISBP-2k26

International Conference AISBP-2k26 (Virtual Mode) | May 16–17, 2026

First Edition: **May 16–17, 2026**

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ISBN: 978-81-69388-01-6



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PREFACE

Founded in 2013, Chendur Research Foundation (CRF) is dedicated to advancing knowledge through impactful research and academic excellence. The foundation supports innovation across various disciplines by conducting conferences and publishing high-quality research, including papers in Scopus-indexed journals. CRF continues to provide a platform for academicians, researchers, and industry professionals to collaborate and share their ideas. We are pleased to invite you to participate in the International Conference on AI and Sustainable business practices – 2026 (AISBP-2k26), to be held in Virtual Mode on May 16–17, 2026.

The conference is jointly organized by Thammasat University, Rangsit Campus, Thailand, Samara University, Ethiopia, in collaboration with Bharathi Women’s College, Annai College of Arts & Science, and CRF, Chennai, Tamil Nadu, India. The aim of this conference is to bring together global experts from academia and industry to exchange knowledge on emerging trends, research advancements, and practical implementations.

AISBP-2k26 features keynote addresses and invited talks by distinguished speakers, along with virtual presentations from researchers around the world. The conference encourages faculty development, alumni engagement, and active participation from young researchers to promote new ideas and strengthen the academic and professional community.

We acknowledge the contribution of the associating institutions, experts, invited speakers, delegates and the conference committee members for their cooperation and excellent support in organizing this conference.

Best Wishes.

EDITORS



DR.S. BALAMURALITHARAN

Message

We are pleased to invite you to participate in the International Conference on AI and Sustainable business practices – 2026 (AISBP-2k26), to be held in Virtual Mode on May 16–17, 2026. The conference is jointly organized by Thammasat University, Rangsit Campus, Thailand, Samara University, Ethiopia, in collaboration with Bharathi Women’s College, Annai College of Arts & Science, and CRF, Chennai, Tamil Nadu, India. The primary goal of this conference is to bring together experts and researchers from academia and industry to share their knowledge on implementations, to encourage faculty and researchers learn and develop new ideas from world-class excellence and to strengthen the institute through an alumni network. We believe that this conference will be a good platform for the young researchers from various fields.



DR. K. SUJITH

We are pleased to invite you to participate in the International Conference on AI and Sustainable business practices – 2026 (AISBP-2k26), to be held in Virtual Mode on May 16–17, 2026. The conference is jointly organized by Thammasat University, Rangsit Campus, Thailand, Samara University, Ethiopia, in collaboration with Bharathi Women’s College, Annai College of Arts & Science, and CRF, Chennai, Tamil Nadu, India. This esteemed event offers a valuable platform for sharing insights and pioneering ideas that advance the fields of computational mathematics and intelligent engineering. I extend my best wishes to the organizers, participants, and delegates for a highly successful conference, and I hope it becomes a truly enriching and impactful experience for all.



Message

We are pleased to invite you to participate in the International Conference on AI and Sustainable business practices – 2026 (AISBP-2k26), to be held in Virtual Mode on May 16–17, 2026. The conference is jointly organized by Thammasat University, Rangsit Campus, Thailand, Samara University, Ethiopia, in collaboration with Bharathi Women’s College, Annai College of Arts & Science, and CRF, Chennai, Tamil Nadu, India, this conference provides a dynamic platform to explore innovative research and emerging technologies in computational mathematics and intelligent engineering. I am confident that the ideas shared and collaborations formed here will inspire meaningful advancements and contribute significantly to the global scientific and engineering community. Wishing everyone a productive and enriching conference experience.

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Sustainable business practices involve integrating environmental, social, and governance (ESG) factors into operations for long-term success, focusing on reducing environmental harm (like emissions, waste, resource use) while ensuring social equity and ethical governance, leading to cost savings, better reputation, and attracting conscious consumers and investors. Key examples include using renewable energy, improving energy efficiency, creating sustainable supply chains, reducing waste, designing eco-friendly products, fostering employee engagement in green initiatives, and transparently reporting progress.

KEY AREAS OF SUSTAINABLE PRACTICES

- Energy & Emissions: Switch to renewable energy (solar, wind), use energy-efficient lighting (LEDs) and appliances (HVAC), and promote sustainable commuting (public transport, carpooling, remote work).
- Waste & Resources: Implement zero-waste policies, recycle, use biodegradable packaging, conserve water, and adopt circular economy principles (reuse, refurbish).
- Supply Chain: Partner with suppliers committed to sustainability, use sustainable materials, and design products for durability and recyclability (lifecycle thinking).
- Social Responsibility: Ensure fair labor practices, promote diversity, engage in community initiatives, and uphold ethical governance.
- Product/Service Design: Develop products with minimal environmental impact, use non-toxic materials, and design for extended life.



9 SUSTAINABLE BUSINESS PRACTICES:

- ☑ Understand why businesses should be more sustainable
- ☑ Audit the supply chain
- ☑ Partner with ESG companies
- ☑ Maximize energy-efficiency
- ☑ Work with local communities
- ☑ Create green products
- ☑ Minimize business waste
- ☑ Involve employees
- ☑ Measure and evaluate sustainability practices
- ☑ Grow with green business practices

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IMPORTANT DATES

Last date for registration: 16.05.2026

Intimation regarding acceptance: 2 DAYS
(AFTER SUBMISSION)

Last date for submission of full paper: 16.05.2026

Conference dates: May 16 & 17, 2026

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Professor & Head, Department of Computer Engineering, Sigma University, Vadodara, Gujarat

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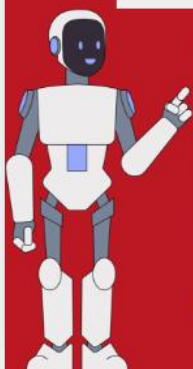
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ADSORPTION METHOD FOR REMOVAL OF TOXIC METALS FROM INDUSTRIAL EFFLUENTS

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Abstract

The present study examines advanced and eco-friendly wastewater management practices in the bauxite sector in response to the overwhelming waste issues confronting the sector. The study targets treatment processes that are designed to be efficient in removing specific contaminants while reducing energy and chemicals in the process. Treatment of bauxite ore wastewater using advanced oxidation processes, membrane filtration, and biological treatment was assessed in industrial laboratories and in pilot plants. The results of this study indicate that there has been a marked increase in the percentage of removal of pollutants reaching concentrations of heavy metals by 95% and organic pollutants by 80%. The systems proposed for treatment processes are also competitive in energy and operational expenditures and therefore are more environmentally friendly than the existing treatment processes. This study presents useful information to the ongoing endeavours of making the bauxite industry environmentally sustainable and paves the way for adoption of the treatment technologies on a large scale in the future.

Keywords: Advanced oxidation processes, Membrane filtration, Bauxite sector

ENHANCING BUSINESS PRACTICES USING GREEN AI

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Abstract

AI integration offers practical insights for supply chains and business sectors that are more sustainable and environmentally beneficial in the long run. Green AI, which emphasizes the use of organic and renewable resources to instil renewable business practices, is necessary to improve the business domain rather than relying solely on AI technology. The goal is to promote products that are produced, used, and disposed away efficiently.

In the current global economy, eco-friendly practices have become a key priority for corporations. Studies on the creation of environmental management systems that encourage employees to engage in pro-environmental activities have been sparked by the growing emphasis on the advantages of environmental legislation. An organization's use of green HR practices shows how committed and knowledgeable it is about environmental issues. Optimizing employee behaviour will result in better environmental results, according to the literature currently available in the subject of environmental management. While the green results of AI-enhanced GHRM have been examined, few studies have examined the non-green effects associated with this approach. By influencing employee behaviour, AI-enhanced GHRM promotes an environmentally conscious culture. Businesses can develop and implement sustainable strategies and achieve corporate sustainability with the aid of AI-enhanced GHRM. The main aim of this paper is to explore use of Green AI for driving various business practices.

Keywords: AI, green AI, Business

A Metric-Centric Review of AI-Driven Congestion Control Algorithms in Computer Networks

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Abstract:

The availability of ultra-high-speed network architectures from 5G Advanced to emerging 6G networks has revealed the inherent limitations of traditional heuristic-based congestion control (CC) schemes. Conventional CC protocols such as TCP Cubic and New Reno face significant challenges in maintaining the dynamics and ultra-low latency demands of current and emerging network such as Low Earth Orbit (LEO) satellite networks and IoT networks. This paper presents a comprehensive metric-centric analysis of Artificial Intelligence (AI)-based congestion control schemes from 2021 to 2026. A taxonomy of Machine Learning (ML), Deep Reinforcement Learning (DRL), and Federated Learning (FL)-based schemes is synthesized from over 100 peer-reviewed articles to develop a comprehensive taxonomy of congestion control schemes using key performance metrics such as throughput, Round-Trip Time (RTT) minimization, packet loss, and Age of Information (AoI). Comparative analysis of the schemes reveals that DRL-based schemes exhibit a 46.29% RTT minimization capability along with near-zero packet loss compared to traditional schemes. Challenges and research directions for 6G autonomous intelligence are also highlighted.

Keywords: 5G/6G Networks, Artificial Intelligence, Congestion Control, Deep Reinforcement Learning (DRL), Explainable AI (XAI), Federated Learning (FL), Quality of Service (QoS)

8-Channel Statistical Process Control System using Raspberry Pi

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Samarth Joshi
Ayush Kadlag
Hariom Homkar

Department of Electronics and Telecommunication Engineering, Vishwakarma Institute of Information Technology, Pune, India.

Abstract

In industrial settings, one must constantly observe numerous factors for the successful operation of business and assurance of products quality. Manual inspections take much too long, make too many errors, and miss process deviations too easily. This problem loses industrial settings time and money. In this work, we propose a real-time, 8-channel SPC system with a Raspberry Pi, high-resolution ADC modules and a Python GUI with a Firebase database. The system performs real-time multi-channel acquisition of analog signals, automatic defect detection, and provides a number of ways to display trends of the monitored processes. The system classifies each measurement as forgiven or pardoned by a PASS/FAIL decision engine and stores defect logs, bar codes, and batch histories for traceability. Operational testing of the system has proven defect detection occurs much earlier than previous methods. Operational testing has proven the system works better than previous methods and provides supervisors with summary reports and defect trends analytics. The system has a low cost, is easily adaptable for different industries, and is ready for use to monitor all hours of the day and week. The system is ready for use in industries where precision and traceability must be guaranteed.

Keywords: Cornerstones of this thesis project are Statistical Process Control, Raspberry Pi 4, Multi-Channel Sensor Data Acquisition, Analog to Digital Conversion, Python GUI, Firebase Realtime Database and Industrial Internet of Things (IIoT). Production Traceability, Automated PASS/FAIL Decision Engine and Analytics in Real Time.

Artificial Intelligence and Employee Engagement: Insights from the IT Industry in Pune City

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Abstract

Artificial intelligence (AI) acquiring a structurally method for changing the entire system of the activities which changes the entire world. Artificial Intelligence always focuses and have higher grade in talent and skill with higher level of advantage. Employee Engagement is always considered with the key level performance in the source of sustained competitive level in the organization. The relationship between AI and employees in the employee engagement is analysed thoroughly in the organization level. The research makes the training and the relationship in the Artificial Intelligence stronger in the employee engagement. There are some important factors which increases understanding, absorption, dedication and understanding which is a key factor for that level.

The AI strategic has different modelling in the method level. It is always aligned in the effective manner for employee engagement for finding out result in Artificial Intelligence.

Keywords: Artificial Intelligence, Employee Engagement, competitive level, absorption.

Circular Economy and Zero-Waste Systems: Redefining Resource Utilization through Recycling and Sustainable Practices

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Abstract

The growing environmental challenges associated with excessive waste generation and inefficient resource utilization have intensified the need for sustainable development practices. The concept of the circular economy, coupled with zero-waste systems, has emerged as a transformative approach to address these concerns by minimizing waste and maximizing resource efficiency. This study explores how recycling practices, biodegradable packaging, water conservation, and circular economy principles contribute to sustainable resource management. The primary objective of this research is to examine the relationship between zero-waste practices and resource efficiency in organizational and societal contexts. A quantitative research design was adopted, and primary data were collected from 200 respondents using structured questionnaires based on a Likert scale. The variables considered include recycling rate, use of biodegradable materials, water conservation practices, and adoption of circular economy strategies, with resource efficiency as the dependent variable. Statistical tools such as descriptive analysis, correlation, and regression were applied using SPSS to analyze the data. The findings reveal a strong positive correlation between circular economy practices and resource efficiency. Recycling and biodegradable packaging showed significant contributions toward reducing environmental impact, while water conservation emerged as a critical supporting factor in sustainability efforts. Regression analysis confirmed that all independent variables significantly influence resource efficiency, with circular practices having the highest impact. The study highlights that organizations adopting zero-waste systems not only reduce environmental degradation but also improve operational efficiency and cost savings. The integration of circular economy principles encourages reuse, refurbishment, and recycling, thereby reducing dependency on raw materials. Furthermore, the research emphasizes the importance of policy support, awareness, and technological advancements in promoting sustainable practices. The implications of this study are relevant for policymakers, industry leaders, and researchers aiming to develop sustainable frameworks. The findings support the argument that transitioning from a linear to a circular economy is essential for long-term environmental sustainability. However, challenges such as lack of awareness, initial investment costs, and infrastructural limitations need to be addressed. In conclusion, the study provides empirical evidence supporting the effectiveness of zero-waste and circular economy strategies in enhancing resource utilization. It recommends a collaborative approach involving stakeholder to implement sustainable practices effectively.

Keywords: Circular Economy, Zero-Waste Systems, Resource Efficiency, Recycling, Sustainability, Biodegradable Packaging, Water Conservation, Environmental Management

A8-Load Balancing in Cloud Computing: A Bibliometric Analysis of Research Trends and Emerging Themes

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Abstract

Load balancing is essential in cloud computing for efficient resource utilization and improved quality of service. This study presents a bibliometric review of cloud load balancing research published between 2015 and 2025 using Scopus data. Bibliometric indicators were analysed with VOS viewer to examine publication trends, key contributors, and research themes. The results show steady publication growth, with India, China, and Saudi Arabia as leading contributors, and highlight metaheuristic and energy-efficient approaches as major research trends. **Design/Methodology/Approach:** The research employs a bibliometric approach to examine Indian cloud computing studies centred on load balancing from 2015 to 2025. Relevant keywords were used to collect Scopus data, which was also manually examined for accuracy and filtered to only include final published publications. In order to identify significant research, the chosen records were analysed for publishing patterns, important authors, institutions, citation impact, preferred sources, collaboration networks, and keyword co-occurrence. **Industry Implication:** The study highlights research trends that align with industry needs such as improved workload distribution, efficient resource utilization, and scalable cloud services. Insights from highly cited works and emerging themes can guide industry cloud user in adopting advanced load balancing models, supporting better system reliability, performance, and cost efficiency. **Originality:** This study focused on bibliometric evaluation of India's contribution to cloud computing, with a particular focus on load balancing—a area that hasn't received much attention in previous bibliometric evaluations. Combining citation analysis, keyword mapping, and publishing patterns, it offers a thorough picture of how the field has changed over the last ten years.

Keywords: Cloud Computing, Load Balancing, Bibliometric Analysis, Metaheuristic Algorithms, Resource Scheduling, Scopus, VOS viewer.

Digital Transformation through AI in Healthcare Management and HR Practices

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Abstract

The role of HRM creates the level of applications within the organization in maintaining the applications in efficacy setup. This also helps in HRM's role with AI creating and helping employees in work place human level in the organization adaptability and acceptability. The role in attaining strategic method to motivate the employees in the organization for contributions in HR departments can shape AI digital transformation which can influence the generation in AI for shaping digital transformation creates the generation of Health care Management into higher level. The focus is into Healthcare how and where HRM is influences in decision making inside the organization. The framework helps in succeeding the culture, leadership, knowledge, policy which encourages the tools in AI adoption. The emphasis on the technical aspects of improvement in the organization in Healthcare management primarily creates the development in HR practices. This framework always success in the adoption of the centric approach where the stakeholder groups align with the human centric approach to achieve organizational goals in Health care management and in HR practices. AI framework makes the stakeholder group in health care management which will help in achieving organizational goals with collaboration of HRM. AI adoption in workplace brings many ideas and administration function in Health care management.

Keywords: Leadership, adaptability, Policy, Strategic Planning, Teamwork.

Financing Agro forestry through Green Credit and Community Innovation: a Pathway from Traditional Practices to Sustainable Growth

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Abstract

This paper examines the opportunities of green financing to enhance the Agro forestry system by filling the credit gaps that have severely afflicted the Agro forestry system over a long period of time. Despite generalized agricultural loans having to be extended by banks and other institutions, specific Agro forestry financing is less developed due to the length of gestation, increased upfront costs, and lack of special lending patterns. Some of these new financial avenues explored in the paper include green credit, blended finance, income based on carbon and community-based solutions via SHGs, FPOs and cooperatives. It also points out the way in which indigenous Agro forestry knowledge and social innovation might assist farmers to structure in a superior way and minimize production risk, as well as make their operations more compatible to formal finance. Connecting these innovations with the sustainability targets such as climate action (SDG 13), life on land (SDG 15), responsible production (SDG 12), and poverty reduction (SDG 1), the study reveals that integrating traditional practices and modern green-finance instruments can help to establish more resilient, more powerful, and environmentally positive rural economies.

Keywords: Greenfinance, Agro forestry systems, Indigenous knowledge, Community institutions, Carbon sequestration, Sustainable rural livelihoods.

A Systematic Review of Metaheuristic-Driven Feature Selection and Machine Learning Architectures for Hepatocellular Carcinoma Diagnosis

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Abstract

Hepatocellular carcinoma (HCC) is one of the most common forms of liver cancer and remains a major cause of cancer-related mortality across the world. In order to improve patient outcomes early detection and accurate prediction of disease is essential. In recent years, machine learning techniques have been increasingly applied to support clinical decision making. This paper presents a systematic review of recent researches that are applying metaheuristic optimization and machine learning techniques for HCC diagnosis and its prediction. The reviewed studies are grouped into three main categories first is dimensionality reduction using statistical techniques, next is metaheuristic feature selection methods such as Particle Swarm Optimization (PSO) and Harris Hawks Optimization (HHO), and last is ensemble learning architectures including bagging and stacking methods. This study highlights recurring challenges that occur in many existing studies such as models that achieve high accuracy often rely on a large number of input features which reduces the interpretability of the model and limits their practical use in clinical environments. Based on this observation, the review identifies opportunities for developing a lightweight machine learning model that maintains strong predictive performance while using a smaller and more interpretable set of clinical features.

Keywords: Hepatocellular Carcinoma (HCC), Medical Diagnosis System, Ensemble Classification, Metaheuristic Feature Selection, Harris Hawks Optimization (HHO), Bagging Ensemble.

Smart Guard: AI-Driven Intrusion Detection for Real-Time Cyber Threat Mitigation

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Abstract

The fast pace of cyber threats, along with the limitations of conventional rule-based Intrusion Detection Systems (IDS), led to the adoption of more adaptive and intelligent security systems. This paper explores the application of AI, specifically deep learning, in IDS to enhance real-time anomaly detection and threat mitigation capabilities. We introduce Smart Guard, a machine learning-based intrusion detection system with a hybrid CNN-LSTM architecture. Smart Guard is trained and tested with benchmark datasets like NSL-KDD and is capable of detecting known as well as unforeseen threats in real time. Smart Guard enhances detection efficiency and minimizes false positives through the temporal and spatial learning capabilities of deep neural networks. Comparative studies with popular machine learning techniques affirm its superiority in performance. Our results demonstrate that Smart Guard delivers robust, scalable, and timely security against dynamic cyber-attacks, being a critical move toward intelligent, self-improving security infrastructure.

Keywords: IDS, Cybersecurity, Deep Learning, LSTM, NSL-KDD, Real-time Threat Detection, and AI Security.

Analysing Instagram Data for Student Anxiety Detection Using Machine Learning

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Abstract

Student anxiety has emerged as a major global concern, significantly influencing both academic performance and overall emotional well-being. With rising stress levels due to academic pressure, peer competition, and social expectations, early detection of anxiety has become increasingly important. In this context, Instagram, one of the most widely used social media platforms among young people, provides a unique and valuable opportunity for identifying signs of mental distress. By analysing various forms of user-generated content such as posts, captions, hashtags, images, and interaction patterns researchers can uncover meaningful behavioural indicators related to anxiety. The integration of machine learning techniques has further enhanced this process, enabling the efficient handling and interpretation of large-scale social media data to derive actionable mental health insights. This review consolidates recent advancements in Instagram-based anxiety detection, examining key aspects including data collection pipelines, feature extraction methodologies, applied algorithms, system performance, and the emerging challenges that shape the future direction of this field.

Keywords: Mental Health, posts, Instagram, Interpretation, Social Computing, Artificial Intelligence.

HTTPS Implementation and Performance Impact on Web Servers

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Abstract

This paper explores the ways in which the rise of HTTPS as the primary method of secure communications over the Internet has changed the way that data is transmitted over the Internet. Specifically, two areas of HTTPS implementation will be analyzed: the security architecture of HTTPS, and the measurable performance impact that HTTPS has had on the performance of web servers.

Transmission of data using HTTP leaves the data vulnerable to interception and manipulation while transmission of data over HTTPS provides confidentiality, integrity and authentication. This paper will primarily look at the process of establishing an encrypted session (TLS/SSL handshake process) and how optimizations in the transition from TLS 1.2 to TLS 1.3 have significantly reduced the handshake overhead that is applied in establishing a secure communication session (from two round-trip latencies to one, and zero-RTT session resumption for returning clients).

The overall resource usage of HTTPS (CPU usage and network overhead for using TLS on modern production infrastructure) has been proven to be less than 1Keywords: HTTPS, HTTP, TLS, SSL, TLS Handshake, Web Server Performance, Encryption, Certificates, Latency, OCSP Stapling, HTTP/2, Session Resumption

Index Terms: HTTPS, SSL/TLS, Web Security, Performance, Analysis, Encryption

PRIVACY-PRESERVING DATA ANALYTICS AT MEC FOR SMART CITY APPLICATIONS**Dr. Gauri Ghule**

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Abstract

The future of smart cities heavily relies on the IoT technology that generates enormous volumes of sensitive data used by the companies in traffic resolution, environmental monitoring, and other fields. Multi-Access Edge computing (MEC) enhances the processing speed, as it enables processors to be lower in computing power than the data being processed. Nevertheless, there are also major privacy and security issues associated with this convenience. To address these issues, the researcher suggests a data analytics model, which is applied in MEC and involves privacy-sensitive approaches, including anonymization and differential privacy. This framework will have an efficient real-time data processing with minimum overhead by designing a lean architecture. This approach will also be confirmed by experimental findings.

Keywords- Smart City, Multi-Access Edge Computing, Privacy Preservation, IoT, Data Analytics, Differential Privacy.

From Population Models to Predictive Intelligence: Machine Learning–Integrated Pharmacometrics in Clinical Pharmacy-A Systematic Review and Meta-Analysis of Real-World Precision Therapeutics

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Abstract

The evolution of clinical pharmacy from traditional population-based dosing toward individualized precision therapeutics has been accelerated by advances in artificial intelligence (AI) and machine learning (ML). Pharmacometrics, traditionally grounded in population pharmacokinetic–pharmacodynamic (PK–PD) models, is now transitioning into predictive intelligence frameworks capable of integrating real-world data (RWD) for patient-specific decision-making. This systematic review and meta-analysis aimed to evaluate the clinical impact, methodological robustness, and translational value of ML-integrated Pharmacometrics approaches in precision therapeutics. A systematic literature search was conducted across PubMed, Scopus, Web of Science, and Embase, focusing on studies published between 2015 and 2025 that applied ML techniques alongside Pharmacometrics modelling in clinical pharmacy settings. Eligible studies included real-world clinical data, therapeutic drug monitoring, or outcome-driven precision dosing interventions. Data were synthesized using random-effects meta-analysis, with outcomes assessed in terms of dosing accuracy, therapeutic target attainment, adverse drug event reduction, and clinical outcomes. Across the included studies, ML-augmented Pharmacometrics models demonstrated significantly improved prediction accuracy compared to conventional population models, particularly in heterogeneous patient populations. Notable improvements were observed in dose individualization, time-to-therapeutic range, and reduction of drug-related toxicity. Importantly, these approaches also supported sustainable healthcare practices by optimizing resource utilization and minimizing trial-and-error dosing. This review highlights the transformative role of AI-enabled Pharmacometrics in clinical pharmacy practice, positioning pharmacists as key stakeholders in data-driven precision medicine. Integrating predictive intelligence into routine clinical workflows represents a sustainable and scalable pathway toward safer, more effective, and personalized therapeutics.

Keywords: Artificial Intelligence, Machine Learning, Pharmacometrics, Precision Therapeutics, Clinical Pharmacy, Real-World Data.

IOT-Based Smart Bag

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Abstract

The rapid advancement of Internet of Things (IoT) technology has enabled the development of smart systems that enhance user convenience and security. This paper presents the design and implementation of an IoT-based smart bag system aimed at improving luggage safety and travel efficiency. The proposed system integrates Arduino-based hardware with sensors such as GPS, ultrasonic sensors, and motion detectors to provide real-time tracking, theft detection, and automatic following features. The system is designed to communicate with an Android application, allowing users to monitor and control their luggage remotely. Unlike existing smart luggage systems that are limited to iOS platforms, the proposed solution focuses on Android compatibility, making it more accessible and cost-effective. The experimental results demonstrate that the system provides reliable tracking, efficient security alerts, and improved user convenience.

Keywords: IoT, Smart Bag, Arduino, GPS Tracking, Ultrasonic Sensor, Android Application

Multilayer Authentication System Using STM32 Microcontroller for Secure Embedded Access Control

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Abstract

Embedded access control systems deployed in critical environments such as banking lockers, industrial panels, and research facilities demand robust security beyond what conventional single-factor mechanisms can offer. Password-only or single-biometric approaches remain vulnerable to device cloning, firmware tampering, identity spoofing, and replay attacks. This paper proposes a Multilayer Authentication System (MAS) implemented on the STM32F103C8T6 microcontroller, enforcing a sequential two-tier security model to address both hardware-level and user-level threats. The first tier performs device authentication by verifying the chip's factory-programmed unique identifier (UID), validating firmware integrity through a hardware CRC check, and monitoring a tamper detection sensor. The second tier authenticates the user through fingerprint biometric recognition using an R307/AS608 optical sensor, followed by a One-Time Password (OTP) delivered via GSM to the registered mobile number. Access is granted only when both tiers are successfully cleared in sequence, preventing partial bypass attacks. Experimental results confirm reliable detection of cloned devices, tampered firmware, and replay attempts, with an end-to-end authentication latency within acceptable bounds for industrial deployment. The system offers a scalable, cost-effective security solution suitable for banking, industrial automation, and smart infrastructure applications.

Keywords: STM32 microcontroller; multilayer authentication; device authentication; fingerprint recognition; one-time password; GSM; embedded security; tamper detection; firmware integrity; access control

A Metric-Centric Review of AI-Driven Congestion Control Algorithms in Computer Networks

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Abstract

The availability of ultra-high-speed network architectures from 5G Advanced to emerging 6G networks has revealed the inherent limitations of traditional heuristic-based congestion control (CC) schemes. Conventional CC protocols such as TCP Cubic and New Reno face significant challenges in maintaining the dynamics and ultra-low latency demands of current and emerging networks such as Low Earth Orbit (LEO) satellite networks and industrial IoT networks. This paper presents a comprehensive metric-centric analysis of Artificial Intelligence (AI)-based congestion control schemes from 2021 to 2026. A taxonomy of Machine Learning (ML), Deep Reinforcement Learning (DRL), and Federated Learning (FL)-based schemes is synthesized from over 100 peer-reviewed articles to develop a comprehensive taxonomy of congestion control schemes using key performance metrics such as throughput, Round-Trip Time (RTT) minimization, packet loss, and Age of Information (AoI). Comparative analysis of the schemes reveals that DRL-based schemes exhibit a 46.29% RTT minimization capability along with near-zero packet loss compared to traditional schemes. Challenges and research directions for 6G autonomous intelligence are also highlighted.

Index Terms: 5G/6G Networks, Artificial Intelligence, Congestion Control, Deep Reinforcement Learning (DRL), Explainable AI (XAI), Federated Learning (FL), Quality of Service (QoS)

Machine Learning-Based Anomaly Detection for Real-Time Smart Grid Energy Monitoring with Alert Notification System

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Abstract

The paper describes a real-time smart grid energy monitoring system, which is data-oriented and created with a simulated industrial dataset and an interactive Streamlit dashboard. The system continuously monitors multiple electrical and environmental parameters, such as voltage, current, power factor, temperature, frequency, active power, reactive power, energy consumption, and renewable energy generation. A live data visualization system shows the trends of the parameters, monthly summaries, the overlay of anomalies and the feed of alerts in multi-tab dashboard format. The system uses threshold-based monitoring along with machine learning-based anomaly detection to enhance fault detection. This method provides the possibility to identify the abnormal operating conditions both in terms of rules and in terms of patterns. The anomalies identified can be viewed on the dashboard and handled by an alert module that classifies events according to their severity and issues notifications. The system also offers renewable energy analytics of the solar and wind generation, and performance indicators aiming at efficiency. The suggested architecture provides an efficient, scalable, and affordable intelligent energy monitoring, anomaly detection and alerting solution to smart grid and industrial applications of energy management.

Index Terms: Smart Grid, Energy Monitoring, Real-Time data analytics, machine learning, anomaly detection, Streamlit dashboard, renewable energy analysis, alert system, IIoT, Timeseries data.

Techno Scholar Management System: A Web-based Research Paper Publication Platform

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Abstract

The process of disseminating research publications was always timeconsuming and sometimes inefficient due to various stages of communicating manually and lack of transparency. In this regard, this paper presents the Techno scholar Management System, which is a web application that seeks to automate several stages in the research publication process including submission of manuscripts, peer reviewing, decision-making by the editor in-chief, and eventual publication. In the development process, I have utilized the MERN stack, which entails an interface for authors, reviewers, the editor-in-chief, and administrators. With the inclusion of open-access publishing principles and open reviews among others, the system is aimed at being efficient while promoting trust within the community of scholars.

Keywords: web application, the MERN stack, decision-making, the editor-in-chief.

A Comprehensive Evaluation of IPv6 Transition Mechanisms and Their Influence on Real-Time Multimedia Services in Enterprise Networks

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Abstract

When considering migration from IPv4 to IPv6, companies are faced with trade-offs because they need to maintain the current functionality of their networks throughout the migration process. In this paper, companies have three migration methods to choose from and we evaluate how well the methods perform with respect to two network applications: voice calls and video streaming. We constructed a test network in software using GNS3 and performed extensive experiments with various traffic loads. Our experiments indicate that the dual stack method of running both protocols concurrently is the most performant. With fifty simultaneous calls, dual stack kept call arrival delays below 29 Ms while translation created delays over 41 Ms. Dual stacks achieved 2 second video start-up times, while start-up took over 3 seconds with translation. Tunnelling came in between with 38 Ms call arrival latencies and 2.8 second video start-up latencies. A 5-yearcost analysis shows that dual stack for 500 users is around \$64k, which is less than half of the \$127k required to maintain IPv4 functionality with a translation appliance. The numbers in this paper give network engineers a hard comparison to make the right migration choice for their environment. Index Terms—IPv6 Transition, Dual-Stack Implementation, NAT64 Performance Analysis, VoIP Quality Assessment, Video Streaming Metrics, Enterprise Network Migration, Tunnelling Overhead Evaluation Abstract—When considering migration from IPv4 to IPv6, companies are faced with trade-offs because they need to maintain the current functionality of their networks throughout the migration process. In this paper, companies have three migration methods to choose from and we evaluate how well the methods perform with respect to two network applications: voice calls and video streaming. We constructed a test network in software using GNS3 and performed extensive experiments with various traffic loads. Our experiments indicate that the dual stack method of running both protocols concurrently is the most performant. With fifty simultaneous calls, dual stack kept call arrival delays below 29 Ms while translation created delays over 41 Ms. Dual stacks achieved 2 second video start-up times, while start-up took over 3 seconds with translation. Tunnelling came in between with 38 Ms call arrival latencies and 2.8 second video start-up latencies. A 5-yearcost analysis shows that dual stack for 500 users is around \$64k, which is less than half of the \$127k required to maintain IPv4 functionality with a translation appliance. The numbers in this paper give network engineers a hard comparison to make the right migration choice for their environment.

Index Terms: IPv6 Transition, Dual-Stack Implementation, NAT64 Performance Analysis, VoIP Quality Assessment, Video Streaming Metrics, Enterprise Network Migration, Tunnelling Overhead Evaluation

AI-Based Disease Risk Prediction System Using Machine Learning

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Abstract

Early identification of potential diseases is one of the most important aspects of modern healthcare. However, many individuals tend to ignore early symptoms or lack access to timely diagnostic tools. With the advancement of machine learning, it has become possible to analyse health-related data and predict disease risks effectively. This paper presents an AI-based disease risk prediction system that utilizes user inputs such as symptoms and lifestyle factors to estimate the likelihood of certain diseases. The system is built using the Random Forest algorithm, which is known for its accuracy and robustness in classification problems. The model is trained on publicly available datasets and evaluated using standard performance metrics. The proposed system not only predicts potential risks but also provides basic health suggestions, encouraging users to seek medical attention when necessary. The results indicate that the system can serve as a supportive tool for early awareness and preventive healthcare.

Keyword: Machine Learning, Disease Prediction, Random Forest, Healthcare Analytics, Predictive Modelling

AI-Based Malware Detection in Network Traffic for Enhanced Computer Network Security

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Abstract

Keeping networks safe from malware has become one of the hardest problems in modern cybersecurity. Older detection tools work by matching traffic against a library of known threat signatures, but this approach breaks down quickly when attackers release new malware variants every single day. This paper looks at how artificial intelligence, particularly machine learning and deep learning, can be used to spot malicious activity directly from network traffic without needing a pre-built signature database. We explore several models — Random Forest, Convolutional Neural Networks, Long Short-term Memory networks, and a hybrid design that combines the last two — and explain how each one learns to separate harmful traffic from normal traffic. Testing on two well-known public datasets showed that the combined CNN-LSTM approach reached detection accuracy above 98% while keeping false alarms under half a percent. The paper also talks honestly about the difficulties that come with real-world deployment, such as attackers deliberately trying to fool the system, traffic patterns changing over time, and the growing use of encryption that hides packet content. We close by pointing toward promising areas for future work, including privacy-friendly collaborative training and tools that help security analysts understand why the AI made a particular decision.

Index Terms: malware detection, network traffic analysis, machine learning, deep learning, intrusion detection, cybersecurity, anomaly detection, neural networks.

Deep Learning For EEG-Based Epileptic Seizure Detection

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Abstract

Detecting epileptic seizures from scalp EEG recordings is an important clinical problem that affects both patient safety and timely initiation of appropriate treatment. Traditional machine learning methods depend on manually extracted spectral-spatial features that are used by binary classifiers to predict two classes. The paper describes an end-to-end approach based on Convolutional Neural Networks (CNN) called Conv1D-CNN that takes raw multichannel EEG signal input, and produces output of one of the three clinically relevant states: Normal, Pre-Seizure, and Seizure. This model removes the need for manually engineered features, provides explicit pre-seizure state detection unavailable in binary solutions, and incorporates class balancing through the weighted cross-entropy loss function. We evaluate our model on the CHB-MIT scalp EEG dataset with 24 subjects providing total of 916 hours of data and achieve an overall accuracy of 90.3%, macro-averaged precision of 0.640, recall of 0.617, F1 score of 0.623, and ROCAUC score of approximately 0.82. Good class-level performance is demonstrated for Normal (F1 = 0.94) and Seizure (F1 = 0.85) classes, while lower performance for Pre-Seizure state (F1 = 0.48) indicates the intrinsic difficulty of this particular problem.

Index Terms: Epileptic Seizure Detection, Electroencephalogram (EEG), Deep Learning, Convolutional Neural Network (CNN), CHB-MIT, Multiclass Classification, Data Augmentation, CHB-MIT Dataset, Biomedical Signal Processing.

Architecturally Enhanced and Temporally Stabilized Small-Object Detection Framework for Dense UAV Surveillance

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Abstract

Unmanned Aerial Vehicle (UAV)-based surveillance systems present severe object detection challenges due to extreme small object sizes, scene density, viewpoint variation, and inter-frame temporal instability. This paper presents an experimentally validated detection-tracking-stabilization pipeline for dense UAV surveillance video. We adopt YOLOv8 as the base detector, trained on the VisDrone2019-DET benchmark, and augment training with Mosaic, MixUp, and multi-scale strategies. Tracking is performed using the ByteTrack algorithm to maintain object identity across frames. A naïve temporal stabilization module is implemented and analysed, revealing its fundamental limitations. Experimental results demonstrate a peak aggregate F1-score of 0.36 at confidence threshold 0.174, strong per-class precision for vehicles, and significant background confusion for small pedestrian-scale objects. The confusion matrix reveals critical misclassification patterns between visually similar classes and high false-negative rates driven by background suppression. The temporal stabilization graph further exposes the insufficiency of naive frame-retention strategies for count-level stability. These findings motivate a proposed advanced stabilization framework incorporating Kalman filtering, appearance embedding, moving-average smoothing, and adaptive confidence refinement. This work contributes a rigorous empirical analysis of the failure modes inherent in standard UAV detection pipelines and defines a clear roadmap for temporally coherent aerial surveillance.

Index Terms: UAV surveillance, small-object detection, YOLOv8, VisDrone, ByteTrack, temporal stabilization, Kalman filter, appearance embeddings, aerial video analysis

Vowel Based AI Infant Cry Analysis

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Abstract

Analysis of infant cry is a crucial aspect in determining the well-being of new-born infants. Recognising various patterns in infant cry patterns can help parents and caregivers to provide timely intervention. Existing infant cry classification systems primarily focus on manually chosen acoustic features and traditional machine learning techniques, which may not be able to effectively detect subtle vowel-like changes in infant vocalizations. This study introduces an artificial intelligence-based infant cry classification system using a vowel-based approach and state-of-the-art audio feature extraction and machine learning models. Our system examines infant cry recordings and extracts significant acoustic features, including Mel-Frequency Cepstral Coefficients (MFCCs), chroma features, spectral contrast, zero-crossing rate, root mean square (RMS) energy and tonnetz features. These features are then employed to train and test various machine learning classifiers such as Support Vector Machine (SVM) and Random Forest. The Random Forest model performed the best with an accuracy of around 91%. The new approach enhances the performance of cry classification by focusing on the vowel-like factor of a cry and the feature representation. The proposed system exhibits promising infant cry classification results, and can be used for intelligent health monitoring and future real-time baby monitoring systems.

Index Terms: Infant Cry, Artificial Intelligence, Machine Learning, Signal Processing, Vowel Analysis, Random Forest, MFCC, Cry Classification, Biomedical Signal Processing, Acoustic Feature Extraction.

AI-Powered Threat Detection to Protect Sensitive Genetic Disease Data in Agricultural Cyber-Systems

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Abstract

Modern agriculture has incorporated cyber farming systems. Genetic disease information against cyber threats is therefore quite crucial to retain. In cyber farming systems, it is a good idea to use intelligence to identify and prevent threats to ensure that the data is processed securely and safely. We should conduct research in order to increase the effectiveness of artificial intelligence models, and improve to meet the current threats. This will assist in maintaining precision agriculture solutions. Artificial intelligence systems can also assist precision agriculture in a manner. They are able to assist in the utilization of resources and enhance productivity.

Keywords: Agricultural Cyber Systems, Genetic Data Security, Artificial Intelligence (AI), Crop Disease Prediction and Data Integrity

ISBN: 978-81-638016-6

Design and Development of a 4-DOF Robotic Arm for Object Manipulation

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Abstract

The design and development of robotic systems have gained significant attention in recent years due to their wide applications in industrial automation, healthcare, and service sectors. This paper presents the design and implementation of a 4-degree-of-freedom (4-DOF) robotic arm for object manipulation. The proposed system utilizes a microcontroller-based control mechanism integrated with servo motors to achieve precise movement and control. The robotic arm is capable of performing pick-and-place operations with improved accuracy and efficiency. The design includes a lightweight mechanical structure, a gripper mechanism, and a user-friendly control interface. Experimental results demonstrate that the system performs smooth and stable operations, making it suitable for educational and small-scale industrial applications.

Keywords- Robotic Arm, 4-DOF, Object Manipulation, Servo Motors, Arduino, Automation

Load Balancing in Cloud Computing: A Bibliometric Analysis of Research Trends and Emerging Themes

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Abstract

Purpose

Load balancing is essential in cloud computing for efficient resource utilization and improved quality of service. This study presents a bibliometric review of cloud load balancing research published between 2015 and 2025 using Scopus data. Bibliometric indicators were analysed with VOS viewer to examine publication trends, key contributors, and research themes. The results show steady publication growth, with India, China, and Saudi Arabia as leading contributors, and highlight metaheuristic and energy-efficient approaches as major research trends.

Design/Methodology /Approach:

The research employs a bibliometric approach to examine Indian cloud computing studies centred on load balancing from 2015 to 2025. Relevant keywords were used to collect Scopus data, which was also manually examined for accuracy and filtered to only include final published publications. In order to identify significant research, the chosen records were analysed for publishing patterns, important authors, institutions, citation impact, preferred sources, collaboration networks, and keyword co-occurrence.

Industry Implication:

The study highlights research trends that align with industry needs such as improved workload distribution, efficient resource utilization, and scalable cloud services. Insights from highly cited works and emerging themes can guide industry cloud user in adopting advanced load balancing models, supporting better system reliability, performance, and cost efficiency.

Originality:

This study focused on bibliometric evaluation of India's contribution to cloud computing, with a particular focus on load balancing—a area that hasn't received much attention in previous bibliometric evaluations. Combining citation analysis, keyword mapping, and publishing patterns, it offers a thorough picture of how the field has changed over the last ten years.

Keywords: Cloud Computing, Load Balancing, Bibliometric Analysis, Metaheuristic Algorithms, Resource Scheduling, Scopus, VOS viewer.

A Scalable Multi-Model Forecasting System for Demand Prediction in Retail Environments

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Abstract

The project utilizes machine learning for product demand forecasting by using available sales and relevant data from history. The study aims to provide businesses with a tool to increase inventory planning accuracy, decrease stockouts, and to make better decisions regarding the supply chain. The demand forecasting solution includes raw data pre-processing, feature engineering, and regression model evaluation to determine which of a variety of regression algorithms provide the most accurate predictions. Once an algorithm has been selected, the solution is deployed as an interactive web application utilizing Streamlit, which allows users to view data trends, explore datasets, and create real-time demand forecasts through an intuitive user interface. Users can input information dynamically, gain graphical insights into their forecasts, and automate their demand forecasting efforts, thus providing business users without a technical background with a useful tool. The proposed model achieved an accuracy of 95.4%, demonstrating strong predictive capability. The work completed in this project illustrates a complete end-to-end pipeline demonstrating how machine learning can improve operational efficiencies, with the resulting analysis providing evidence of the effectiveness of the demand forecasting application as well as its application to real-world businesses.

Keywords: Demand Prediction, Machine Learning, Forecasting, Regression Models, Data Pre-processing, Streamlit Deployment, Predictive Analytics, Real-Time Visualization.

Optimized Prompt Engineering Strategies for Mitigating Rubric Misalignment in Automated Grading Systems

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Abstract

Large language model (LLM)-based assessment systems often face a challenge called rubric misalignment, where the scores generated by the AI differ from what a human evaluator would provide. This study investigates how different prompt engineering strategies can help solve this issue, especially for short-answer questions. We test several methods, such as chain-of-thought (CoT) prompting, few-shot learning, hybrid approaches, and more complex reasoning techniques like tree-of-thought (ToT) and graph-of-thought (GoT). To ensure our experiments are repeatable, we use a consistent rubric scoring system based on JSON. We measure performance using numerical alignment metrics and textual similarity scores, including BLEU. Our results show that structured reasoning methods are especially good at tackling rubric misalignment problems.

Keywords: Automated Grading, Prompt Engineering, Chain-of-Thought, Few-Shot Learning, Tree-of-Thought, Graph-of-Thought, Rubric Alignment, BLEU Score

TRIALVERSE: An Explainable Neuro-Symbolic AI Ecosystem for Intelligent Clinical Trial Recruitment, Retention, and Outcome Optimization

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Abstract

The Trialverse model employs an auto-scaling feedback loop that recalibrates continuously in response to changes in the condition of a patient and updates in clinical protocol through the use of real-time data. This auto-scaling loop significantly increases the likelihood of detecting high-risk patients in the early stages of an intervention, and provides an opportunity for improving future clinical adherence. Extensive evaluations of the model using a wide variety of Phase II/III trial datasets have demonstrated that it has the ability to generalize to different conditions while maintaining both fair and accurate results across demographic groups. In addition, the Trialverse model incorporates the use of domain expertise to support the actions of AI when predicting outcomes. Overall, through this methodology, clinical trial optimization efforts can be achieved through more secure and fair processes. In the future, we will investigate federated learning-related approaches to create an estimated clinical trial outcome using decentralized methods. We show that TRIALVERSE accurately improves on traditional machine learning models for recruitment accuracy, dropout prediction and protocol violation detection experimentally on two multi-institutional clinical trial datasets.

A Hybrid Multimodal AI Framework for Climate-Smart Agriculture, Environmental Intelligence, and Adaptive Disaster Early Warning Systems

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Abstract

Climate change, degradation of natural resources, and an increase in disaster frequency are expected to seriously affect global food security, the environmental sustainability of ecosystems on which biodiversity relies, and the resilience of humanity. Some aspects of traditional monitoring and forecasting depend on isolated data sources and domain-specific models, which may limit their ability to provide comprehensive and adaptive decision support. This work proposes a Unified Multimodal AI Framework for Climate-Smart Agriculture, Environmental Intelligence, and Adaptive Disaster Early Warning Systems (UCI), which is an integrated artificial intelligence architecture designed to integrate heterogeneous environmental data into predictive, prescriptive, and real-time risk-aware analytics. We present a hybrid deep learning architecture that integrates multispectral satellite imagery, IoT sensor streams, meteorological records, LiDAR data, geospatial information, seismic indicators, and community-generated observations. This context-aware multimodal fusion mechanism provides attention-gated weighting of each modality based on contextual relevance, enabling more robust environmental perception in unmodeled and rapidly changing conditions. Additionally, the framework itself associates explainable AI mechanisms and adaptive trust-weighted feedback models, in order to reinforce transparent and community-centric decision-making. Results demonstrate that integrated multimodal environmental intelligence systems can significantly enhance climate resilience, sustainable agricultural productivity and proactive disaster preparedness and provide an inclusive framework for scalable intelligent environmental governance and sustainable development.

An Efficient Framework for Dynamic Link Prediction in Social Networks

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Abstract

Online social networks are commonly represented as graph structures, where individuals are modeled as nodes and their interactions as links. These networks evolve continuously as new relationships are formed and existing connections fade over time. Predicting such future interactions, known as link prediction, plays an important role in enhancing recommendation systems, online communication, and user engagement on platforms such as Facebook and LinkedIn. However, the dynamic and large-scale nature of social networks introduces complex structural and temporal dependencies, making accurate link prediction a challenging task. Traditional approaches often fail to effectively capture both structural and temporal information while maintaining computational efficiency. This study reviews recent advancements in dynamic link prediction and highlights the need for efficient, scalable, and sustainability-aware approaches for processing continuously growing social network data. It also discusses key research challenges and emerging opportunities for improving prediction performance, reducing computational overhead, and supporting real-time intelligent analysis of social networks.

Keywords: Dynamic Link Prediction, Social Networks, Temporal Relationships

Optimized Prompt Engineering Strategies for Mitigating Rubric Misalignment in Automated Grading Systems

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Abstract

Large language model (LLM)-based assessment systems often face a challenge called rubric misalignment, where the scores generated by the AI differ from what a human evaluator would provide. This study investigates how different prompt engineering strategies can help solve this issue, especially for short-answer questions. We test several methods, such as chain-of-thought (CoT) prompting, few-shot learning, hybrid approaches, and more complex reasoning techniques like tree-of-thought (ToT) and graph-of-thought (GoT). To ensure our experiments are repeatable, we use a consistent rubric scoring system based on JSON. We measure performance using numerical alignment metrics and textual similarity scores, including BLEU. Our results show that structured reasoning methods are especially good at tackling rubric misalignment problems.

Effect of various process parameters on hardness of aluminum alloy based hybrid surface composite fabricated using friction stir processing (FSP) Route

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Abstract

Friction stir processing (FSP) is widely recognized as a highly prominent solid-state technique used to manufacture hybrid surface composites (HSCs). These surface composites are specifically engineered materials designed to significantly enhance critical surface properties, most notably structural hardness and wear resistance. The primary focus of this study is to systematically investigate the fabrication of HSCs utilizing an AA 6082 aluminum alloy as the base matrix material, reinforced with a precise mixture of silicon carbide and graphite particles. The experimental methodology utilizes specialized processing tools featuring distinct tilt angles of 3 degrees and 5 degrees. These are employed across a comprehensive combination of process parameters, including varying tool rotational speeds and feed rates (traverse speeds), different patterns of tool rotation, the total number of passes, and diverse weight percentage ratios of the reinforcement particles. Furthermore, to establish a rigorous comparative baseline, unreinforced FSPed surfaces—created without adding reinforcement particles to the matrix—were also prepared. Ultimately, the research meticulously evaluates how these varying processing parameters directly influence the resulting overall surface hardness of both the reinforced HSCs and the unreinforced FSPed control surfaces.

Keywords: Friction stir processing, Hybrid surface composite, AA 6082, Silicon carbide, Graphite, Hardness

Deep Learning-Based Driver Drowsiness Detection System

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Abstract

This study presents an advanced driver drowsiness detection framework leveraging deep learning techniques, particularly 2D and 3D Convolutional Neural Networks (CNNs), to improve road safety through early fatigue recognition. The proposed system integrates spatial and temporal analysis to detect critical indicators such as eye closure, yawning, and head nodding. Unlike traditional approaches, the framework employs multistage adaptive CNN architectures combined with temporal modeling methods, including CNN-LSTM and attention-based mechanisms, to enhance detection accuracy under real-world conditions such as low lighting and occlusion. Benchmark validation using datasets like NTHU-DDD and KEC-DDD demonstrates improved performance in ROC-AUC, precision-recall, and robustness compared to conventional models. Additionally, deployment-aware optimization techniques such as pruning and quantization enable real-time implementation in Advanced Driver Assistance Systems (ADAS). The proposed approach contributes to proactive fatigue management, reducing accident risks and enhancing driver safety through interpretable and efficient AI-based monitoring systems.

Keywords: Driver Drowsiness Detection, 3D CNN, Multimodal Deep Learning, Explainable AI, ADAS Systems

Directed Sum 3 Labeling of Graphs

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Abstract

A digraph is directed graph in which each edge has direction. In this paper we investigate new labeling scheme named directed sum 3 labeling of graphs. A function f from vertex set $V(W)$ to $\{0, 1, 2, \dots, n-1\}$ and edge labeling defined by $f^*: E(W) \rightarrow \{0, 1\}$, $f^*(l_p l_{p+1}) = 2^{lp} \pmod{3}$ such a labeling is called as directed sum 3 labeling if $|e_f(1) - e_f(2)| \leq 1$ holds. A graph which preserves directed sum 3 labeling is called as directed sum 3 graph. In this paper, we study directed sum 3 labeling of linear cycle, directed diamond snake, directed star graph and, linear directed paths. Further extended results on the various operations on linear directed path elaborated with sufficient conditions well presented.

Keywords: directed labeling, directed sum 3 graph labeling, directed sum 3 graph, directed path.

Social Engineering on Social Media using Behavioral Forensics

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Abstract

Despite the fact that social media platforms have become hubs for extended communication and human touch, they also provide a fertile field for social engineering attacks which can be carried out by malicious actors. This is in spite of the fact that these platforms have developed into nerve centers for the activities in question. The vulnerabilities of technology are not exploited in these attacks; rather, human psychology, trust, and behavioral patterns are utilized as the means of attack. The purpose of this research is to present a behavioral-forensics framework with the intention of examining how users react when they are exposed to a variety of social-engineering methods (including phishing URLs, fake friend requests, baiting offers, and false-authority remarks, among others). This framework was established with the intention of achieving the goal of doing this analysis. In addition to this, the research investigates and offers behavior-based strategies for minimizing the impacts of the condition, as well as psychological and demographic susceptibilities. Through the use of simulated tests and user answers from a wide range of age groups, the research explores patterns of vulnerability and decides which approaches are the most effective. Based on the findings of a comparative review of existing defenses that are based on content or technology, it was discovered that human-behavior-informed techniques have the potential to dramatically boost detection and resilience against social engineering. This was determined by contrasting these strategies with the defenses that were already in place. The paradigm that has been constructed provides a fresh contribution that bridges the gap between forensics, social media security, and human behavioral analysis. This is done with the purpose of persuading individuals to incorporate behavioral safeguards into their cybersecurity tactics.

Keywords: social engineering, social media, behavioral forensics, phishing, user psychology, susceptibility, mitigation, demographic analysis

Artificial Intelligence and Sustainable Business Practices: Transforming Corporate Sustainability through AI-Driven Innovation

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Abstract

This research paper examines the transformative role of artificial intelligence (AI) in advancing sustainable business practices across global industries. As organizations face mounting pressure to address environmental, social, and governance (ESG) challenges, AI emerges as a critical enabler of sustainable transformation. This study analyzes how AI technologies—including machine learning, natural language processing, computer vision, and predictive analytics—are being deployed to optimize resource utilization, reduce carbon emissions, enhance supply chain transparency, and drive circular economy models. Drawing on case studies from diverse sectors including manufacturing, retail, finance, and energy, this paper demonstrates that AI-powered sustainability initiatives can simultaneously deliver environmental benefits and business value. The research also addresses critical challenges including the carbon footprint of AI systems themselves, ethical considerations in AI deployment, data privacy concerns, and the need for robust governance frameworks. Through a comprehensive analysis of current applications and future trajectories, this paper argues that AI represents not merely a technological tool but a fundamental paradigm shift in how businesses conceptualize and operationalize sustainability. The findings suggest that successful AI-driven sustainability strategies require cross-functional collaboration, stakeholder engagement, transparent metrics, and alignment with global sustainability frameworks such as the UN Sustainable Development Goals.

Keywords: Artificial Intelligence, Sustainable Business Practices, ESG, Machine Learning, Carbon Reduction, Circular Economy, Corporate Sustainability, Green AI

**GREEN ENERGY OPTIMIZATION THROUGH ARTIFICIAL INTELLIGENCE: AN
EMPIRICAL SURVEY OF MANAGERIAL PERCEPTIONS AND
ADOPTION BARRIERS IN INDIAN ENTERPRISES**

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Abstract

The convergence of Artificial Intelligence (AI) and green energy systems has emerged as one of the most consequential trends in sustainable business management. This paper presents an empirical, survey-based investigation into managerial perceptions, adoption readiness and organizational barriers to AI-driven green energy optimization in Indian enterprises. Drawing upon structured questionnaire responses from 312 managers across manufacturing, services and infrastructure sectors, the study employs descriptive statistics, factor analysis and structural equation modelling (SEM) to identify the key drivers and impediments of AI adoption in energy management systems. Findings reveal that cost-efficiency expectations, regulatory pressure and ESG compliance obligations are primary motivators, while talent scarcity, high initial investment and data privacy concerns constitute the most significant barriers. The paper contributes to the growing literature on AI-enabled sustainability by offering a business-management lens to a largely technology-oriented discourse and provides actionable recommendations for policymakers, enterprise leaders and institutional investors. The study situates India within the broader global transition to intelligent energy systems and calls for collaborative governance frameworks that enable smaller enterprises to participate meaningfully in the AI-green energy nexus.

Keywords: Artificial Intelligence, Green Energy, Energy Optimization, Sustainable Business Practices, ESG, Managerial Perception, Adoption Barriers

About the Conference

The CRF is organizing the International Conference on AI and Sustainable Business Practices - 2026 (AISBP-2026), May 16-17, 2026. The primary goal of this conference is to bring together experts and researchers from academia and industry to share their knowledge on implementations. To encourage faculty to pursue higher education and skill development in order to achieve. Encourage faculty and researchers to learn and develop new ideas from world-class excellence. To strengthen the institute through an alumni network. The conference features keynote addresses and invited talks by eminent invited speakers from around the world, as well as virtual presentations by researchers. This conference will also serve as a venue for young researchers to share and debate novel ideas. You are welcome to contribute papers and attend the conference.

Encourage faculty development, skill enhancement, and networking with global alumni for world-class excellence in research and education.

About Annai College

Annai College of Arts and Science is a college in Kovilacheri, Kumbakonam, Tamil Nadu, India. Affiliated to Bharathidasan University Trichirapalli.

About BWC

Bharathi Women's College is a women's general degree college located at Chennai, Tamil Nadu. Established in 1964 and affiliated with University of Madras. This college offers courses in arts, commerce and science.



About Thammasat University

Thammasat University was inaugurated on June 27, 1934. The original name of the University, as given by Professor Dr. Pridi Banomyong, was the University of Moral and Political Sciences. Professor Dr. Banomyong wished to establish a university to educate Thai people of democracy introduced to the nation for the first time two years earlier.

