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Proceedings of the International Conference on

Artificial Intelligence, Innovation and Sustainable Development

(ICAIISD 2026)





AMIEE
Empowering Innovation, Shaping Futures

CMAOI ASSOCIATION
A Commerce and Management Association for Industry Experts and Academic Professionals

Proceedings of the International Conference on "Artificial Intelligence, Innovation and Sustainable Development"

(ICAIISD 2026)

First Volume

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Preface

The rapid advancements in Artificial Intelligence (AI), innovation, and sustainable development have revolutionized the global landscape, creating new opportunities and challenges for industry professionals, academicians, and researchers. Recognizing the significance of these evolving technologies, the **2nd International Conference on Artificial Intelligence, Innovation & Sustainable Development (ICAIISD–2026)** was successfully held virtually on **29th and 30th August 2026**, serving as a premier platform to facilitate knowledge exchange, research collaboration, and industry-academia engagement.

The conference, jointly organized by the **CMAOI Association** in collaboration with **AMIEE Association**, aimed to explore the transformative role of AI, multidisciplinary innovation, green technologies, and sustainable digital transformation.

This Conference Proceedings is a comprehensive compilation of selected research papers, each presenting valuable insights, case studies, and empirical findings that contribute to the growing body of knowledge in **AI and sustainable development.** The contributions from renowned academicians, researchers, and industry experts reflect the conference's immense success in fostering intellectual discussions and technological innovations.

We extend our sincere gratitude to all **authors, presenters, keynote speakers, session chairs, and participants** who contributed to the success of this landmark event. We hope that this publication serves as a valuable resource for researchers, academicians, and professionals striving to navigate the rapidly evolving **AI and sustainable technology** landscape.

Happy reading!

Dr. Aamir Junaid Ahmad

Conference Chair Secretary,

CMAOI Association

Proceedings of the International Conference on “Artificial Intelligence, Innovation and Sustainable Development (ICAIISD 2026)"

An International Conference on “Artificial Intelligence, Innovation and Sustainable Development (ICAIISD 2026)” was held on 29th and 30th August 2026. The conference was organized by the CMAOI Association in Collaboration with and AMIEE Association.

Commerce and Management Association of India (CMAOI)

A revered organization of commerce, management, and technology professionals, CMAOI is a junction of intellectual highbrow with revolutionizing industry trends. With over 500 illustrious members from academia and industry, the association is a resourceful platform for industry alliance and partnership. The association's initiatives are geared towards shaping the future of commerce and management practices in India, ensuring that members are well-equipped to navigate the evolving business landscape.

AI-ML Innovative Entrepreneurs and Engineers Association (AMIEE)

AMIEE is a distinguished syndicate committed to augmenting Artificial Intelligence, Machine Learning, and entrepreneurial inventiveness. AMIEE is the heart of India's technological resurrection, having a dynamic nexus of around 500 academicians and industry leaders across the board who perform excellent networking, knowledge exchange, and collaboration, aiming to drive progress and innovation in the millennial domain.

Proceedings of the International Conference on " Artificial Intelligence, Innovation and Sustainable Development (ICAIISD 2026) "

Innovation is the foundation of progress, and collaboration is the force that drives it forward. The Proceedings of the **2nd International Conference on Artificial Intelligence, Innovation & Sustainable Development (ICAIISD–2026)**, jointly organized by the **AMIEE Association** and **CMAOI Association**, brought together thought leaders, researchers, and professionals from around the globe. The virtual event witnessed an impressive collection of research submissions and presentations, including contributions from international institutions and leading academic centers across India. The participation of experts from top NIRF-ranked institutions further highlighted the global relevance, academic rigor, and multidisciplinary impact of the conference.

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About AMIEE Association

The Artificial Intelligence, Machine Learning, Innovative Entrepreneurs and Engineers Association **(AMIEE)** is an eminent nonprofit professional body that plays a pivotal role in the advancement of Artificial Intelligence **(AI)**, Machine Learning **(ML)**, innovation, engineering, and entrepreneurship. With a strong focus on interdisciplinary collaboration and societal transformation, **AMIEE** brings together a diverse community of researchers, academicians, technologists, engineers, industry professionals, and aspiring entrepreneurs committed to leveraging technology for the greater good.

AMIEE's foundational objective is to bridge the gap between cutting-edge technological innovation and societal application. The association actively promotes the research, development, and ethical use of **AI** and **ML** across a wide range of sectors, including but not limited to healthcare, education, scientific research, agriculture, environmental sustainability, arts, commerce, and social welfare. By fostering the responsible deployment of these technologies, **AMIEE** seeks to create inclusive solutions that address complex real-world problems and contribute to sustainable development.

The association serves as a dynamic platform for knowledge exchange, skill development, and collaborative engagement. It regularly organizes international conferences, research symposiums, innovation challenges, technical workshops, and capacity-building programs that empower individuals to excel in their respective fields. **AMIEE** also supports scholarly research by facilitating publications, research collaborations, and interdisciplinary dialogues that span academic institutions and industry networks globally.

At its core, **AMIEE** is deeply committed to social equity and inclusive growth. Through targeted initiatives and community outreach programs, the association prioritizes the empowerment of underprivileged and marginalized populations, especially in rural and semi-urban regions of India. These efforts include providing access to quality education, digital literacy, technical training, and entrepreneurship support to children, youth, women, and disadvantaged groups. **AMIEE** believes that technology should serve as a tool for social inclusion, not division, and works relentlessly to ensure that the benefits of **AI** and **ML** are equitably distributed.

As a nonprofit entity, **AMIEE** adheres to a principle of reinvestment—allocating all revenue and resources toward the advancement of its objectives. The organization does not distribute profits or dividends to its members. Instead, it channels funding into the development of impactful programs, research support, community empowerment projects, and capacity enhancement strategies aimed at building a better, more equitable society.

Through its holistic and visionary approach, **AMIEE** positions itself as a key enabler of innovation-led development. It is not only a hub for professional excellence but also a movement towards creating a society where technological progress is inclusive, ethical, and human-centric. The association's long-term vision is to be a catalyst in shaping a future where every individual, regardless of socio-economic background, has the opportunity to learn, grow, innovate, and contribute meaningfully to the advancement of humanity.

Conference Highlights

With the harmony of wit and its delibration, the conference spotlighted keynote addresses, panel discourses, and research orientation, with an intermix of Artificial Intelligence and Fintech. The discussions and ruminations uncovered the evolving and revolutionizing ramifications of AI in financial services, providing the future scope of emerging trends, limitations, and upcoming prospects. Therefore, the conference assimilated the beautiful encounter of tomorrow's reality with today's discernment.

"Join us. Shape the future". A big shout-out to the budding scholars.

About CMAOI Association

The Commerce and Management Association of India (CMAOI) is a distinguished, nonprofit professional organization committed to the advancement of education, research, and ethical practices in the domains of commerce, management, and allied disciplines across India. Incorporated with a vision of catalyzing systemic transformation in the academic and professional landscape, CMAOI serves as a national platform for scholars, educators, institutional leaders, researchers, and industry practitioners who are collectively working toward academic excellence, innovation, and social upliftment.

With an active and growing membership of over 650 professionals, including Heads of Departments, senior academicians from prestigious universities and colleges, and influential figures from the industry, CMAOI represents a powerful consortium of thought leaders and changemakers. The association fosters a collaborative and interdisciplinary environment where ideas, research findings, and pedagogical advancements are shared freely to elevate the standards of commerce and management education in India.

CMAOI's mission is to empower individuals and institutions through opportunities for continuous learning, professional development, knowledge dissemination, and collaborative research. The association plays an instrumental role in organizing conferences, faculty development programs (FDPs), workshops, and seminars at regional, national, and international levels. These initiatives are designed to enhance the skill sets of educators and practitioners, promote cutting-edge research, and encourage knowledge-sharing that contributes to sustainable business practices and ethical leadership.
The vision of CMAOI is to be a leading catalyst for transformative advancements in commerce and management education, fostering excellence, integrity, and innovation. The organization envisions a future where Indian professionals and institutions lead global conversations in business, entrepreneurship, corporate governance, and economic development. Through strategic alliances and community-driven programs, CMAOI actively promotes inclusive practices and strives to bridge the gap between academic research and practical business solutions.

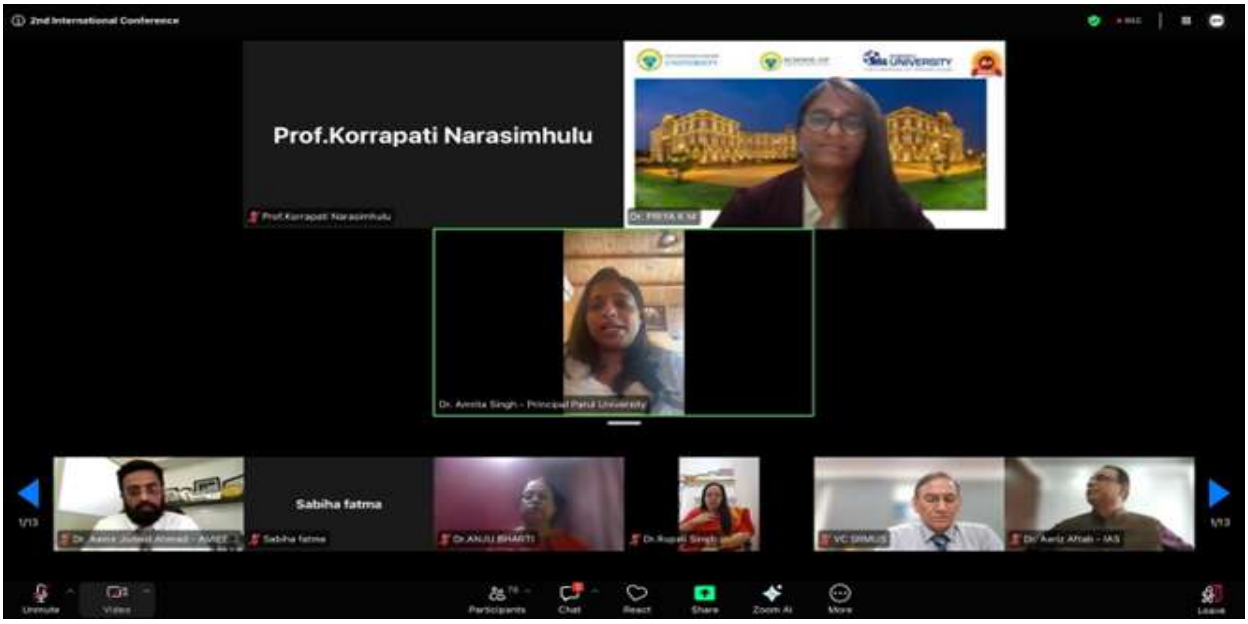
Aligned with its nonprofit mandate, CMAOI is deeply committed to societal development. The organization reinvests all revenue and resources into programs that support underprivileged communities through education, skill-building, healthcare access, and awareness campaigns. Special emphasis is placed on empowering children, youth, women, and marginalized groups by integrating them into mainstream society through inclusive policies and collaborative outreach. This social vision aligns with national developmental goals and positions.

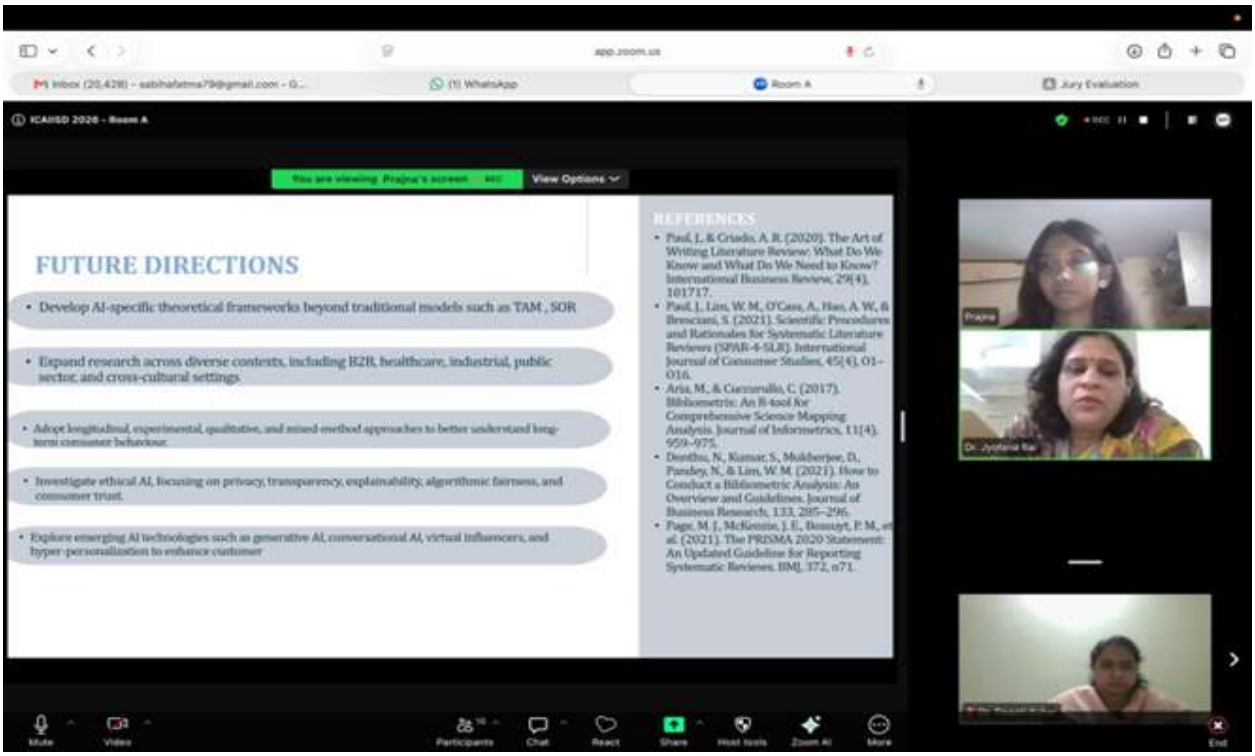
CMAOI as a socially responsible body working toward an equitable and progressive India.

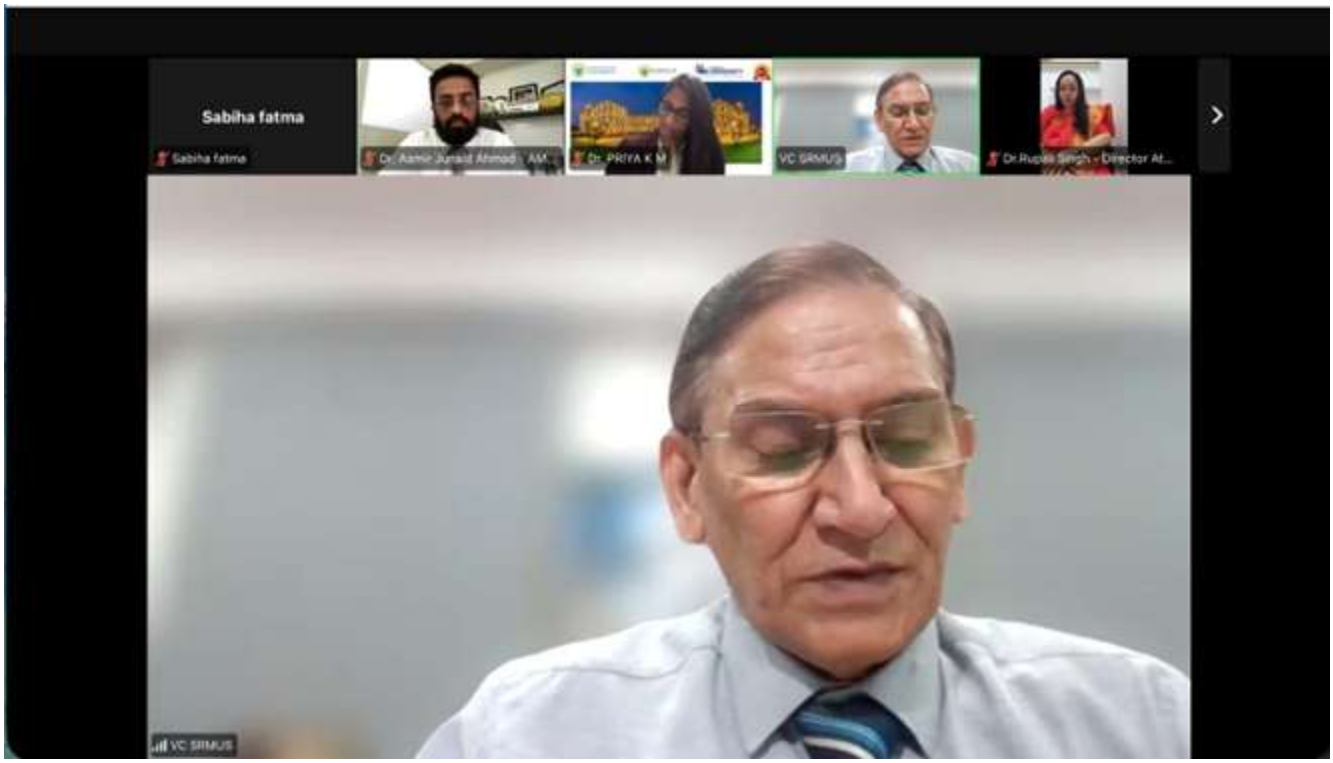
Furthermore, the organization extends its objectives beyond academia into areas such as art, science, sports, environmental protection, social welfare, and charity, reflecting a comprehensive commitment to national development. The association is strictly non-dividend-paying and functions with the sole purpose of societal betterment, capacity-building, and the dissemination of knowledge.

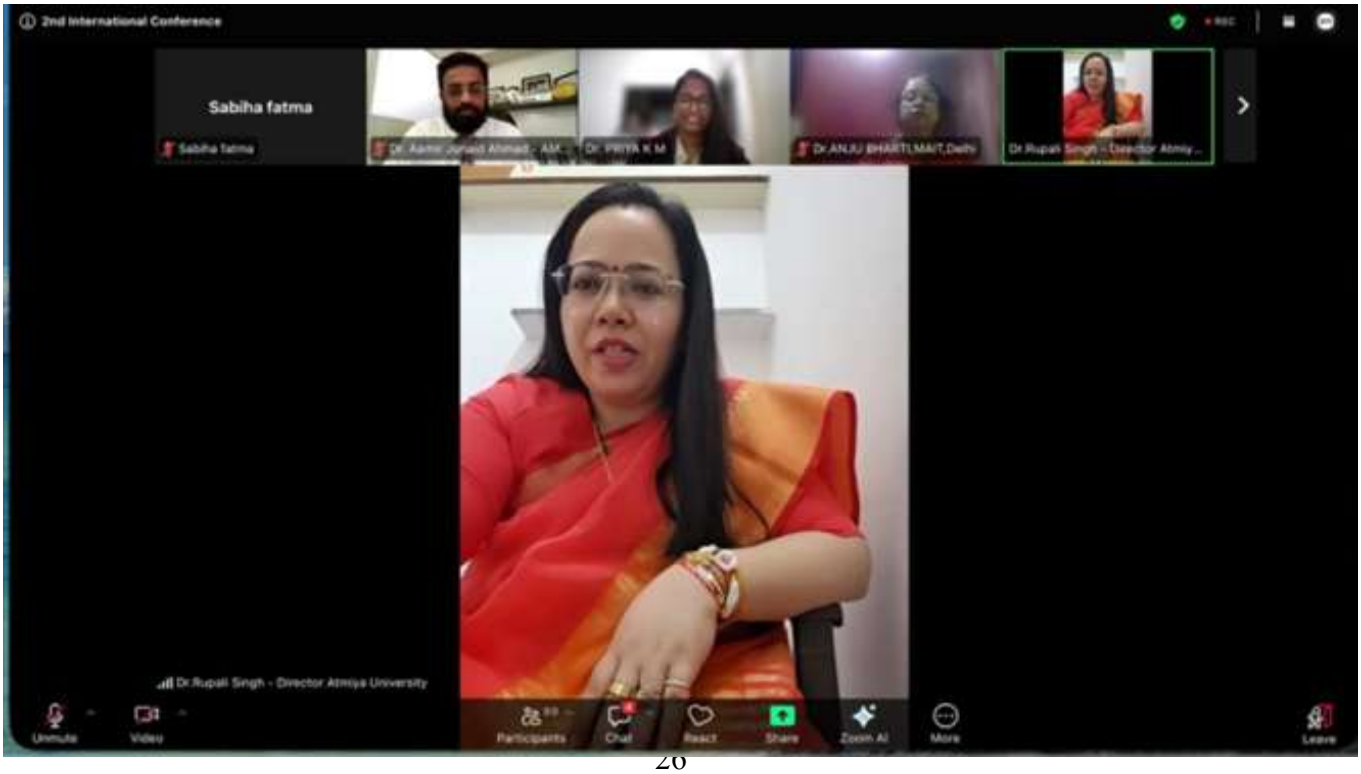
In essence, the Commerce and Management Association of India stands as a beacon of academic and professional excellence. It is a vibrant intellectual ecosystem that not only advances commerce and management education but also drives impactful change at the grassroots level. CMAOI continues to contribute to India's vision of inclusive growth by equipping professionals and institutions with the tools they need to lead responsibly and effectively in a rapidly evolving global economy.

A Glimpse into the Knowledge Exchange at the "International Conference on Artificial Intelligence, Innovation and Sustainable Development (ICAIISD 2026)"






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Share
Zoom AI
More
Leave

Contents

Title Page No.

Chapter 1 45

Transforming Research, Education, Industry, And Society Through Generative AI: A Survey-Based Multidisciplinary Study 46

Chapter 2

FloraGuard AI: A Mobile Edge-Computing App for Real-Time Crop Disease Diagnosis and Treatment Suggestions

Chapter 3 47

Advanced Power Management of Hydrogen Fuel Cell Electric Vehicles Using Supercapacitor-Assisted Energy Storage

Chapter 4 48

Decadal Changes in Groundwater Quality of an Urbanizing Semi-Arid Aquifer in Vadodara Western India

Chapter 5 49

Decoding Parkinson's Disease from EEG Signals: A Systematic Review of Machine Learning and Deep Learning Frameworks

Chapter 6 50

College Student Performance Analytics and Placement Prediction Using Machine Learning

Chapter 7 51

What Actually Fits: Context Selection for Local-First Retrieval on Memory-Constrained Hardware

Chapter 8 52

Smart Agriculture Using Artificial Intelligence and IoT: Enhancing Crop Monitoring, Irrigation, and Decision-Making 53

Chapter 9

IoT-Enabled Sensor Applications in Smart Healthcare, Smart Agriculture, Environmental Monitoring and Smart Energy & Safety Monitoring

Chapter 10 54

An intelligent adaptive learning framework based on reinforcement learning for educational transformation 55

Chapter 11

Generative ai-driven scientific workflows: a provenance-centered framework for reproducible and scalable discovery

Chapter 12 56

Managing the "Gig & Platform" Workforce: Psychological Contracts and Organizational Commitment Among Non-Traditional Workers in the Saurashtra Region of Gujarat State

Chapter 13 57

TrustGuard A Risk Aware Human Oversight Framework for Safe Autonomous AI Agents.

Chapter 14 58

Financial risk tolerance and mitigation mechanism and its effects On investment decisions among women with reference to urban areas in Bengaluru.

Chapter 15 59

Artificial Intelligence for Sustainable Development: Possibilities and Challenges of Multidisciplinary Innovation in Research, Education and Society

Chapter 16 60

Automated Classification of Brain Tumors from MRI Scans Using a Custom Convolutional Neural Network

Chapter 17 61

Performance Analysis of Solar Photovoltaic Systems Using Artificial Intelligence: A Comparative Study of MPPT Techniques

Chapter 18 62

Intelligent Gesture-Controlled Digital Painting: A Webcam-Based Bimanual Framework for Real-Time Shape Recognition and Correction

Chapter 19 63

Comparative Evaluation of AI Models for Financial Decision -Making: Evidence from Credit, Fraud, and Stock Forecasting

Chapter 20 64

Human Behavior : A Psychological Perspective

Chapter 21 65

AI that thinks before it acts: The rise of agentic AI

Chapter 22 66

A Risk-Based Multi-Layered Cybersecurity Framework for Securing Remote Patient Monitoring Systems 67

Chapter 23

AI-Enabled Proactive Maintenance Program: Securing Industrial Operations, Data Centres, and Personal Computing Systems

Chapter 24 68

Consumer Awareness of the Right to Repair concept and its benefits for durable goods

Chapter 25 69

A Machine Learning Based Multiple Disease Prediction System for Diabetes, Heart, and Liver Disease Diagnosis

Chapter 26 70

Greenhouse Farming: Cultivating the Future

Chapter 27 71

IOT based Smart IV monitoring system

Chapter 28 72

Artificial Intelligence Enabled Sustainable Marketing and Consumer Purchase Intention: The Mediating Role of Consumer Trust

Chapter 29 73

Sustain-x

Chapter 30 74

Energy-Aware and Privacy-Preserving Federated Learning for IoT

Botnet Detection at the Edge

Chapter 31 75

A study on green technology integration for sustainable smart city

development: a comparative study of Chennai and Mumbai.

Chapter 32

The Influence of AI Knowledge Acquisition on the Perceived Competence of Gen Z in Southern Kerala

Chapter 33 76

An Explainable Multi-Source Machine Learning Framework for

Early Prediction of Service Degradation in IoT and Smart Systems

Chapter 34 77

Transforming HR practices: Integrating Diversity, Equity, and Inclusiveness for an Inclusive Workplace

Chapter 35 78

Edge-Lite: A Lightweight Task-Aware Prompt Compression Framework for Scientific Question Answering

Chapter 36 79

Identification of Nymphaea lotus (Indian Lotus) using machine learning algorithm

Chapter 37 81

Twin Grow: A Cloud-Based A IoT Digital Twin System for Intelligent Mushroom Farming

Chapter 38 82

Risk and Return Analysis: Performance Evaluation of Select

Mid and Small Cap Mutual Fund Schemes

Chapter 39 83

Artificial Intelligence and Student Readiness for the Future Workforce

Chapter 40 85

Dual-State Confirmed Women Safety Wearable System Using

IoT Sensor Fusion and LLM-Assisted Post-Incident Intelligence

Chapter 41 86

Comparative Analysis of Machine Learning and Neural Network

Models for Sleep Apnea Detection Using ECG Data

Chapter 42 88

Intelligent AI Framework for Adaptive Clinical History Tracking

Chapter 43 89

A Study on Digitized Entertainment: Factors Influencing Consumer Adoption of OTT Platforms.

Chapter 44 90

Skills, Competencies, Ecosystem and Entrepreneurial Success:

A Study of MSME'S in East and West Godavari Districts

of Andhra Pradesh

Chapter 45 91

Consumer Adoption of AI-Enabled Instagram Shopping A Systematic Literature Review

Chapter 46 93

Explainable Multimodal AI for Proactive Human–Robot

Collaboration in Industry 5.0 Manufacturing

Chapter 47 94

AI-Driven Digital Twin for Intelligent Energy Management in Net-Zero Smart Cities

Chapter 48 95

AI-Enabled Financial Innovation and Sustainable Algorithmic Trading: A Regime-Adaptive and Cost-Aware Framework for the Indian Stock Market

Chapter 49 96

Impact of Delivery- Time pressure on the wellbeing of quick commerce workers

Chapter 50 97

From Couch to Code- Understanding the Relationship Between Human Counselling and Digital Therapy among Young Adults in the Digital Era: A Systematic Review

Chapter 51 98

A study on the role of human resource training interventions in improving quality control performance of employees at shri Lakshmi steels and suppliers

Chapter 52 99

Smart College Management System

Chapter 53 100

Deepguard: an explainable resnet50 framework for

Deepfake image and video detection

Chapter 54 101

The Evolution of Artificial Intelligence in Human Resource

Management From Automation to Generative AI

Chapter 55 102

Sleep well predictor

Chapter 56 103

HKT-MOP: A Hierarchical Multi-Outcome Knowledge Tracing Model for Programming Performance Prediction on According

Chapter 57 104

Predicting Marital Satisfaction in Indian Marriages Using Machine Learning on Synthetic Data Based on NFHS-5 and IHDS-II: A Socio-Cultural Feature Engineering

Chapter 58 105

Agriculture and food

Chapter 59 106

Profiling Consumer to Consumer E-Commerce using Facebook

Chapter 60 107

The role of artificial intelligence in shaping investment patterns

among working women: evidence from Bangalore city

Chapter 61 108

Democratizing Pedagogy: How Technological Advancement is Diversifying Finance Teaching

Chapter 62 109

AI Integrated Smart Concrete Monitoring and Predictive Failure System

Chapter 63 110

Bounties, Virtue, and Governance Failure:

A Conditional Ethics of Incentivized Whistleblowing in Financial Regulation

Chapter 64 111

Work–Life Integration as a Catalyst for Faculty Well-Being, Job Satisfaction and Engagement: A Conceptual Framework

Chapter 65 112

AI Agents for Autonomous Cybersecurity

Chapter 66 113

The Hybrid Deep Learning Framework for Cardiovascular Disease Prediction Using Clinical Data

Chapter 67 114

The Role of Artificial Intelligence in Marketing: A Conceptual Study of Consumer Purchase Behavior in the Retail Sector

Chapter 68 115

Business and entrepreneurship: catalyst for innovation, employment, and inclusive economic growth

Chapter 69 116

Multi-Model Machine Learning Approach to Housing Unit Price Prediction and Market Segmentation

Chapter 70 117

Quantifying the Stability–Scalability Trade-off of First Order and Quasi-Newton Optimization Methods under Controlled Conditioning

Chapter 71 118

Federated Learning for Privacy Preserving AI

Chapter 72 119

What Drives Students Choice of Higher Education Institutions:

An Empirical Analysis of Behavioral and Institutional Factors

Chapter 73 120

Development of a Machine Learning Model for Assessing the Impact

of Dust Accumulation on Solar Panel Performance

Chapter 74 121

An Architecture-Aware Deep Transfer Learning Framework for Robust Multi-Class Lung Disease Classification

Chapter 75 122

Corrosion behavior and life cycle analysis of marine brown seaweed gel as admixture in sustainable concrete - A Review

Chapter 76 123

Occupational Stress and Stress Management Practices among Employees in the Electronics Manufacturing Industry in Chennai India

Chapter 77 124

KAIZY: A Resource-Efficient AI Agent Architecture Using Relational Retrieval and Multi-Provider LLM Failover

Chapter 78 125

AI-Based Pavement Failure Prediction and Preventive Maintenance Using Machine Learning

Chapter 79 126

Design and Modeling of improved MPPT control for solar powered vehicle with Battery storage

Chapter 80 127

Artificial Intelligence and Machine Learning-Driven Personalization: A Bibliometric-Systematic Literature Review and Future Research Agenda 128

Chapter 81

Marine Entrepreneurship in the Blue Economy: Emerging Opportunities, Innovative Business Models, and Challenges for Sustainable Growt 129

Chapter 82

The Influence of Social Media Marketing on Gen Z Purchase Decisions

Chapter 83 130

Federated learning with differential privacy for collaborative model training over heterogeneous edge devices

Chapter 84 131

Adapting Quality-Controlled Class-Conditional Diffusion Augmentation for Few-Shot Hazardous Waste Subclass Classification

Chapter 85 132

AI Driven Groundwater Recovery Time Estimation and Sustainable Recharge Planning

Chapter 86 133

Development of Carbon Fibre Based Self-Sensing Concrete for Structural Health Monitoring

Chapter 87 134

Experimental Study on Thermally Insulated Lightweight Concrete and Strength Prediction Using Random Forest Regressor

Chapter 88 135

A Review of ANN Based Performance Evaluation of Self-Healing

Concrete with Bacteria and Fungi

Chapter 89 136

AI construction cost regression

Chapter 90 137

Predicting Marital Satisfaction in Indian Marriages Using Machine Learning on Synthetic Data Based on NFHS-5 and IHDS-II: A Socio-Cultural Feature Engineering

Chapter 91 138

AI-Powered Marketing Personalization and Consumer Behavior in the Age of Generative and Agentic AI: A Conceptual Framework of Trust, Engagement and Purchase Intention

Chapter 92 139

A Unified Implementation Framework for Neural Networks: Integrating Architecture Selection, Training, Validation, Explainability, and Deployment

Chapter 93 140

Influence of blended learning and AI tools usage on the development of future -ready skills among higher education students

Chapter 94 141

Network Intrusion Detection Using Machine Learning: A Random Forest Approach on the Unsw-Nb15 Dataset

Chapter 95 142

A Statistical Survey on the Usage, Trust, and Impact of ChatGPT among Engineering Students

Chapter 96 143

Occupational Stress and Stress Management Practices Among

Professors in Higher Educational Institutions – An Empirical Study

Chapter 97 144

AI-Driven Sensational Thumbnail Detection Using Comment Sentiment and Transformer Models

Chapter 98 145

A Study on Relationship and impact of Intellectual Property Rights on IPR Learning Outcomes, Career readiness among Commerce Students

Chapter 99 146

Engineering Customer Loyalty with Artificial Intelligence: The Engagement Imperative

Chapter 100 147

IoT-Based Smart Cattle Health Monitoring System: A Proposed Architecture for Real-Time Livestock Health Analytics

Chapter 101 148

AI-Based Adaptive Tsunami Early-Warning, Last-Mile Evacuation

and Non-Evacuee Rescue System for Coastal Communities

Chapter 102 149

AI-Based Automated Evaluation of Handwritten Descriptive Answer Scripts Using Vision-Language OCR and Constraint-Aware LLM Grading

Conclusions 150

CH-1 Transforming Research, Education, Industry, And Society Through Generative AI: A Survey-Based Multidisciplinary Study

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Abstract

Generative Artificial Intelligence (Generative AI) is increasingly influencing the way people conduct research, learn, work, and access services. This study examines the role of Generative AI in transforming research, education, industry, and society, with a focus on Jalgaon City. The study follows a descriptive and quantitative research design and is based mainly on primary data collected through a structured Google Form questionnaire from 120 respondents, including students, research scholars, faculty members, and industry professionals. A non-probability convenience sampling method was used.

The findings show that ChatGPT was the most frequently used Generative AI tool. Respondents identified literature review as the major research activity improved by AI, while personalized learning was considered its major contribution to education. In industry, business automation and marketing and customer service were identified as major areas of influence. Healthcare and government services were among the important societal areas benefiting from Generative AI. Increased productivity and time saving were reported as major positive impacts, while misinformation, privacy, and ethical concerns were identified as key challenges.

Overall, the study indicates that Generative AI has a positive and growing influence across research, education, industry, and society, highlighting the need for responsible, ethical, and informed use of technology.

Keywords: Metaheuristic Optimization, Multi-Objective Optimization, Pareto Front, Multi-Criteria Decision Making, Hybrid Optimization.

CH-2 FloraGuard AI: A Mobile Edge-Computing App for Real-Time Crop Disease Diagnosis and Treatment Suggestions

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Abstract

Early detection of crop diseases is a critical challenge in agricultural research, and while deep learning models have achieved high diagnostic accuracy, their dependence on stable internet connectivity limits practical deployment on real farms. This paper presents FloraGuard AI, a complete mobile application that addresses this gap by integrating an efficient offline AI model, Explainable AI (XAI), and a treatment recommendation system into a single farmer-facing tool. A Transfer Learning approach using EfficientNetV2-B0 was employed to classify 60 distinct crop diseases in real time. The model was evaluated using 5-fold cross-validation on a combined and deduplicated dataset of 42,696 images, achieving an average accuracy of 98.15% (±0.4%) and an F1-score of 0.9811 (±0.005), with on-device inference completed in just 48 milliseconds. Beyond disease identification, the app generates an actionable treatment plan, recommending organic or chemical interventions drawn from a knowledge base built on verified agricultural guidelines. Grad-CAM-based heatmaps were incorporated to improve model transparency, and a field study with 15 farmers and agricultural experts confirmed increased trust in the system's diagnoses and treatment suggestions. An independent in-the-wild evaluation on 200 real farm photographs further demonstrated the model's robustness, while also revealing a measurable accuracy gap between controlled and field conditions. By combining accurate, low-latency, offline inference with practical treatment guidance, FloraGuard AI offers a deployable framework for bridging the divide between agricultural AI research and real-world farm use.

Keywords: Image classification, transfer learning, EfficientNetV2, edge computing, crop disease diagnosis, precision agriculture.

CH-3 Advanced Power Management of Hydrogen Fuel Cell Electric Vehicles Using Supercapacitor-Assisted Energy Storage

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Abstract

The urgent global demand for sustainable transportation has accelerated the development of green hydrogen-powered electric vehicles (GHEVs). This paper presents a modular prototype architecture integrating proton exchange membrane (PEM) fuel cells, a high-efficiency DC–DC boost converter, and hybrid supercapacitor energy storage. The work encompasses the entire hydrogen value chain, including production, distribution, and on-board power management. Emphasis is placed on realistic dynamic load matching, power regulation, and scalability with consideration for operational environment factors. Experimental validation demonstrates that the prototype achieves a power density of 0.32 W/cm² at 80 °C and 3 atm, with an efficiency of approximately 55%, confirming scalability trends comparable to larger commercial PEM stacks. This research provides strategic insights for designing adaptable hydrogen mobility solutions aligned with India's green energy initiatives.

Keywords—Electric Vehicles (EVs), Green Hydrogen Electric Vehicles (GHEVs), PEM Fuel Cells, DC–DC Boost Converter, Hybrid Energy Storage, Fuel Cell Electric Vehicles (FCEVs), Energy Management

CH-4 Decadal Changes in Groundwater Quality of an Urbanizing Semi-Arid Aquifer in Vadodara Western India

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Abstract

Groundwater is the principal source of domestic, agricultural, and industrial water supply in rapidly urbanising regions of India, yet increasing abstraction and anthropogenic pressures threaten its long-term quality. This study presents a decadal assessment of groundwater quality in Vadodara, Gujarat, by comparing historical baseline data (2014–2017) with regional groundwater monitoring records available up to 2026. Six strategically located monitoring stations representing residential, commercial, and industrial areas were evaluated using standard APHA analytical procedures. The assessment focused on key physicochemical parameters, including pH, electrical conductivity (EC), total dissolved solids (TDS), fluoride (F^-), chemical oxygen demand (COD), and hardness.

The results indicate a marked deterioration in groundwater quality over the study period. Fluoride concentrations increased substantially at several locations, reaching 6.90 mg/L at Sama (GW1) and 5.10 mg/L at Baroda Dairy (GW4) in the 2026 comparison dataset, greatly exceeding the Bureau of Indian Standards (BIS) permissible limit for drinking water. Organic contamination also intensified, with COD increasing from 2.0 mg/L to 45.50 mg/L at Gajravadi (GW3), indicating increasing anthropogenic influence. Elevated TDS (2100 mg/L) and high electrical conductivity at Baroda Dairy, together with severe hardness at Gotri, further demonstrate progressive groundwater mineralisation and declining suitability for domestic use. These trends are consistent with intensive groundwater abstraction, urban expansion, and inadequate wastewater management.

The study highlights the combined influence of geogenic processes and anthropogenic activities on groundwater deterioration in Vadodara and underscores the need for integrated groundwater management. Recommended interventions include managed aquifer recharge, strengthened sewage infrastructure, regular groundwater quality monitoring, and community-scale defluoridation measures to protect groundwater resources and public health.

Keywords: Groundwater quality; Urban aquifer; Semi-arid region; Fluoride contamination; Hydrogeochemistry; Urbanisation; Groundwater monitoring; Vadodara; Western India.

CH-5 Decoding Parkinson's Disease from EEG Signals: A Systematic Review of Machine Learning and Deep Learning Frameworks

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Abstract

Parkinson's disease (PD) is the second most common neurodegenerative disorder worldwide, yet it continues to be diagnosed primarily through subjective clinical evaluation - a process that is slow, inconsistent across observers, and largely blind to early-stage disease. This paper reviews some studies published between 2021 and 2026, drawn from IEEE Xplore, IOP Publishing, Elsevier, and Springer, all of which examine automated PD diagnosis using EEG signals combined with machine learning (ML) and deep learning (DL). Across these studies, a regular methodological pattern emerges: Researchers convert raw 1D EEG time-series into 2D time-frequency representations (spectrograms) using transforms such as Gabor, Morlet Wavelet, Wavelet Scattering (WST), Smoothed Pseudo-Wigner-Ville Distribution (SPWVD), and the S-transform. Then classify the resulting images using hybrid deep learning models. Hybrid architectures particularly CNN-Transformer pipelines and Densely Linked Bidirectional LSTM (DLBLSTM) networks consistently achieve accuracies above 95%, sometimes reaching 99.97%. They outperformed standalone CNNs by roughly 4-6% and traditional ML methods by up to 9%. A key finding of this review is that Explainable AI (XAI), when combined with automated channel selection, can reduce the number of EEG electrodes by 50% with almost no loss in diagnostic accuracy, which has significant implications for portable, wearable screening devices. That said, three recurring challenges continue to limit clinical translation: datasets remain small and often homogeneous; the volume conduction effect distorts functional connectivity measurements; and the opaqueness of deep learning models undermines clinician trust. We further examined an emerging body of Graph Neural Network studies which addressed the connectivity-modelling and volume-conduction challenges directly. We concluded this review by identifying Graph Neural Networks for brain-connectivity modeling, multimodal data fusion, and XAI-driven saliency pipelines as the most promising directions for achieving clinically trustworthy, individualized PD diagnostics.

Keywords: Parkinson's Disease, EEG, CNN-Transformer pipeline, Densely Linked Bidirectional LSTM, Graph Neural Networks, Explainable AI, Time-Frequency Representation

CH-6 College Student Performance Analytics and Placement Prediction Using Machine Learning

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Abstract

Educational institutions generate large volumes of student data through academic records, attendance, assessments, skill development activities and placement processes. However, effective utilization of these data for academic and placement decision making remains challenging. This paper presents a Student Performance Analytics and Placement Prediction Framework integrating data analytics, machine learning, clustering and business intelligence visualization. The framework uses an initial dataset of 75 student records and 22 attributes containing academic, behavioral, employability, extracurricular and student-risk related information. A Placement variable is subsequently derived using predefined Previous CGPA, Aptitude Score and Coding Score criteria for the placement classification experiment. Linear Regression is applied for academic performance prediction, Logistic Regression for placement classification, Decision Tree for performance classification, and K Means for student segmentation. A Power BI dashboard is developed to visualize placement outcomes, academic performance, attendance, employability skills, performance categories and dropout risk. Logistic Regression achieved an accuracy of 93.33 percent with a weighted F1 score of 0.93 on the evaluated test set, while Linear Regression obtained an MSE of 1.5467 and an R^2 score of -0.4373. Decision Tree classification achieved an accuracy of 40.00 percent. Since the placement labels were derived using predefined academic and technical criteria, the placement classification result should be interpreted as an evaluation of the defined rule-based labeling scheme rather than as evidence of generalized real-world placement prediction.The results indicate the potential of the proposed framework for student segmentation, placement analysis and data driven academic decision support, while the limited dataset size restricts generalizability.

Keywords— student performance analytics; placement classification; machine learning; educational data analytics; Power BI; student segmentation; academic performance

CH-7 What Actually Fits: Context Selection for Local-First Retrieval on Memory-Constrained Hardware

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Abstract

Running a language model on your own machine keeps your files private, but consumer hardware imposes a context budget that server deployments never feel. We report measurements from a deployed local-first system that indexes a user's files and answers questions over them. Early versions injected whole-project content into every turn: roughly 59K tokens, prompt evaluation in the minutes, mitigated by truncating context to the trailing 8,000 characters. Three findings. First, retrieval-based selection recovers most of the available answer coverage at a small fraction of the prompt: on real repositories a 2,500-character budget reaches 0.79 topic recall against whole-project injection's 1.00, using 23 times fewer tokens with 14.9 times faster prompt evaluation. Second, the trailing-window truncation that several local tools ship is close to worthless on real corpora, 0.12 recall on one repository and 0.00 on another, against 1.00 on a synthetic benchmark, where its apparent success is an artifact of file ordering. Third, and the reason for this paper's framing: a diversity-aware selection rule that improved recall from 0.62 to 0.93 on our synthetic benchmark is corpus-dependent. It gains 0.64 to 0.78 on a document corpus but slightly loses on both code repositories. We give a predictor computable from retrieval alone: where a flat top-k already spans more than about 1.5 clusters, forcing further spread costs relevance; where it concentrates below that, diversifying pays. It separates all four corpora. We also report two measurement faults that each produced a confident false positive in our own results before real corpora exposed them: prompt-prefix caching, which inverts latency comparisons by more than 500 times, and substring-based recall scoring, which under-reports on any corpus whose files exceed one chunk.

Keywords—retrieval-augmented generation; on-device inference; local-first software; context selection; benchmark validity

CH-8 Smart Agriculture Using Artificial Intelligence and IoT: Enhancing Crop Monitoring, Irrigation, and Decision-Making

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Abstract

Agriculture is increasingly challenged by irregular rainfall, water scarcity, changing climatic conditions, rising labor requirements, crop diseases, and the need to improve productivity without increasing the unnecessary use of natural resources. Traditional agricultural practices often depend on periodic manual observation and fixed schedules for irrigation and field management. These methods may not provide an accurate representation of continuously changing soil and crop conditions. The integration of Artificial Intelligence (AI) and the Internet of Things (IoT) provides an opportunity to develop intelligent agricultural systems capable of continuously sensing field conditions, analysing data, predicting future requirements, and supporting farmers in timely decision-making. This paper presents an expanded smart agriculture framework focused on three major functions: crop monitoring, precision irrigation, and intelligent decision support. The proposed system collects data from soil-moisture, temperature, humidity, light, and other environmental sensors through IoT-enabled devices. The collected information is transmitted through a communication network to an edge gateway or cloud platform, where it is cleaned, stored, and analysed. AI and machine-learning techniques are then used to identify patterns, estimate irrigation requirements, detect abnormal conditions, classify crop-related observations, and generate recommendations. The framework also supports automatic or semi-automatic control of irrigation equipment while preserving farmer oversight. The paper explains the architecture, workflow, data-processing methodology, AI techniques, evaluation parameters, advantages, implementation challenges, and future research opportunities. The proposed approach demonstrates how continuous sensing and intelligent analysis can transform agricultural management from reactive manual observation into a more precise, data-driven, and resource-aware process.

CH-9 IoT-Enabled Sensor Applications in Smart Healthcare, Smart Agriculture, Environmental Monitoring and Smart Energy & Safety Monitoring

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Abstract

The Internet of Things (IoT) is becoming a fundamental technology for the development of sensorized intelligent systems in several domains of society. This paper presents a structured literature review on architectures for sensing and intelligence in the scope of four research areas: Smart Healthcare, Smart Agriculture, Environmental Monitoring, and Smart Energy and Safety Monitoring. Recent journal articles, systematic reviews, and conference papers were analysed to report sensor modalities, communication architectures, and learning algorithms, namely machine learning (ML) and deep learning (DL), that have been proposed in literature for each of the above research areas. A consolidated inventory of algorithms that have been reported in the above surveyed works, as well as a comparison of sensing technologies, learning techniques, and their corresponding applications, are also presented. Finally, open challenges that have been found to be recurring, i.e., sensor calibration and drift, energy efficiency, security and privacy, heterogeneous data, and the gap between proof-of-concept prototypes and large-scale scalable and practical implementations, as well as future research directions, are outlined. The purpose of this work is to provide a useful, structured literature review that can serve as a background and reference for researchers interested in sensorized IoT applications using algorithmic approaches.

Keywords: Internet of Things (IoT); Smart Healthcare; Smart Agriculture; Environmental Monitoring; Smart Energy; Safety Monitoring; Sensors; Machine Learning; Deep Learning; Literature Survey.

CH-10 An Intelligent Adaptive Learning Framework Based on Reinforcement Learning for Educational Transformation

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Abstract

Application of reinforcement learning (RL) in the educational context can yield a major change in how students learn and interact with education and how instructors assess student achievement. Application of RL in education enables individualized and adaptive learning, through which level of difficulty can be tailored depending on the performance of a student. Consequently, it may lead to an increase in motivation and engagement by students. The paper will discuss the theoretical basis of the RL and its usage in the field of education with a particular focus on its potential to establish intelligent, adaptive, and personalized learning environments. The dynamic interplay of learners and educational systems that RL facilitates is reward-based and makes it possible to continuously optimize learning trajectories, content delivery, and pedagogical choices. The paper identifies important uses which include intelligent tutoring systems, customized learning processes, classroom control and dynamic educational systems like Reinforcement Learning in Adaptive and Intelligent Educational Systems (RLATES). Moreover, it discusses the advantages of RL in enhancing student motivation, benefiting a diverse group of learners, and maximizing the amount of resources.

Keywords—Reinforcement Learning, Education, Machine Learning, Student, Artificial Intelligence

CH-11 Generative AI-driven Scientific Workflows: A Provenance-centered Framework for Reproducible and Scalable Discovery

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Abstract

Generative AI is widely used in scientific research to assist with literature reviews, hypothesis formation, data analysis, and experimentation. While these capabilities revolutionize discovery, they present reproducibility challenges due to undocumented workflows and human decisions. To address this, we introduce TRACE-Sci, a provenance-based workflow for AI-assisted research. TRACE-Sci treats computational artifacts as auditable objects, linking them to evidence, execution context, and validation results through five components: task identification, evidence anchoring, tool execution, context locking, and risk-based checkpoints. We assessed the architecture using a Monte Carlo simulation across 120 synthetic workflow instances. Compared to direct and tool-augmented LLM workflows, TRACE-Sci achieved a mean provenance completeness of 91 percent, a rerun success rate of 88 percent, and a citation verification rate of 93 percent. The breakdown demonstrates that provenance completeness increases non-linearly with human review coverage. These results suggest that scientific AI systems should be evaluated based on their auditability and reproducibility rather than just task completion.

Keywords—generative artificial intelligence; scientific workflows; reproducibility; provenance; large language models; research agents; human-in-the-loop; computational science Generative AI is widely used in scientific research to assist with literature reviews, hypothesis formation, data analysis, and experimentation. While these capabilities revolutionize discovery, they present reproducibility challenges due to undocumented workflows and human decisions. To address this, we introduce TRACE-Sci, a provenance-based workflow for AI-assisted research. TRACE-Sci treats computational artifacts as auditable objects, linking them to evidence, execution context, and validation results through five components: task identification, evidence anchoring, tool execution, context locking, and risk-based checkpoints. We assessed the architecture using a Monte Carlo simulation across 120 synthetic workflow instances. Compared to direct and tool-augmented LLM workflows, TRACE-Sci achieved a mean provenance completeness of 91 percent, a rerun success rate of 88 percent, and a citation verification rate of 93 percent. The breakdown demonstrates that provenance completeness increases non-linearly with human review coverage. These results suggest that scientific AI systems should be evaluated based on their auditability and reproducibility rather than just task completion.

Keywords—generative artificial intelligence; scientific workflows; reproducibility; provenance; large language models; research agents; human-in-the-loop; computational science

CH-12 Managing the "Gig & Platform" Workforce: Psychological Contracts and Organizational Commitment Among Non-Traditional Workers in the Saurashtra Region of Gujarat State

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Abstract

With a focus on major urban-industrial centers like Rajkot, Jamnagar, Bhavnagar, and Junagadh, this study investigates the structural and psychological dynamics of platform and gig labor in the Saurashtra area of Western Gujarat, India. This study assesses how employee perceptions of organizational obligation, transactional psychological contracts, normative commitment, and turnover intentions are affected by the shift from relational, community-based informal employment to algorithmic management, drawing on Psychological Contract Theory (Rousseau, 1989). The study examines the relationship between digital platform governance (e.g., Zomato, Swiggy, Porter, Rapido, Urban Company) and socio-cultural dynamics (e.g., siddhapana, local trade networks, informal credit dependency) using a structured conceptual framework and qualitative field narratives.

The majority of gig workers in Saurashtra are young, semi-skilled workers leaving low-wage informal manufacturing (such as brass parts in Jamnagar, foundries and engineering units in Rajkot) or agricultural micro-enterprises, in contrast to Western contexts or Indian metropolises where gig work is frequently pursued for flexible secondary income.

The psychological contract—the unspoken, implicit shared expectations between employee and employer—undergoes a paradigm shift when employees switch to app-based platforms.

Keywords: Gig economy, platform labor, Psychological Contract Theory, Algorithmic Management, Normative Commitment

CH-13 TrustGuard A Risk Aware Human Oversight Framework for Safe Autonomous AI Agents

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Abstract

Autonomous AI agents can perform increasingly consequential actions on behalf of users, creating a need for human oversight that is proportional to the potential risk of each action. This paper presents TrustGuard, a lightweight and interpretable risk-aware human oversight framework for AI agents. TrustGuard automatically evaluates proposed actions using five factors: privacy risk, financial risk, data modification risk, irreversibility risk, and external impact. Each factor is scored from zero to five, producing a total score from zero to twenty-five. Based on the score, actions are classified as Low, Medium, or High Risk and mapped to autonomous execution, user confirmation, or human approval. A Python and Streamlit prototype was implemented to demonstrate the framework. The rule-based analyzer was calibrated using 120 development scenarios and subsequently evaluated on a held-out pilot set of 30 new scenarios. TrustGuard correctly classified 27 of the 30 test scenarios, achieving 90 percent accuracy. The results demonstrate the potential of transparent risk-based oversight while also identifying limitations in detecting some security-sensitive and privacy-sensitive actions.

CH-14 Financial Risk Tolerance and Mitigation Mechanism and Its Effects on Investment Decisions Among Women with Reference to Urban Areas in Bengaluru.

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Abstract

This study examines financial risk tolerance, risk mitigation strategies, and the influence of financial literacy on investment decisions among women in urban Bengaluru. A sample of 200 female respondents was surveyed to investigate the impact of these factors on investment behaviour. The results show that 50% of the people who answered the survey have a moderate risk tolerance, 24% have a high or very high-risk tolerance, and 27.5% have a low or very low risk tolerance. A lot of women use risk mitigation strategies. For example, 77.5% of them use portfolio diversification, 72.5% prefer conservative investment choices, and 65% talk to financial advisors. Most of the people (60%) have a moderate level of financial literacy, while 25% have a high level of literacy. This has a big effect on how confident they are about investing in stocks, mutual funds, and digital platforms. Investment behaviour shows a balanced approach, with 75% of people keeping a variety of assets, 70% investing in fixed-income instruments, 65% in mutual funds, and 52.5% using digital platforms. Younger women (20–35 years) are more willing to take risks, are better with computers, and know more about money than older women, who tend to prefer safer, more traditional investments. The research finds that risk tolerance, risk mitigation strategies, and financial literacy all play a role in investment decisions. It also emphasises the need for specific financial education programs, advisory services, and digital literacy initiatives to boost women's confidence and involvement in investing. The results give policymakers, banks, and teachers useful information that they can use to help urban women in Bengaluru become more financially independent and included.

Keywords: Financial Risk Tolerance, Risk Mitigation Mechanisms, Women Investors, Investment Decisions, Financial Literacy, Urban Bengaluru, Investment Confidence, Financial Education

CH-15 Artificial Intelligence for Sustainable Development: Possibilities and Challenges of Multidisciplinary Innovation in Research, Education and Society

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Abstract

This research paper intends to critically review the role of Artificial Intelligence (AI) as a multidisciplinary catalyst for the attainment of the global Sustainable Development Goals (SDGs). The impact of AI today is not just limited to the technological aspect but is broadly changing research, higher education and the whole social ecosystem. AI not only allows individualized instruction and fast assessment, but it also frees teachers from administrative tasks so they can focus on quality teaching. In addition, AI in science and data analysis is giving people new skills for the future and speeding up the pace of knowledge creation. However, the paper also points out that the unregulated use of artificial intelligence, despite its technological advantages, could exacerbate existing social inequalities. The big challenges are algorithmic bias, serious concerns around data privacy, infrastructural gaps and the rapidly growing digital divide. Moreover, increasing use of AI without an appropriate ethical framework can threaten human rights and social justice. In the end, the advantages of artificial intelligence can only be fully achieved if technological innovation is combined [2] with a Human-Centered approach, rather than substituting for human teachers or human judgment. The report also highlights that the value of AI for sustainable development lies not only in technological efficiency but also in how it is developed and used in a human-centred, ethical, inclusive and environmentally sustainable way. Therefore, to be an effective tool for sustainable development, Artificial Intelligence requires the promotion of collaboration across disciplines of knowledge, online literacy and responsible innovation, as well as clear ethical and policy frameworks. Only in this way can we ensure that AI is used not just to serve the demands of the market, but to make a meaningful contribution to inclusive and sustainable human development.

Keywords: Artificial Intelligence, Sustainable Development, Multidisciplinary Innovation, AI in Education, Research and Innovation, Social Transformation, AI Ethics.

CH-16 Automated Classification of Brain Tumors from MRI Scans Using a Custom Convolutional Neural Network

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Abstract

Brain Tumors are among the most life-threatening neurological conditions, and the outcome for a patient depends heavily on how early and how accurately the tumor is identified. Magnetic resonance imaging (MRI) is the tool radiologists rely on most, but reading scans by eye is slow, and different readers do not always agree on borderline cases. This paper describes a custom convolutional neural network (CNN) that was designed and trained from scratch to sort brain MRI images into four categories: (1) Meningioma , (2) Glioma , (3) Pituitary tumor, and (4) No tumor. The network was trained on 5,600 images and tested on a separate, unseen set of 1,600 images, drawn from a combined public dataset of 7,023 scans images which is compiled from the Figshare and Br35H repositories. The architecture is made up of four convolutional blocks with an increasing number of filters (32, 64, 128 and 128), followed by a dense classification head with dropout for regularization, giving a compact model of roughly 496,000 trainable parameters. On the held-out test set the model reached an overall accuracy of 94.0%, with an F1-score of 0.98 for pituitary tumor, 0.95 for scans showing no tumor, 0.94 for meningioma, and 0.88 for glioma, the class the model found hardest to separate from the others. These results indicate that a comparatively small, purpose-built custom CNN, trained without transfer learning from a large pretrained network, can still reach a level of accuracy that is useful as a first-pass screening aid.

Keywords— Brain tumor classification; Convolutional Neural Network; MRI; Deep Learning; Medical image analysis

CH-17 Performance Analysis of Solar Photovoltaic Systems Using Artificial Intelligence: A Comparative Study of MPPT Techniques

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Abstract

Solar photovoltaic power generation is gaining attention as a clean and pollution free energy source due to its innate capabilities and environmental benefits, but achieving high efficiency in PV systems remains difficult, particularly because partial shading creates multiple peaks in the power curve and makes it hard to locate the true maximum power point. This paper looks at maximum power point tracking (MPPT) methods, both the older traditional ones and the newer AI based approaches, and how they compare. Hill Climbing algorithms respond slowly when conditions change quickly and produce more oscillations that are difficult to tune properly. Perturb and Observe (P&O) is one of the most widely used methods because it is simple to implement and needs fewer sensors, though it keeps oscillating near the peak rather than settling at it. Incremental Conductance (INC) works better under rapidly changing environmental conditions since it tracks the maximum power point by comparing incremental and instantaneous conductance but it is more complex to implement than P&O and needs more computation and sensors. An extended traditional MPPT protocol is presented in this paper, clarifying the misconception that P&O and INC are almost identical under steady state and transient conditions, and it is tested using a MATLAB R2021b simulation against a particle swarm optimization (PSO) based MPPT under the same conditions. Once the proposed method gets close to the maximum power point it switches to the P&O method starting from the best fitness point already found, which is meant to reduce the searching time. Looking at the best voltage and power values across the eight iterations recorded, the proposed method reached higher power output than PSO in most cases, although in a few iterations PSO gave close or even higher values, so it is not a clear win every time. The optimal voltage for MPPT ranged roughly between 20 and 45 volts depending on morning or noon conditions, and the tracking line was estimated by linearizing the relationship between panel temperatures and operating voltage. Voltage step size still matters here, too small and it takes longer to reach the MPP, too large and it reaches faster but oscillates more. The output power and current under constant irradiance were also simulated to check tracking performance, which was found to be reasonably satisfactory. Emerging MPPT techniques were not included in this comparison since their algorithms are still developing and changing quickly. Future work should focus on microcontroller and wireless sensor network integration to support real time monitoring and control of PV power generation.

Keywords— Artificial Intelligence; Solar Photovoltaic Syatem; Maximum Power Point Tracking; Perturb and Observe; Incremental Conductance; Particle Swarm Optimizatio;, Partial Shading

CH-18 Intelligent Gesture-Controlled Digital Painting: A Webcam-Based Bimanual Framework for Real-Time Shape Recognition and Correction

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Abstract

Human-computer interaction (HCI) development continues to move the boundaries of digital art making. Still, digital art production still tends to depend too much on traditional input devices like the stylus and the mouse, which can be off-putting to many. This paper introduces "Futuristic Digital Art," a revolutionary AI-based painting software that converts an everyday webcam into a smart and expressive creative artistic device. The system employs real-time vision-based hand tracking to deliver gesture controls in a natural way for brush and color selection, drawing, and other canvas operations. At the heart of its innovation is a powerful auto-correction engine that can identify and refine hand-drawn geometric shapes and letters with great accuracy. Utilizing the MediaPipe framework for stable hand landmark detection and algorithmic solution for gesture recognition and shape identification, the system presents an intuitive, hardware-agnostic solution.This research demonstrates a significant step towards democratizing digital art and interaction by marrying the expressiveness of natural human movement with the accuracy of intelligent computational direction.

CH-19 Comparative Evaluation of AI Models for Financial Decision-Making: Evidence from Credit, Fraud, and Stock Forecasting

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Abstract

Purpose: This research sets out to compare statistical methods, machine learning, and deep learning models across three critical financial domains: credit scoring, fraud detection, and stock price forecasting. The goal is to weigh their predictive accuracy against other vital factors like interpretability, computational efficiency, and regulatory fit, ultimately helping practitioners choose the right AI approach for specific decision-making contexts.

Design/methodology/approach: We employed an empirical comparative framework using real-world, large-scale financial datasets. By testing statistical, machine learning, and deep learning models side-by-side on these three tasks, we assessed them not just on how well they predict, but also on their explainability, speed, and ability to meet compliance standards.

Findings: Our analysis reveals that there is no single "best" model for every scenario. While ensemble techniques and deep learning architectures often deliver superior accuracy when handling complex data patterns, traditional approaches like Logistic Regression and ARIMA remain unmatched in terms of transparency and ease of regulatory approval. Consequently, the choice of model must be driven by the specific needs and trade-offs of the application at hand.

Research limitations/implications: It is important to note that this study focuses on a specific set of financial tasks and datasets. Future work should broaden the scope to include other financial applications, explore hybrid AI models, and track evolving regulatory landscapes to ensure our findings remain robust and generalizable.

Practical implications: For financial institutions, these insights offer a clear roadmap for selecting AI tools. By carefully balancing performance, explainability, efficiency, and compliance, organizations can adopt AI responsibly, leading to better-informed decisions and more effective service delivery.

Social implications: Beyond business metrics, this study advocates for ethical AI adoption. By prioritizing transparency, fairness, and accountability, we aim to bolster public trust while ensuring that practices like fair lending, fraud prevention, and financial decision-making are conducted reliably and equitably.

Originality/value: This paper delivers a comprehensive comparison of statistical, machine learning, and deep learning models across multiple financial use cases. It moves beyond simple performance metrics to highlight the inherent trade-offs between accuracy, interpretability, and deployment feasibility, providing a practical framework for navigating AI model selection in the finance sector.

Keywords: LSTM, artificial intelligence, machine learning, deep learning, credit scoring, fraud detection, interpretability, stock-price forecasting.

CH-20 Human Behaviour : A Psychological Perspective

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Abstract

Human Behaviour is the range of actions, responses, and patterns of conduct exhibited by individuals, which arise from the interaction of biological, psychological, and social factors in response to internal states and external environmental stimuli. An individual's behaviour tends to change across various life phases as they advance, such as from innocence to maturity. However, there are some components that may remain consistent in a person's life, such as personality, character, and genetics. This report highlights the learning of human behaviour through different possible methods and their disadvantages.

Keywords: Human behaviour, Human psychology, Stimuli, Behavioural Study, etc.

CH-21 AI that thinks before it acts: The rise of agentic AI

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Abstract

Artificial Intelligence has advanced rapidly, enabling systems that produce fluent text, code, and other content directly from natural-language prompts, yet conventional prompt-response systems remain limited when a task requires several coordinated steps, since each step still depends on human interpretation and manual sequencing. This limitation has motivated the emergence of Agentic AI, a class of systems capable of receiving a goal, forming a plan, selecting and invoking external tools, taking actions, observing outcomes, and revising their approach accordingly. Rather than a single-turn response, agentic behaviour combines a foundation model with planning, memory, tool use, and feedback mechanisms, shifting the interaction model from "prompt → response" to "goal → plan → act → observe → adapt." This paper examines the architecture, operating principles, and application areas of Agentic AI across software engineering, cybersecurity, education, business automation, healthcare support, and cloud operations, and situates it against conventional Generative AI. Because increased autonomy expands the consequences of an incorrect decision, the paper further examines reliability and security concerns such as prompt injection, excessive permissions, tool misuse, memory poisoning, and cascading errors, and proposes a conceptual SAFE-Agent framework built around secure identity and permissions, adaptive planning, feedback and verification, and explainability with human escalation. The discussion argues that controlled autonomy under continuous human oversight is essential to safe deployment, and that the field's near-term trajectory favours autonomy that expands gradually and verifiably within defined limits rather than unrestricted autonomy. Agentic AI is presented as one of the significant emerging directions in computer science in 2026, whose real-world value depends as much on governance, transparency, and accountability as on raw model capability.

CH-22 A Risk-Based Multi-Layered Cybersecurity Framework for Securing Remote Patient Monitoring Systems

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Abstract

The rapid adoption of Remote Patient Monitoring (RPM) has changed how healthcare is delivered by enabling the continuous collection and remote transmission of physiological and clinical data from patients to healthcare providers. Yet, because of the distributed and varied structure of RPM systems, there are several cybersecurity weaknesses affecting medical devices, local communication networks, cloud platforms, application interfaces, and clinical information systems. This study examines the primary cybersecurity and a cyber-fraud risk associated with RPM and presents a conceptual, multi-layered framework for securing patient data throughout its lifecycle. To carry out the analysis, a structured, risk-based methodology is used to describe the RPM ecosystem, identify threats, prioritize major attack vectors using the DREAD model, and assign identified risks to appropriate security controls. The analysis covers device hijacking, data-integrity attacks, man-in-the-middle attacks, cloud database breaches, ransomware, identity fraud, and other cross-layer threats. Of the threats examined, the cloud database breach received the highest DREAD score of 38 out of 50, followed by device hijacking and ransomware, each with a score of 35 out of 50. Based on these results, a five-pillar security framework is proposed that incorporates a hardware-based root of trust, end-to-end encryption, blockchain-assisted integrity auditing, AI-driven anomaly detection, and Zero-Trust Architecture. This framework offers complementary protection for device identity, data confidentiality, integrity, continuous monitoring, and adaptive access control. The study stresses that RPM cybersecurity is not just a technical necessity but a vital part of patient safety and the resilience of the healthcare system. Since the framework is conceptual, further work should involve implementing it as a prototype and evaluating its effectiveness through controlled experiments.

Keywords: Remote Patient Monitoring; Cybersecurity; Cyber Fraud; Internet of Medical Things; Healthcare Data Security

CH-23 AI-Enabled Proactive Maintenance Program: Securing Industrial Operations, Data Centers, and Personal Computing Systems

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Abstract

The seamless operation of modern electrical,mechanical, and IT infrastructure—ranging from heavy industrial factory motors and corporate manufacturing lines to large-scale enterprise data centers and everyday personal computers (PCs)—is vital for sustained global productivity and data security. Conventional maintenance methodologies are predominantly reactive or rely on rigid fixed-schedule inspections, which frequently result in catastrophic financial losses, prolonged operational downtime, and irreversible hardware or data damage for large industries and enterprises. This paper introduces an advanced, AI-driven predictive maintenance framework engineered to monitor critical hardware health in real time across diverse operational domains, specifically, in heavy industrial setups. The system continuously tracks component vibrations and thermal stress to prevent sudden assembly halts; in enterprise grade data centres. It monitors server thermal thresholds and power stability to avert massive network outages. In personal computing devices, it evaluates hardware degradation trends to prevent unexpected system crashes. By seamlessly integrating Internet of Things (IoT), sensor networks with sophisticated machine learning algorithms, the proposed framework analyses streaming operational telemetry to detect subtle anomaly patterns long before an actual physical breakdown occurs. Empirical evaluations demonstrate that this proactive data-centric paradigm significantly minimizes downtime, optimizes enterprise maintenance budgets, and substantially extends the operational lifespan of hardware ecosystems across both industrial and consumer sectors. By integrating Artificial Intelligence and IoT for real-time anomaly detection, this proactive framework successfully prevents unexpected downtime, optimizes maintenance budgets, and enhances the operational longevity of industrial, enterprise, and personal computing hardware ecosystems.

Keywords: Artificial Intelligence, Predictive Maintenance, Internet of Things (IoT), Data Centers, Real-Time Monitoring, Anomaly Detection, Machine Learning, Hardware Reliability.

CH-24 Consumer Awareness of the Right to Repair concept and its benefits for durable goods

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Abstract

The Right-to-Repair concept has gained increasing importance as consumers, governments, and environmental organizations seek to reduce electronic waste, extend product lifespans, and promote sustainable consumption. Durable goods such as smartphones, laptops, washing machines, refrigerators, televisions, and other household appliances often require repair during their useful life. However, consumers may lack awareness about their repair rights, the availability of spare parts, repair services, warranty conditions, and the economic and environmental benefits of repairing products rather than replacing them. Research design can be adopted, using a structured questionnaire to collect primary data from consumers. Secondary information may be collected from journals, government publications, reports, books, and reliable websites. The study is expected to provide insights into consumer awareness and identify measures that can encourage greater adoption of repair practices. Increased awareness can contribute to longer product lifecycles, reduced waste, cost savings, and more sustainable consumption.

Keywords: Right to Repair, Consumer Awareness, Durable Goods, Product Repair, Sustainable Consumption, E-Waste, Consumer Behavior, Repair Practices, Circular Economy.

CH-25 A Machine Learning Based Multiple Disease Prediction System for Diabetes, Heart, and Liver Disease Diagnosis

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Abstract

The Machine Learning Based Multiple Disease Prediction System is an intelligent healthcare platform designed to assist in early and accurate disease diagnosis using advanced machine learning techniques. In today's fast-paced world, timely detection of diseases is crucial for effective treatment and improved patient outcomes. This system check when a patients can input their symptoms and receive highly accurate predictions, enabling seamless interaction between predictive models. The system utilizes multiple supervised machine learning algorithms, including Support Vector Machine (SVM), Random Forest, Logistic Regression, Decision Tree, K-Nearest Neighbors (KNN), and Naïve Bayes, to analyze patterns in medical data and predict the likelihood of various diseases such as Diabetes, Heart Disease, and Liver Disease. By comparing the performance of different algorithms, the system ensures higher accuracy and reliability in predictions. Healthcare professionals' benefit from faster diagnostic support, while patients receive preliminary insights into their health conditions, reducing delays in treatment. Overall, this models acts as a supportive tool for medical decision making, bridging the gap between traditional diagnostic methods and modern intelligent systems, thereby enhancing healthcare efficiency, accuracy, and reliability.

Keywords—Disease Prediction; Healthcare Analytics; Machine Learning; Medical Diagnosis; Predictive Modeling; Supervised Learning;

CH-26 Greenhouse Farming: Cultivating the Future

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Abstract

Global food systems are under mounting pressure from erratic weather, shrinking arable land, and a growing population that continues to raise demand for reliable harvests. Against this backdrop, greenhouse farming has moved from a niche horticultural practice to a mainstream strategy for producing food under conditions that farmers, rather than the weather, largely control. This paper examines how protected cultivation has developed over time, the engineering and digital tools now shaping it, and the economic, ecological, and policy questions that determine whether the technology can scale responsibly. Evidence is drawn from both international experience and the Indian context, with particular attention to automation, sensor networks, and artificial-intelligence-based monitoring that are reshaping how growers manage their crops. The discussion also considers the social dimension of the shift — new rural jobs, opportunities for women in agribusiness, and the entrepreneurial ecosystems forming around polyhouse cultivation — alongside persistent obstacles such as steep upfront costs, thin technical training, and uneven regulatory support. The paper closes by arguing that greenhouse farming's long-term value depends less on any single technology and more on aligning research, finance, and policy so that the benefits of controlled-environment agriculture reach smallholders as readily as large commercial operations.

Keywords: protected cultivation, sustainable agriculture, controlled-environment farming, climate resilience, agri-technology

CH-27 IOT based Smart IV monitoring system

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Abstract

Intravenous (IV) fluid therapy is widely used in hospitals to administer essential fluids, medications, nutrients, and electrolytes to patients. Conventional IV monitoring largely depends on nurses or caregivers manually observing the fluid level and drip rate, which can be time-consuming and may lead to delayed intervention, especially in busy hospital environments. An empty IV bottle or interruption in fluid delivery can cause serious complications, including air entering the IV line, interruption of medication administration, and discomfort to the patient. To address these limitations, this project proposes an **IoT-Based Smart IV Monitoring System** that provides continuous, real-time monitoring of IV fluid quantity and infusion rate.

The proposed system uses a **load cell** integrated with a suitable amplifier module to continuously measure the weight of the IV fluid bag. Since the weight of the bag decreases as the fluid is administered, the remaining fluid quantity can be estimated from the measured weight. In addition, an **infrared (IR) sensor** is positioned near the drip chamber to detect individual drops and calculate the drip rate in real time. The sensor data are collected and processed by an **ESP32 microcontroller**, which acts as the central processing unit of the system. Based on the remaining fluid quantity and current drip rate, the ESP32 estimates the approximate time remaining before the IV fluid becomes empty.

Unlike conventional systems that generate an alert only when the IV bag is almost or completely empty, the proposed system provides **predictive early warnings**. The estimated remaining time allows nurses to take appropriate action in advance, such as replacing the IV bag, adjusting the infusion, or checking the patient's condition. The system can also transmit monitoring information through an IoT communication network to a suitable monitoring interface, enabling healthcare personnel to observe the IV status remotely. Parameters such as remaining fluid level, drip rate, estimated time to empty, and abnormal infusion conditions can be monitored continuously.

As an additional safety mechanism, the project proposes an **automatic tube-clamping mechanism** for critical conditions. When the system detects a critical state, such as an extremely low fluid level, abnormal drip rate, or potential interruption of infusion, the mechanism can automatically restrict or stop the flow through the IV tube. This provides an additional layer of protection while allowing healthcare personnel to respond to the alert. The proposed system therefore combines **IoT, sensor technology, embedded systems, real-time data processing, predictive estimation, and automated safety control** into a single smart healthcare solution.

The system is designed to reduce the risk of continuous manual monitoring, improve the timeliness of nursing intervention, and enhance patient safety. By providing continuous measurement, predictive alerts, and an optional automatic tube-clamping facility, the proposed IoT-based smart IV monitoring system has the potential to improve the reliability and efficiency of IV fluid management in hospitals, clinics, and other healthcare environments. The prototype can further be enhanced using cloud platforms, mobile applications, machine-learning-based prediction, multi-patient monitoring, and integration with hospital information systems for scalable and intelligent healthcare management.

CH-28 Artificial Intelligence Enabled Sustainable Marketing and Consumer Purchase Intention: The Mediating Role of Consumer Trust

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Abstract

Artificial Intelligence (AI) is increasingly changing sustainable marketing by helping organizations develop more targeted and technology-driven green marketing practices. However, the effectiveness of AI-enabled green marketing might depend on the consumers' trust in the sustainability-related information provided by firms. The study investigated the impact of AI-enabled green marketing on green purchase intention with consumer trust as a mediator. The proposed relationships were tested using a quantitative research design and Structural Equation Modeling (SEM) on 250 Indian consumers. The results show that AI-enabled green marketing has a positive effect on green purchase intention and consumer trust, and consumer trust significantly mediates the relationship between AI-enabled green marketing and green purchase intention. The study emphasizes the importance of consumer trust in converting AI-enabled sustainable marketing practices into higher green purchase intentions

CH-29 Sustain-X: A Non-Compensatory Composite Index for Community-Scale Water–Energy–Food–Biodiversity Resilience

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Abstract

Frameworks that integrate water, energy, food, ecosystems, and circularity already exist in abundance — the WEF/WEFE nexus literature, circular-economy-in-the-nexus studies, community resilience indices such as BRIC and the FEMA Community Resilience Challenges Index, and national composite indices such as the SDG India Index all cover overlapping ground. This paper does not claim to be the first framework to combine these dimensions. Instead, it identifies a narrower, methodological gap: almost all existing composite sustainability and resilience indices — including dedicated water-energy-food resilience indices — aggregate their dimensions compensatorily (typically by weighted arithmetic mean), so that strong performance in one sector can mathematically conceal a critical failure in another. This paper proposes SUSTAIN-X, a community-scale composite index that combines entropy-derived objective weighting, partially non-compensatory geometric-mean aggregation across four essential-resource domains (water, energy, food, and biodiversity/ecosystems, each internally infused with circularity and climate-sensitivity indicators), and an explicit threshold-floor rule that flags critical deficiency in any single domain regardless of the composite score. A worked numerical illustration shows that compensatory aggregation and geometric-mean aggregation alone can both mask a collapsed domain that the threshold-floor rule exposes. A replicable case-study design is proposed for the Chennai Metropolitan Area, India, using only public secondary data. The paper presents the framework, index construction methodology, research questions, a proposed case-study design, expected result patterns, and limitations, and positions the contribution relative to closely related prior work.

Keywords: Composite index; community resilience; water-energy-food nexus; circular economy; climate adaptation; entropy weighting; non-compensatory aggregation; SDG

CH-30 Energy-Aware and Privacy-Preserving Federated Learning for IoT Botnet Detection at the Edge

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Abstract

The proliferation of Internet of Things (IoT) devices has created an expansive attack surface that botnets routinely exploit to launch large-scale distributed denial-of-service (DDoS) campaigns and intrusive scanning operations. Conventional cloud-centric detection approaches require continuous transmission of sensitive network traffic to central servers, raising concerns about bandwidth consumption, latency, and privacy. Federated learning (FL) offers a decentralized alternative by enabling collaborative model training across edge gateways without exposing raw data. However, standard federated averaging imposes uniform computational and communication burdens on resource-constrained IoT edge nodes and does not inherently protect against information leakage from shared model updates. This paper proposes an energy-aware and privacy-preserving federated learning framework specifically designed for IoT botnet detection at the edge. The framework introduces a budgeted client participation mechanism that selects edge gateways based on cost-utility trade-offs, thereby reducing per-round communication and computational overhead. Additionally, it applies calibrated Gaussian noise and gradient clipping to local model updates before transmission, providing a formal differential privacy guarantee while preserving detection utility. Raw network traffic and extracted features remain confined to local gateways, ensuring that only protected, sparsified updates are communicated to the aggregation server. Evaluation is performed on publicly available IoT botnet corpora partitioned by physical device, capturing realistic non-independent and identically distributed (non-IID) data distributions. The study reports security-relevant metrics including recall, macro-F1, and false positive rate, alongside communication volume, participating clients, and a transparent energy proxy. Experimental results demonstrate that the proposed approach achieves competitive botnet detection performance while substantially improving energy efficiency and privacy guarantees compared to centralized and standard federated baselines.

CH-31 A Study on Green Technology Integration for Sustainable Smart City Development: A Comparative Study of Chennai and Mumbai.

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Abstract

Rapid urbanisation is transforming cities across the world, creating both opportunities and challenges for sustainable development. This project presents a comparative study of the urban infrastructure of Chennai and Mumbai and examines how these Indian metropolitan cities can learn from successful global models such as Singapore, Copenhagen and Dubai.

Chennai and Mumbai are important economic and urban centres of india, but both face infrastructure challenges such as traffic congestion, road maintenance, flooding, waste management, water management and increasing energy demand. Chennai has started to be adopting smart technology as solar power, smart public transport and green infrastructure. Mumbai, with its large and complex metropolitan system, extensive transport, housing, road and utility networks, but coordination between different different authorities remains a major challenge.

The study compares the challenges with international approach. Singapore's waste to energy system demonstrates waste can be converted into electricity.

As global urbanisation accelerates modern cities face acute pressure regarding energy consumption, environmental degradation and resource management. The Green technology in Chennai's regular infrastructure. Transformative paradigm to address these urban sustainability challenges.

This paper explores the in integration of Internet of Things infrastructure, artificial intelligence, and renewable energy systems into urban design to optimize resource efficiency, lower carbon footprints, and enhance quality of life.

Keywords: smart cities, Chennai, Mumbai, green technology, urban infrastructure, sustainable development, waste to energy and global comparison

CH-32 The Influence of AI Knowledge Acquisition on the Perceived Competence of Gen Z in Southern Kerala

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Abstract

The dependence of AI is increasing worldwide. Every corner of the world is exploring the multi-nuances of artificial intelligence. Recent news articles and review of literatures are saying that gen Z population are increasingly using AI for everything they are doing like education, job and daily activities. In Kerala itself, the number of gen Z population relying upon generative AI is of 91 to 93 percentage. This statistical data is a clear indicator of the ability of gen Z population in using AI effectively and productively.

This study explores AI literacy of generation Z population of the southern Kerala on the basis of AI awareness, usage, evaluation and ethics. Along with that the degree of association between AI literacy and perceived competence is also measured, where perceived competence is the that competence is one of three fundamental psychological needs essential for optimal functioning and well-being. The concept is evolved from the thought that AI should also be used for the benefit of competence of the self by the youth along with other usages.

The ability to master the skills required for studies and target job, skillset to handle complex challenges and demands in academic coursework and future job, ability to achieve goals and building a strong career foundation and the ability to meet expectations and perform successfully and applying what learned in the job context are considered here to measure the perceived competence of the gen Z of Southern Kerala.

The study uses a systematic research methodology for establishing this relationship. A sample size of 145 is deployed for the study along with valid questionnaire on AI literacy and perceived competence. The study reveals that there is a high degree of AI literary among the youth of southern Kerala and there is a strong degree of association between AI literacy and perceived competence among the gen Z of the southern Kerala. This study is robust by means of impactful content as well as the use of apt methodology for its objectives.

Keywords: AI Literacy, Perceived Competency, Generation Z, Southern Kerala

CH-33 An Explainable Multi-Source Machine Learning Framework for Early Prediction of Service Degradation in IoT and Smart Systems

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Abstract

Internet of Things (IoT) and smart systems have become essential components of modern digital infrastructure, supporting smart homes, buildings, industrial automation, intelligent transportation, environmental monitoring, healthcare, energy management, and connected public infrastructure. These systems rely on continuous interaction among heterogeneous sensors, edge devices, gateways, networks, cloud services, and application platforms. Service degradation in any layer can affect responsiveness, data availability, decision-making, and overall reliability. Conventional monitoring approaches primarily use static thresholds and generate alerts after performance deterioration becomes evident. This paper proposes an Explainable Multi-Source Machine Learning Framework for Early Prediction of Service Degradation in IoT and Smart Systems (EML-IoT-SD). The framework integrates heterogeneous operational telemetry, including sensor transmission rate, network latency, packet loss, CPU and memory utilization, gateway response time, edge workload, cloud response time, connected devices, communication errors, battery level, and historical incidents. A hybrid prediction architecture combines tree-based machine-learning models for structured features with Long Short-Term Memory (LSTM) networks for temporal dependency learning. An ensemble risk score is interpreted using SHAP-based explainability to identify major factors contributing to each prediction. The framework classifies future system states into Normal, Warning, and Critical levels and supports early intervention across diverse and continuously evolving operational environments. The methodology addresses fragmented monitoring data, limited temporal modelling, and insufficient interpretability. Evaluation will use real or controlled IoT telemetry and metrics including precision, recall, F1-score, ROC-AUC, PR-AUC, false-alarm rate, inference latency, and prediction lead time. The proposed framework provides a practical foundation for proactive, intelligent, and explainable reliability management of IoT-enabled smart systems.

Keywords: Internet of Things, smart systems, artificial intelligence, machine learning, service degradation, predictive analytics, explainable artificial intelligence, SHAP, LSTM, XGBoost, IoT reliability.

CH-34 Transforming HR practices: Integrating Diversity, Equity, and Inclusiveness for an Inclusive Workplace

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Abstract

Diversity, Equity, and Inclusion (DEI) is a comprehensive framework focusing on balancing the workforce in organizational settings that foster equitable access to opportunities and resources at the workplace. The present study synthesizes existing literature and empirical studies that highlight the significance of aligning Diversity, equity, and inclusiveness at the workplace. The primary aim of this paper is to explore the essential strategies to be redefined for the successful implementation of DEI initiatives for the inclusive workplace. It had identified the spectrum of strategic HR practices, such as HR Policies & HR Practices, Leadership behaviour, Decision making process, and Sustainability workforce. The four strategic dimensions in the study provide a broader implication for organizational practices. Emphasizing diversity, equity, and inclusiveness are essential for an inclusive workplace.

Keywords: Diversity, Equity, Inclusiveness, HR Practices and inclusive workplace

CH-35 Edge-Lite: A Lightweight Task-Aware Prompt Compression Framework for Scientific Question Answering

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Abstract

Large language models are increasingly used for scientific question answering and educational support, yet their repeated invocations incurs substantial energy and memory costs that are prohibitive on resource-constrained academic hardware. Existing prompt compression methods typically rely on auxiliary neural networks or GPU resources, rendering them unsuitable for pure CPU environments with strict memory limits. This paper presents Edge-Lite, a lightweight task-aware prompt com-pression framework designed specifically for scientific question answering under these constraints. The system combines sparse TF-IDF feature extraction, a multiclass logistic-regression task router, short academic prompt templates, and a deterministic TF-IDF×position scoring mechanism followed by greedy token pruning. All components operate exclusively on CPU, require only tens of kilobytes of trainable parameters, and remain fully offline after a single training pass. Evaluated on the complete SciQ, ARC-Challenge and ARC-Easy datasets, Edge-Lite achieves a mean token reduction of 48.8% while retaining 80.3% keyword-preservation accuracy, substantially outperforming truncation, random pruning and frequency-based baselines at the same budget. The router occupies 31 KB, peak pipeline memory stays under 560 MB, and mean inference latency is 0.45 ms per query. Ablation studies confirm that both task-aware routing and key-word protection are essential for the observed accuracy-reduction trade-off. The results demonstrate that effective, reproducible prompt compression for scientific workloads is attainable without GPUs or large auxiliary models.

Index Terms—prompt compression, green AI, edge computing, scientific question answering, CPU-only inference, task-aware routing

CH-36 Identification of Nymphaea lotus (Indian Lotus) using machine learning algorithm

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Abstract

In this work, a rare medicinal plant of nymphae lotus (Indian lotus) with medicinal properties is identified by taking the properties of the plant and studying the same for identification using machine learning algorithm of random forest algorithm with water lilies and other similar plants grown in water. The algorithm would identify the plant given the plant details similar to IRIS data identification.

CH-37 Twin Grow: A Cloud-Based AIoT Digital Twin System for Intelligent Mushroom Farming

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Abstract

Growing mushrooms demand a close regulation of climate conditions including temperature, humidity, CO 2 level, light intensity, and moisture in the substratum.

Nevertheless, a lot of farms still use manual control and reactive changes, which result in irregular production and the waste of resources. In a bid to overcome such issues, the current paper presents TwinGrow, a cloud-based AIoT Digital Twin that will help to monitor the environment of mushroom cultivation in real-time and predict as well as control its conditions automatically. The system will have a combination of IoT sensors like DHT22, MQ-135, LDR, and soil moisture sensor and ESP32 microcontroller as the edge controller. Sensor data is sent to AWSiot core, placed in dynamoDB and run on machine learning models with AWS sage maker. Digital Twin developed uзing AWS TwinMaker is a visualization and predictive environmental will replica of the cultivation chamber. The controlled use of mist generators, fans, and pumps, on a closed-loop system, are controlled by automated applications using AWS Lambda and Node-RED. The efficacy of Alo T-oriented ɜmart agriculture using experimental outcome indicates better environmental conditions, low water and energy usage, and predictable yields.

CH-38 Risk and Return Analysis: Performance Evaluation of Select Mid and Small Cap Mutual Fund Schemes

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Abstract

The mutual fund industry has become an integral part of the modern Indian financial system, offering investors with professionally managed, diversified and easy accessible investment opportunities. The researcher made an attempt to evaluate the risk-return performance of selected Mid and Small Cap mutual fund schemes of five top Asset Management Firms in India such as SBI, Kotak, Mahindra, Sundaram, Tata and Quant Mutual Fund across both Direct and Regular Plans. Based on secondary data on Net Asset Value (NAV) gathered from the selected official scheme websites, AMFI and SEBI for the period 1 July 2024 to 1 July 2026, the researcher utilizes risk performance measures to determine the efficiency and reliability of the schemes. The results reveal that Direct Plans consistently performed better than respective Regular Plans based on risk adjusted measures, small cap schemes have been more volatile than mid cap schemes and Sundaram Mid Cap Fund (Direct Plan) achieved the highest Ratio. Finally, with assist of various analyze mutual fund schemes with a mix of return and risk adjusted indicators, opt for Direct Plans and investors can ready to invest in schemes that match their risk profile and time horizon.

Keywords: Mutual Funds, Risk and Return Analysis, NAV, Mid and Small Cap Funds.

CH-39 Artificial Intelligence and Student Readiness for the Future Workforce

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Abstract

Artificial intelligence is transforming the global workforce, requiring educational institutions to prepare students with relevant competencies. Understanding college students' perceptions of the role of AI in education and in their professional development helps to identify institutional readiness and gaps in the curriculum.

The present study examined the perceptions of management college students of Delhi NCR on AI on four dimensions: (1) understanding of AI and its applications; (2) contribution of AI toward knowledge and skill development; (3) fear of job displacement and upskilling needs; and (4) suggestions for curriculum integration.

The study was conducted in several Delhi NCR higher education institutions using a cross-sectional quantitative approach. Convenience sampling was used to collect data from undergraduate students of different domains. An online survey was used to allow access while maintaining the anonymity of the participants.

The survey instrument was developed based on validated questionnaires, using a five-point Likert scale, including four domains, i.e., AI awareness, educational benefits, employment concerns, and curriculum recommendations. For every domain, composite mean scores were computed. To analyse the tested mean differences in demographics in univariate analysis, we used non-parametric tests with Bonferroni correction ($p < 0.05$). Cronbach's alpha was used to assess internal consistency. About 10% of the sample was used for pilot testing to verify the clarity of the instrument. The results showed adequate reliability and performance of the instrument. Following results were obtained: Students' perception of AI as a tool to support learning and skill development was largely positive, but a significant tension was observed: while students acknowledged the value of AI, they also expressed concerns about AI replacing workers, particularly for undergraduates who were concerned about AI replacing faculty.

Students used AI tools to enable learning activities and generate study materials, acknowledging the need for ongoing skill development, but there were significant gaps in formal training, with high use often taking place without the benefit of structured support or curricular integration.

Barriers included financial and technological constraints, especially for students with limited resources and faculty concerns that over-reliance could undermine critical thinking. The gaps can be filled with a staged curriculum integration strategy supported by fundamental workshops. Faculty can use AI to carry out research and prepare lessons, allowing them to engage in higher-order teaching activities and decrease their workload. Colleges and universities need to incorporate AI into their curricula to prepare students for changing job markets. Faculty must undergo rigorous professional development to optimize the use of AI in education. Through these coordinated strategies, addressing technological constraints, providing faculty training, developing ethical guidelines, and standardizing responsible AI use, institutions can navigate the complexities of AI adoption while maintaining educational integrity and ensuring that technological advancement serves pedagogical objectives.

Keywords: Artificial Intelligence, Delhi NCR, Future Workforce, Student Readiness

CH-40 Dual-State Confirmed Women Safety Wearable System Using IoT Sensor Fusion and LLM-Assisted Post-Incident Intelligence

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SRM University

Abstract

Women's safety remains a significant social challenge, with existing wearable safety systems often relying either on manual panic buttons or fully automated anomaly detection. Manual systems become ineffective when a victim is unable to activate the device, while automated approaches based on physiological signals or motion sensing frequently produce false alarms during routine activities such as running, exercising, or emotional stress. To address these limitations, this paper proposes a Dual-State Confirmed Women Safety Wearable System that combines edge-based multi-sensor fusion with a confirmation mechanism to improve emergency detection reliability while minimizing false alerts. The proposed architecture integrates inertial measurement unit (IMU) and photoplethysmography (PPG) sensors for continuous monitoring, GSM-based standalone emergency communication, and cloud-based large language model (LLM) assistance for post-incident reporting.

The wearable continuously analyzes motion and physiological information to compute a threat score using lightweight sensor fusion algorithms executed entirely on the edge device. Rather than immediately escalating every detected anomaly, the system enters a suspected emergency state and activates a silent haptic confirmation window, allowing the user to cancel accidental detections caused by normal daily activities. If no response is received within the confirmation interval, the wearable automatically transmits an SOS alert containing GPS coordinates, timestamps, and emergency status directly through an onboard GSM module, eliminating dependence on smartphones or internet connectivity. This deterministic edge-based design ensures rapid emergency response while significantly reducing unnecessary emergency notifications.

Unlike conventional wearable systems that transmit only location information, the proposed framework incorporates a cloud-based Llama 3.2 model after emergency confirmation to generate structured post-incident intelligence. Instead of processing continuous sensor streams, the wearable uploads a compact event log containing motion anomalies, heart-rate trends, GPS trajectory, confirmation status, and communication metadata. The LLM transforms this

information into a concise incident summary, chronological event timeline, severity assessment, and recommended actions for responders. Because the LLM operates only after emergency confirmation, it remains completely isolated from the real-time detection pipeline, ensuring that cloud processing does not introduce latency into safety-critical decision making.

Experimental evaluation using normal daily activities and controlled emergency simulations demonstrates that the proposed dual-state confirmation strategy effectively reduces false alarms while maintaining low-latency emergency response. Sensor fusion improves robustness compared with single-sensor approaches, and the confirmation mechanism filters accidental detections before emergency escalation. The smartphone-independent GSM communication further enhances reliability in real-world scenarios, while the LLM-generated reports provide responders with meaningful contextual information instead of simple location alerts. Overall, the proposed architecture offers an energy-efficient, explainable, and practical solution for next-generation women's safety wearables by integrating autonomous detection, false-alarm suppression, reliable communication, and intelligent post-incident reporting within a unified system.

CH-41 Comparative Analysis of Machine Learning and Neural Network Models for Sleep Apnea Detection Using ECG Data

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Abstract

Obstructive Sleep Apnea (OSA) is a common sleep disorder characterized by repeated interruptions or reductions in breathing during sleep, which can lead to serious cardiovascular and metabolic complications. Conventional diagnosis primarily relies on polysomnography (PSG), which is expensive, time-consuming, and requires specialized clinical facilities. This study presents an automated and cost-effective approach for detecting sleep apnea using single-lead Electrocardiogram (ECG) signals, providing a lightweight alternative for preliminary screening.

The proposed framework utilizes the PhysioNet Apnea-ECG database, containing 70 long-duration ECG recordings. The signals are preprocessed and divided into 30-second overlapping windows, followed by extraction of twelve statistical and time-domain features, including mean, standard deviation, signal energy, RMS, zero-crossing rate, and heart rate variability measures. The extracted features are standardized and used to train and compare four supervised machine learning classifiers: Random Forest, Support Vector Machine (SVM), Logistic Regression, and Multi-Layer Perceptron (MLP).

The experimental results demonstrate that the Random Forest classifier achieved the best overall performance, obtaining an accuracy of 91%, an F1-score of 0.87, and a ROC-AUC of 0.94. The model effectively distinguishes apnea and normal ECG segments while maintaining robustness against noisy biomedical signals and class imbalance. Feature importance analysis further identifies signal energy, standard deviation, RMS, zero-crossing rate, and HRV measures as important contributors to apnea classification.

To demonstrate practical applicability, the trained model was integrated into a Streamlit-based web application that enables ECG upload, automated preprocessing, apnea prediction, ECG visualization, confidence estimation, and clinical report generation. The proposed system emphasizes interpretability, computational efficiency, and accessibility, making it suitable as a preliminary sleep apnea screening tool. Future improvements can incorporate advanced frequency-domain features, deep learning models, multimodal physiological signals, clinical validation, and IoT or wearable-based continuous monitoring.

CH-42 Intelligent AI Framework for Adaptive Clinical History Tracking

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Abstract

This study focuses on the field of effective communication between the patient and the health care professionals. It is an essential component for accurate clinical assessment. However, patient may describe their health condition using informal, ambiguous fragment, incomplete and in non-medical language, making it difficult from clinician to obtain relevant information during a consultation. The missing information such has symptoms duration, severity, frequency, associated symptoms and triggering factors may require additional questioning and can increase the complexity of the clinical history taking process. Recent research on Natural Language processing (NLP) has demonstrated the ability to extract patient response, symptoms and identify missing information. AI will generate a comparative history of missing identified symptoms and support the dynamically assist clinician throughout the history taking process. The proposed framework analyses the information provided by the patient; identifies the relevant information gap for follow up questions. AI functions as an information support and communication layer rather than an autonomous diagnostic system. Following each interaction, the framework updates the patient information and identifies the remaining gaps. The proposed framework will be evaluated using measured information completeness, preservation, relevant question, supporting important human understanding. This study aims to investigate how interactive AI assistance can reduce information loss during patient-clinician communication and support complete and structured clinical history taking.

Keywords— Artificial Intelligence (AI); NaturalLanguage Processing (NLP); Patient-Clinician Communication; Clinical History Taking; Information Gap Detection; Adaptive Questioning

CH-43 A Study on Digitized Entertainment: Factors Influencing Consumer Adoption of OTT Platforms.

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Coimbatore

Abstract

The rise of digital technology has transformed how people consume and enjoy entertainment. In recent years, Over-The-Top (OTT) platforms have gained significant popularity by enabling consumers to access movies, web series, TV shows, and other digital content from any location at any time. This study aims to understand the factors that drive consumers to adopt and utilize OTT platforms. The study investigates various factors, including content quality, content variety, subscription cost, convenience, accessibility, streaming quality, personalized recommendations, and ease of use. These factors can shape consumer preferences, satisfaction levels, and the likelihood of continued use of OTT services. The study also examines how shifts in entertainment habits, alongside the rising adoption of smartphones and internet services, have driven the expansion of OTT platforms. This study draws on consumer responses and opinions concerning their OTT usage and preferences. The findings are anticipated to offer deeper insights into the factors that drive consumer choices when selecting an OTT platform. The study could also assist OTT service providers in better understanding consumer expectations and enhancing their content, pricing strategies, and overall user experience. In summary, the study underscores the increasing significance of digital entertainment and identifies the key drivers behind consumer adoption of OTT platforms within an evolving media landscape.

CH-44 Skills, Competencies, Ecosystem and Entrepreneurial Success: A Study of MSME's and East and West Godavari districts of Andhra Pradesh

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Abstract

The Indian economy is based on Micro, Small and Medium Enterprise (MSME) with an estimated contribution of nearly third of national output, and massive employment creation, especially in semi-urban and rural areas, in a decentralized fashion. The state of Andhra Pradesh and particularly on East and West Godavari which are the most agriculturally prolific MSMEs have a high concentration of agro-based, aquaculture and food-processing MSMEs whose survival and development is largely hinged on the skills and competencies possessed by their promoters and the friendliness of the entrepreneurial ecosystem. This paper takes a descriptive and analytical survey on current literature in entrepreneurial skills, entrepreneurial competencies and entrepreneurial ecosystem and how these constructs theorised interact in the development of MSME success with particular reference to the East and West Godavari region. Using existing competency frameworks, ecosystem model and Indian policies of MSME, the review classifies the antecedents of entrepreneurial success into three general clusters of individual competency, behavioural ability and ecosystem level enabler, as well as suggests a conceptual framework of integration between these three clusters and the MSME performance outcomes of growth, sustainability, innovation and employment generation. The scarcity of Godavari districts-specific empirical evidence is also reflected in the review, which makes it a significant gap in primary research in the future. Researchers, policy makers and MSME support institutions interested in enhancing entrepreneurship in the region are what the paper is likely to be useful to.

Keywords—Entrepreneurial Skills; Entrepreneurial Competencies; Entrepreneurial Ecosystem; MSMEs; Entrepreneurial Success; Andhra Pradesh; Godavari Districts

CH-45 Consumer Adoption of AI-Enabled Instagram Shopping a Systematic Literature Review

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Abstract

This review examines how artificial-intelligence-enabled features shape consumer adoption of Instagram shopping. It focuses on the cognitive and evaluative processes through which personalization, recommendation, conversational assistance, social content analytics, and AI-supported influencer activity may influence perceived product value (PPV), attitude toward the product (ATP), AI trust (AIT), and purchase-related responses. The review also considers how these relationships may be interpreted in the Indian social-commerce context without treating any single adoption theory as sufficient.

Design/methodology/approach

A systematic literature review was structured around PRISMA reporting principles. Searches were conducted in OpenAlex and Semantic Scholar using combinations of terms for artificial intelligence, machine learning, personalization, recommendation systems, chatbots, Instagram, social commerce, consumer adoption, purchase intention, trust, perceived value, and attitude. The review used database searching, duplicate removal, title and abstract screening, full-text eligibility assessment, and thematic synthesis. Open-web material was used only to supplement India-specific contextual evidence and reporting guidance; it was not treated as a substitute for the academic evidence base.

Findings

The literature indicates that AI features influence adoption through several connected pathways rather than through usefulness or ease of use alone. Personalization and recommendation relevance can increase convenience, engagement, and perceived value, while inaccurate, opaque, or intrusive personalization can activate privacy concerns and weaken trust. Trust frequently operates as a bridge between AI-enabled interaction and purchase intention. Social and relational cues, including influencer interaction, electronic word of mouth, and review quality, add a second layer

to the adoption process. The Indian evidence points to the importance of transparency, affordability, cultural and regional variation, privacy control, and credible social proof. The synthesis organizes these findings through PPV, ATP, and AIT as complementary constructs rather than as components of one exclusive model.

Originality/value

The review contributes a framework-agnostic account of AI-enabled Instagram shopping by connecting platform-level AI affordances with product evaluation, attitude formation, and trust. It also identifies India as a theoretically meaningful setting rather than merely a geographic extension of evidence from mature e-commerce markets. The proposed PPV–ATP–AIT architecture can support future empirical studies while remaining compatible with TAM, VAM, UTAUT, S-O-R, trust, privacy-calculus, social-influence, and consumer-culture perspectives.

Keyword: AI-enabled shopping; Instagram commerce; consumer adoption; perceived product value; AI trust

CH-46 Explainable Multimodal AI for Proactive Human–Robot Collaboration in Industry 5.0 Manufacturing

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Abstract

Industry 5.0 is a manufacturing paradigm shift that puts human-centeredness, sustainability and resilience at the forefront of production, making collaborative robots partners instead of substitutes for humans. However, the current human–robot collaboration (HRC) systems are mostly reactive, meaning that they react to the human's actions after they have happened, thereby reducing safety margins, adding idle time, and restricting productivity gains. This research overcomes the lack of fusion of multimodal human-behavior sensing, short-horizon intention prediction, explainable decision-making and adaptive task planning in a unified human-centric framework. A unified architecture is suggested, in which heterogeneous human behavioral signals are fused together and based on an attention mechanism, a probabilistic representation of near future human intention is estimated. This is complemented by an explainable AI module providing a human-interpretable form of robot decision rationale, as well as an adaptive task planner that takes into account safety, resource efficiency and productivity. A conceptual evaluation methodology is specified, and baseline comparisons and evaluation metrics are specified but not dealt with empirically. The framework is set to assist in moving towards proactive HRC in Industry 5.0 manufacturing environments that are safer, more transparent, and more sustainable..

Index Terms—Human–Robot Collaboration, Multimodal AI, Human Intention Recognition, Explainable AI, Industry 5.0, Smart Manufacturing, Proactive Robotics

CH-47 AI-Driven Digital Twin for Intelligent Energy Management in Net-Zero Smart Cities

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Abstract

Achieving net-zero carbon cities in real-world practice demands deep decarbonization of local energy systems with real-time sensing and predictive analytics capabilities. However, existing smart energy management approaches largely rely on static, rule-based control strategies and lack integrated frameworks that combine real-time IoT sensing, digital twin representation, and adaptive AI-driven decision-making at the district level**.** We propose an AI-empowered digital twin (DT)-based framework for smart energy management in net-zero smart cities with an emphasis on distributed electricity systems. The key innovations of this work include (i) a physically-consistent control loop comprising IoT layer, DT, and AI analytics, (ii) a three-layer DT architecture with the physical layer involving smart meters and distributed energy resources (DER), digital layer with building- and grid-level cyber twins, and an AI layer for predictive analytics and learning-based dispatch, and (iii) a district-level simulation testbed involving 12 net-zero buildings with roof-top PV, storage, and EV charging stations. Our case study with the digital twin of a net-zero district under the rule-based controller revealed that the adaptive AI dispatcher reduced the peak demand by 18.6%, raised the share of renewables in electricity consumption by 24.3%, and decreased the annual carbon footprint by 21.7% compared to the rule-based controller. This work provides insights into how to leverage digital twins and AI for achieving net-zero energy communities.

Keywords—Digital Twin; Artificial Intelligence; Smart Cities; Net-Zero Energy; Reinforcement Learning; IoT; Energy Management System; Renewable Energy Integration

CH-48 AI-Enabled Financial Innovation and Sustainable Algorithmic Trading: A Regime-Adaptive and Cost-Aware Framework for the Indian Stock Market

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Abstract

Algorithms are now being trained for algorithmic trading purposes, but good predictive accuracy does not prove that an AI strategy is capable of earning economical profitable profits. This study addresses the question of whether trading on volatility-regime information and selecting profitable trade improves performance in Indian Stock market. Daily data covering the period Jan 2015-July 2026 is used. The dataset consists of Nifty 50 index and India VIX values and contains 2,868 matched trading days. The year 2015 to 2019 serves as the initial learning history for the strategy, while the period Jan 2020-July 2026 (1634 observations) are tested using the expanded walk-forward out-of-sample framework. An algorithm is employed for next-day Nifty 50 market direction prediction: logistic regression and XG-boost. The trading infrastructure enables decision-making on going long, selling short, or doing nothing (no-trade). Regime-adaptive specification of AI learning makes it possible. Decision confidence thresholds vary dependent on low, moderate, or high volatility levels, in such a way that when the NIFTY VIX is in a regime of low-volatility, confidence requirement for decision for action become low, but when NIFTY VIX is in a regime of high volatility, required confidence becomes high. The overall XG-Boost accuracy (50.55%, R-AUC 0.511) is poor. However, the area under curve is higher in low (0.548) and moderate (0.547) VIX state compared to high VIX (0.456). Block-bootstrap inference suggests that performance in high volatility decreases significantly. However, regime-adaptive trading does not enhance performance versus static AI in risk-adjusted terms. Static and adaptive XG-Boost has annualized cumulative returns of -19.69% and -9.00% respectively, compared to positive returns on passive Nifty 50 and 20/50 moving-average benchmark; and a break-even implementation cost of 3.87 bps. The findings show that AI trading strategies are dependent on the market state but are economically fragile and that the crucial hurdle is deciding whether a prediction is sufficiently reliable and valuable to warrant making a trade.

Keywords—Artificial intelligence; algorithmic trading; NIFTY 50; India VIX; machine learning; volatility regimes; trading abstention; transaction costs.

CH-49 Impact of Delivery-Time pressure on the wellbeing of quick commerce workers

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Abstract

Quick commerce has transformed urban retail by promising the rapid delivery of groceries and household products. This business model depends substantially on delivery workers who operate under strict time targets, app-based monitoring, traffic congestion, customer expectations, and uncertain working conditions. Recent reports indicate that short delivery windows are associated with greater physical strain, urgency, and stress among delivery workers. This paper examines how delivery-time pressure may influence the well-being of quick-commerce delivery workers. Drawing on the Job Demands–Resources model **(Zhang et al., 2022), (Hariharan & Mampra, 2026)** the paper proposes that delivery deadlines, traffic risks, long working hours, customer pressure, and algorithmic monitoring function as job demands that increase work-related stress. Fair earnings, platform support, insurance, safety training, and rest opportunities are proposed as job resources that may protect worker wellbeing. The paper develops a conceptual framework and proposes relationships for future empirical testing. It contributes to the literature by connecting quick-commerce operations with the physical, psychological, and occupational wellbeing of delivery workers.

Keywords: Quick commerce, delivery workers, time pressure, gig economy, worker wellbeing, Job Demands–Resources model

CH-50 From Couch to Code- Understanding the Relationship Between Human Counselling and Digital Therapy among Young Adults in the Digital Era: A Systematic Review

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Christ University

Abstract

The pandemic life was considered to be causal factor for mental health conditions like stress, anxiety, depression, suicide and addiction among young adults. Digital age has changed the way people interact with clients from advertising their services through various social media platforms to choosing a therapist. A lot of interventions, counselling sessions, help line numbers from various private and government sector were introduced to help people who were suffering. The objective of the study is to identify the effectiveness of mental health chatbots, the differences between human counseling and digital therapy among young adults through systematic review, PRISMA (preferred reporting items for systematic review and meta analyses) framework will be used for the selection and analysis method. Reviews will be collected from data sources such as pubmed, google scholar, web of science and scopus, studies published from 2019-2024. The inclusion criteria will be focused on the studies based on the effectiveness of human counselling and digital therapy. Qualitative and Quantitiave findings will be identified using thematic and narrative approaches. The research attempts to compare the efficacy of human and digital approaches by providing valuable insights for counsellors, app developers for digital therapy and policy makers in bridging the gap between human counselling and digital therapy.

Keywords: Human Counselling, Digital therapy, Young Adults

CH-51 A Study on the Role of Human Resource Training Interventions in Improving Quality Control Performance of Employees at Shri Lakshmi Steels and Suppliers

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Abstract

This study focuses on analysing the role of Human Resource (HR) training interventions in improving the quality control performance of employees in the steel industry, with special reference to **Shri Lakshmi Steel Suppliers**. In the present competitive industrial environment, maintaining quality standards is essential for organizational growth, customer satisfaction, productivity, and operational efficiency. The study examines how HR training programs influence employee efficiency, technical skills, productivity, error reduction, problem-solving ability, and adherence to quality standards. Both primary and secondary data were used for the study. Primary data were collected from **110 employees** through a structured questionnaire using simple random sampling. The collected data were analysed using statistical tools such as correlation, regression, and One-Way ANOVA. The findings reveal that HR training interventions have a significant positive impact on quality control performance. Employees reported improvements in technical knowledge, job efficiency, problem-solving ability, defect identification, and productivity after participating in training programs. The study also found a positive relationship between training effectiveness and quality control performance, while organizational support and continuous training contributed to employee satisfaction and improved work quality.

The study concludes that effective HR training interventions play a vital role in developing employee competencies and maintaining high-quality standards at Shri Lakshmi Steel Suppliers. Properly designed and continuously monitored training programs help employees perform their duties more accurately and efficiently, reduce errors, improve productivity, and strengthen quality control practices. Therefore, organizations should treat training and development as a strategic investment that supports employee performance, operational excellence, and long-term organizational success.

CH-52 Smart College Management System

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Mit Academy of Engineering Pune

Abstract

In college, there are many small activities that take place, such as club events, tech events, or non-tech events, as well as keeping track of assignments and events. But most of the time, this information is not available in one place, and sometimes, due to a lack of

communication, it does not reach the needed ones. Because of that, students get confused, or miss updates, and even teachers have to repeat the same information again and again, or sometimes they don't get a chance to attend the particular.

In our project, we tried to solve this problem simply. We built a Smart College Management System, which is a web-based platform where students and teachers can access useful

information in one place, with notifications. The idea was not to make something very complex, but tried to make something which is useful in college life.

We also added a chatbot feature. It helps users by answering common questions, so they don't have to depend on others for small doubts. Along with that, we included a reminder system that sends emails for important updates like deadlines or events. This is an easy way, and every individual gets updated.

While working on this project, our main focus was to keep everything simple and easy to use. The system helps reduce confusion and makes things a bit more organized. Overall, it is a small step towards making college work easier.

CH-53 Deepguard: An Explainable Resnet50 Framework for deepfake Image and Video Detection

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Abstract

A photograph shared online today can be transformed into a highly realistic artificial identity within seconds, making it increasingly difficult to distinguish authentic media from AI-generated content. This growing threat creates serious challenges for digital trust, misinformation control, and forensic media verification, particularly when synthetic content undergoes compression or other forms of post-processing. To address this problem, this paper proposes an efficient deepfake detection framework that first detects and extracts facial regions from input images and videos, then applies ResNet50-based transfer learning to learn discriminative spatial features associated with manipulation. The framework uses a customized classification layer for binary authenticity prediction, while video detection is performed through frame-level analysis followed by prediction aggregation. Grad-CAM is incorporated to provide visual explanations of the regions influencing the model's decisions. The dataset consists of authentic and AI-generated images, resized to 224×224 pixels and enhanced using augmentation techniques such as rotation, flipping, and scaling. The model is trained using the Adam optimizer with a learning rate of 0.0001, batch size of 32, 20 epochs, and binary cross-entropy loss, with a 70:30 training-validation split. The proposed system is implemented as a web-based application using Streamlit, with Firebase Authentication and Cloudflare protection for security. The evaluation uses accuracy, precision, recall, and F1-score, while the reported validation curve reaches approximately 92% performance after the tenth epoch. Grad-CAM further improves interpretability by highlighting image regions that influence predictions. The framework demonstrates potential as an automated approach for reliable synthetic-media authentication and can support efforts to reduce misinformation and improve the credibility of digital media in social media and journalism.

Keywords: Deep Learning; Digital Media Authentication; Face Detection; Forensic Analysis; Generative Learning; Image and Video Analysis; ResNet50

CH-54 The Evolution of Artificial Intelligence in Human Resource Management from Automation to Generative AI

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CMR University

Abstract

Artificial Intelligence (AI) has been integrated into Human Resource Management (HRM) practices, transforming from automating administrative tasks to algorithmic decision-making, AI-enabled augmentation, and Generative Artificial Intelligence (GenAI). This study aims to review the progress of AI in HRM, identify its applications, benefits, and challenges, and discuss future trends. An integrative review methodology was used to explore the literature on AI-enabled HRM, algorithmic HRM, AI augmentation, and Generative AI. From the reviewed literature, the study determined the evolution of AI in four stages: HR automation, algorithmic and predictive HRM, AI-enabled augmentation, and Generative AI. In addition, the review uncovered that human-AI collaboration is a developing trend and will be a critical aspect of

future HRM practice. According to the study, the application of AI in recruitment, training, and

development, performance management, and employee experience is likely to benefit organisations by improving efficiency and productivity. However, the reviewed literature highlighted various challenges, including biases, privacy concerns, transparency, accuracy, trust, and the need for human judgment in AI-enabled HRM. Thus, this study provides an integrated view of the evolution of AI in HRM, its potential benefits and challenges, and future trends. Overall, the study provides an insight into the future of AI-enabled HRM, indicating that its success will depend on organisations' responsible implementation, workforce AI literacy, and collaboration between humans and AI.

Keywords: Artificial Intelligence, Human Resource Management, Generative Artificial Intelligence, Human-AI Collaboration.

CH-55 Sleep well predictor

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MIT Academy of Engineering

Abstract

The increasing dependence on smartphones among teenagers has negatively impacted sleep quality. This study presents a machine learning-based system that predicts sleep quality by integrating smartphone usage behavior, pre-sleep screen exposure, psychological factors, and lifestyle attributes. A weighted Sleep Quality Score is developed to classify individuals into Good, Average, and Poor sleep categories. Several machine learning classifiers are evaluated, with Logistic Regression achieving the highest and most balanced performance. The model is further implemented as an interactive Streamlit application for real-time prediction of sleep health. The results emphasize the importance of combining digital behavior and mental health indicators for early detection and prevention of poor sleep habits among teenagers.

CH-56 HKT-MOP: A Hierarchical Multi-outcome Knowledge Tracing Model for Programming Performance Prediction on Accoding

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University of Allahabad

Abstract

Knowledge tracing (KT) supports adaptive learning by estimating learners' evolving knowledge states from sequential interaction data. In programming education, conventional binary correct–incorrect formulations omit rich diagnostic feedback generated by online judges, including compilation errors, wrong answers, time-limit exceedances, and accepted solutions. This paper presents HKT-MOP, a Hierarchical Knowledge Tracing model for Multi-Outcome Programming assessment. HKT-MOP represents programming submissions through a shared sequential encoder and two prediction heads that reflect the operational hierarchy of online judging: a compilation head predicts whether a submission results in a compilation error or a compiled state, while a conditional execution head predicts the outcome of compiled submissions. The model is evaluated on a processed subset of the ACcoding online-judge dataset using binary and multiclass Deep Knowledge Tracing (DKT) baselines. Evaluation considers both a standard random 70–15–15 split and a realistic domain-shift setting in which models are trained on daily practice submissions and evaluated on contest submissions. Under the standard setting, HKT-MOP attains 92.74% compilation accuracy and 61.97% execution accuracy. Under daily-to-contest domain shift, its compilation head retains 88.34% accuracy, corresponding to a 4.40 percentage-point decrease, compared with drops of 8.38 and 9.44 points for binary and multiclass DKT, respectively; this accuracy-based advantage is more modest when measured by macro-F1. The findings indicate that explicitly modeling the compilation–execution structure improves interpretability and yields a smaller accuracy drop for the compilation head under realistic distribution shift.

CH-57 Predicting Marital Satisfaction in Indian Marriages Using Machine Learning on Synthetic Data Based on NFHS-5 and IHDS-II: A Socio-Cultural Feature Engineering

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Abstract

This study presents a machine learning framework for predicting marital satisfaction, categorized as High, Medium, or Low, in Indian marriages using socio-cultural and demographic features derived from a synthetic dataset of 10,000 records modeled on the marginal distributions of the National Family Health Survey-5 (NFHS-5) and the Indian Human Development Survey (IHDS-II). The dataset incorporates culturally relevant attributes such as marriage type, age at marriage, parental approval, caste match, dowry exchange, income level, and years since marriage, alongside demographic and household-level variables including gender, education, religion, urban or rural residence, and inter-caste or inter-religion status. A structured preprocessing pipeline was employed, comprising missing-value imputation, one-hot and ordinal encoding, construction of domain-motivated interaction terms (such as caste and parental approval, and dowry and income), numeric feature scaling, and a stratified 80:20 train-test split. Four predictive models, namely Logistic Regression, Random Forest, XGBoost, and LightGBM, were trained using stratified five-fold cross-validation with GridSearchCV for hyperparameter optimization, and evaluated on a held-out test set of 2,000 samples using accuracy, precision, recall, and F1-score. Among the models compared, Random Forest achieved the highest predictive accuracy of 90.2 percent, followed by XGBoost at 88.9 percent and LightGBM at 88.4 percent, while Logistic Regression achieved the lowest accuracy of 73.4 percent, underscoring the importance of modeling non-linear and conditional socio-cultural effects. Permutation importance analysis identified parental approval and dowry-related variables as the most influential predictors of marital satisfaction, followed by inter-caste status, years since marriage, and education level. The study further presents an operational ethical risk-management framework covering the identification of sensitive attributes, fairness assessment, bias mitigation, and ongoing monitoring and governance, given the sensitivity of variables such as caste and dowry. The work concludes that tree-based ensemble methods, particularly Random Forest, offer a favorable balance of predictive accuracy and interpretability for socio-cultural marital satisfaction tasks, while emphasizing that ethical governance and fairness-aware modeling practices are essential prerequisites before any deployment of such models beyond academic research.

Index Terms: Marital Satisfaction, Random Forest, XGBoost, LightGBM, Feature Engineering, Ethical AI.

CH-58 Agriculture and food

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Abstract

Agriculture and food technology together form an important part of the modern agrifood system, connecting crop production with harvesting, processing, preservation, packaging, distribution and consumption. Increasing population, climate variability, water scarcity, food losses and changing consumer expectations create a need for efficient and sustainable technologies. This review examines the role of modern technologies across the agricultural and food value chain. In agriculture, precision farming, Internet of Things sensors, Artificial Intelligence, remote sensing, drones and smart irrigation can support data-driven decisions and efficient resource use. In food technology, improved processing, cold-chain management, non-thermal preservation, intelligent packaging and digital traceability can improve food safety, quality and shelf life. The review also discusses post-harvest losses, food waste, sustainability, challenges of technology adoption and future directions. The overall finding is that technology is most useful when it is affordable, reliable, context-specific and supported by farmer and food-industry skills. An integrated approach from farm to fork can improve productivity, reduce avoidable losses and contribute to more resilient and sustainable food systems.

Keywords—Agriculture; Food Technology; Precision Agriculture; Artificial Intelligence; Internet of Things; Food Processing; Food Preservation; Smart Farming; Sustainability

CH-59 Profiling Consumer to Consumer E-Commerce using Facebook

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Abstract

Modern retailing is being shaped by consumer-to-consumer (C2C) electronic commerce, or e-commerce. Although social media as an economic vehicle can result in varying customer value and, therefore, has the potential to create customer interactions that lie outside the reach for conventional C2C e-commerce actors, though a large amount of C2C e-commerce occurs on social media-driven platforms (like Facebook), it has remained a largely unexplored area of study. Therefore, this paper's goal is to discover and investigate various C2C e-commerce consumer profiles on social media.

The data obtained from a quantitative study that focuses on C2C e-commerce is analysed using cluster analysis and confirmatory factor analysis.

We offer and analyse four distinct customer profiles: apathetic, salvagers, bargain seekers, and enthusiasts. These profiles show how valuable it is for consumers to trade used things with other Facebook members.

Only one city data is captured. The ability to be generalized of the results may be impacted by cultural variations in opinions of Facebook's function and C2C online buying. Self-reported data served as the foundation for the cross-sectional data set.

According to the study, social media can provide a unique environment for consumer-to-consumer (C2C) electronic commerce, which could lead to distinctive customer experiences. Second, in order to evaluate future value creation possibilities and obstacles, businesses should carefully investigate how their current segments align with the customer traits described in this research (enthusiasts, value seekers, salvagers, and apathetic). Third, in order to provide their customers with the advantages that are unique to C2C e-commerce, traditional stores should consider the potential of serving as a platform for cross-selling or other forms of C2C interaction.

This study is one of the earliest attempts to identify C2C customers of internet retailers in relation to social media. It's interesting to see that the profiles vary according to people's perceptions of value rather than usual customer demographics. When taken as a whole, they provide intriguing empirical access to investigate the possibilities and ramifications of social media-driven C2C e-commerce.

CH-60 The Role of Artificial Intelligence in Shaping Investment Patterns Among Working Women: Evidence from Bangalore City

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Abstract

Artificial Intelligence (AI) has emerged as a transformative force in the financial sector, significantly influencing investment behavior and financial decision-making processes. This research paper examines the role of Artificial Intelligence in shaping investment patterns among working women in Bangalore City through a comprehensive socio-economic and behavioral analysis. The study adopts a mixed-methods research design combining quantitative and qualitative approaches. Primary data were collected from 465 working women employed in both public and private sectors across Bangalore City through structured questionnaires, interviews, and focus group discussions.

The study evaluates the impact of AI-driven financial technologies such as robo-advisors, mobile investment applications, automated portfolio management systems, predictive analytics, and digital financial planning tools on women's investment decisions. Findings reveal that AI-based financial platforms have significantly improved investment awareness, portfolio diversification, financial confidence, and participation in digital investment instruments among working women.

The research identifies education level ($\beta = 0.39$, $p<0.001$), income level ($\beta = 0.33$, $p<0.001$), digital literacy ($\beta = 0.29$, $p<0.001$), and employment sector ($\beta = 0.24$, $p<0.001$) as major determinants influencing the adoption of AI-based investment tools. Women utilizing AI-enabled investment platforms demonstrated higher participation in mutual funds, equities, SIPs, and diversified investment portfolios compared to non-users.

However, the study also highlights challenges such as digital inequality, lack of financial literacy, privacy concerns, algorithmic bias, and limited trust in automated financial systems. The paper concludes with recommendations for policymakers, financial institutions, fintech companies, employers, and researchers to promote inclusive AI-driven financial ecosystems that support women's financial empowerment and investment participation.

Keywords:
Artificial Intelligence, Investment Patterns, Working Women, Financial Technology, Women Investors, Bangalore City, Financial Literacy, FinTech, Robo-Advisors, Digital Finance

CH-61 Democratizing Pedagogy: How Technological Advancement Is Diversifying Finance Teaching

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Abstract

Finance education has relied for roughly a century on a narrow pedagogical repertoire anchored in the lecture and the case method. Advances in artificial intelligence, low-code development, and digital publishing are now lowering the cost of building simulations, scenario-based tools, gamified assessments, and narrative forms such as finance-themed blogs and thrillers, producing a genuine pluralism in how finance can be taught. This conceptual and policy-oriented paper argues that this pluralism, while real, is not yet democratized: it remains concentrated in a small number of well-resourced institutions, while the majority of India's finance faculty and students remain largely outside its reach. Drawing on secondary data from the All India Survey on Higher Education, the Telecom Regulatory Authority of India, the National Centre for Financial Education, and recent systematic reviews of pedagogical innovation and policy implementation, the paper develops a dual-barrier framework showing that unequal access to pedagogical innovation is driven jointly by resource and infrastructure constraints and by skill and incentive gaps embedded in faculty appraisal systems. The paper closes with policy and institutional recommendations addressing both barriers simultaneously, arguing that without such intervention, technology-enabled pedagogical innovation risks widening, rather than narrowing, the gap in finance education quality across Indian higher education.

Keywords—finance education; pedagogical innovation; educational technology; digital divide; faculty incentives; gamification; case method; financial literacy; India

CH-62 AI Integrated Smart Concrete Monitoring and Predictive Failure System

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Abstract

Concrete is one of the most widely used materials in the construction industry, and its strength and durability are strongly affected by factors such as internal temperature, moisture, curing conditions, and the surrounding environment. Conventional methods of inspecting concrete can be time-consuming and may not detect early signs of deterioration. To address this issue, this project proposes an AI-Integrated Smart Concrete Monitoring and Predictive Failure System for continuous monitoring of concrete conditions.An M25 grade concrete cube is prepared with embedded DS18B20 temperature and SHT31 humidity sensors to monitor changes in internal temperature and moisture during the curing process. The sensor readings are collected using an ESP32 microcontroller and transmitted through an IoT-based system for real-time storage and visualization. The collected data are then analysed using Artificial Intelligence and Machine Learning techniques to identify unusual patterns and predict possible concrete failures at an early stage.The proposed system combines embedded sensors, IoT communication, real-time monitoring, and AI-based predictive analysis into a single framework. This approach can help in the early identification of abnormal concrete conditions, improve structural safety and durability, and provide a practical and scalable solution for smart infrastructure and predictive maintenance.

Keywords - Smart Concrete, Internet of Things (IoT), Artificial Intelligence, Machine Learning, DS18B20, SHT31, ESP32, Temperature Monitoring, Moisture Monitoring, Predictive Failure.

CH-63 Bounties, Virtue, and Governance Failure: A Conditional Ethics of Incentivized Whistleblowing in Financial Regulation

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Abstract

Financial regulators increasingly rely on monetary bounty programs — most prominently the U.S. Securities and Exchange Commission's (SEC) Dodd-Frank whistleblower program and, in India, the Securities and Exchange Board of India's (SEBI) informant mechanism for insider trading — to detect fraud that internal governance structures fail to catch. These programs raise an unresolved ethical question: does monetizing an act of moral courage corrupt its ethical character, or is it a justified second-best corrective for weak internal governance? This paper develops a conceptual, theory-driven answer. Drawing on virtue ethics, agency theory, and institutional theory, it argues that the ethical status of bounty-based whistleblowing is not fixed but conditional: it is a legitimate corrective mechanism where internal governance is weak or captured, and a corrosive substitute where internal governance is otherwise robust. The paper disaggregates "moral hazard" in whistleblowing into two distinct mechanisms — firm-side moral hazard (under-investment in internal compliance) and whistleblower-side moral hazard (delayed reporting to let violations, and bounties, grow) — and develops three testable propositions linking bounty design to governance quality. A brief comparative discussion of SEBI's informant mechanism illustrates how the framework travels beyond the U.S. regulatory context. The paper contributes a governance-contingent ethical framework that reframes an often binary (pro/con) debate and offers regulators a basis for calibrating bounty design to institutional context.

Keywords: whistleblowing, moral hazard, financial regulation, virtue ethics, agency theory, corporate governance, SEC, SEBI

CH-64 Work–Life Integration as a Catalyst for Faculty Well-Being, Job Satisfaction and Engagement: A Conceptual Framework

Savi

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Abstract

The evolution of higher education necessitates that institutions of higher learning consider the well-being of their faculties along with other aspects such as teaching, research, administration and digitalization. This conceptual paper attempts to propose a framework based on theories to conceptualize the effect of work-life integration on well-being, job satisfaction and employee engagement among faculties. Through Job Demands-Resources model, boundary theory, work-family enrichment theory, conservation of resources theory and social exchange theory, this paper conceptualizes the concept of work-life integration via boundary control, schedule flexibility, role compatibility, work-life enrichment and family supportive supervision. It suggests that work-life integration affects job satisfaction and employee engagement directly and indirectly through employee well-being, where institutional support is seen as a moderator. The paper contributes to the higher-education and human-resource literature by shifting the discussion from individual work–life management towards institutional conditions that enable sustainable faculty performance and well-being. A quantitative cross-sectional methodology is proposed for subsequent empirical testing using validated measures and structural equation modelling with bootstrapped mediation and moderation analysis. The framework offers practical implications for universities seeking to develop flexible, supportive and sustainable work environments for academic professionals.

Keywords—work–life integration; faculty well-being; job satisfaction; employee engagement; higher education; institutional support; sustainable human resource management; JD–R model

CH-65 AI Agents for Autonomous Cybersecurity

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Abstract

The increasing number and complexity of cyberattacks make rapid threat detection and response a major challenge for security teams. This paper proposes a controlled multi-agent AI framework for autonomous cybersecurity, where specialized agents work together to detect suspicious activity, investigate events, assess threats, and select appropriate responses. A policy-based control layer and human oversight are included to prevent unsafe or unauthorized actions. The framework also uses threat intelligence and MITRE ATT&CK knowledge to provide better context during analysis. Rather than replacing security professionals, the proposed approach focuses on reducing repetitive work and improving the speed and consistency of incident handling. Its effectiveness can be evaluated using detection rate, precision, F1-score, false-positive rate, response time, automation rate, and explainability. The framework provides a practical foundation for studying how AI agents can support safer and more responsive cybersecurity operations.

CH-66 Hybrid Deep Learning Framework for Cardiovascular Disease Prediction Using Clinical Data

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Abstract

Background: Cardiovascular disease (CVD) is a major global health concern, and accurate early prediction can support timely clinical intervention. Using a publicly accessible Kaggle cardiovascular dataset with 70,000 patient records, this study explores deep learning for automated CVD risk prediction.

Objective: To develop a robust deep learning model for CVD classification and evaluate its predictive performance against established machine-learning algorithms.

Methods: The dataset was preprocessed using missing-value inspection, outlier treatment, feature normalization, and stratified data partitioning. The proposed Hybrid CNN-LSTM model integrates convolutional feature extraction with Long Short-Term Memory (LSTM) representation learning to capture nonlinear relationships among clinical and lifestyle variables. Accuracy, precision, recall, F1-score, and ROC-AUC were used to assess performance. Random Forest, XGBoost, Support Vector Machine, and Multilayer Perceptron were used for comparison.

Results: The proposed Hybrid CNN-LSTM achieved 94.37% accuracy, 93.82% precision, 94.16% recall, 93.99% F1-score, and 97.21% ROC-AUC, demonstrating superior predictive performance compared with Random Forest (91.84%), XGBoost (92.63%), Support Vector Machine (89.76%), and Multilayer Perceptron (91.52%).

Conclusion: The findings demonstrate that Hybrid CNN-LSTM can effectively learn complex clinical patterns and provide accurate CVD risk prediction. The proposed approach shows strong potential for AI-assisted cardiovascular screening and clinical decision support.

Keywords: Deep Learning; Cardiovascular Disease; Hybrid CNN-LSTM; Healthcare Analytics; Clinical Prediction; Machine Learning

CH-67 The Role of Artificial Intelligence in Marketing: A Conceptual Study of Consumer Purchase Behaviour in the Retail Sector

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Abstract

Artificial Intelligence (AI) is transforming retail marketing by enabling organizations to analyse consumer data, personalize interactions, predict purchasing behaviour, and automate marketing activities. This conceptual study examines the role of AI in influencing consumer purchase behaviour in the retail sector. Drawing on existing literature, the paper discusses major applications including recommendation systems, chatbots and virtual assistants, predictive analytics, personalized advertising, dynamic pricing, customer relationship management, and sentiment analysis. The study conceptualizes their influence through personalization, customer engagement, trust, satisfaction, purchase intention, impulse buying, and customer loyalty. The paper also identifies challenges related to data privacy, cybersecurity, algorithmic bias, transparency, reduced human interaction, implementation cost, ethical concerns, and consumer acceptance. The study argues that responsible AI adoption should combine data governance, ethical oversight, employee capability development, and human-AI collaboration.

CH-68 Business and entrepreneurship: catalyst for innovation, employment, and inclusive economic growth

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Abstract

"Innovation is the specific instrument of entrepreneurship, the means by which change is exploited as an opportunity." — Peter Drucker, Innovation and Entrepreneurship

Entrepreneurship is widely seen as one of the main engines of economic development, technological progress, and job creation, in both rich and poor economies. This paper looks at how business enterprise and entrepreneurial activity connect to national economic growth, drawing on established theory, recent global evidence, and a few grounded field stories. It follows entrepreneurship from an individual act - someone noticing an opportunity - through to something closer to an ecosystem-level phenomenon, shaped by access to capital, regulation, education, and culture. Cases here range from small enterprises in emerging economies to technology start-ups scaling across borders, showing how entrepreneurial ventures turn ideas into jobs, value, and community resilience. Ecosystems such as Silicon Valley, Bengaluru's technology corridor, and India's Startup India programme illustrate how policy, capital, and culture combine to make enterprise formation possible. Drawing on the work of Joseph Schumpeter, Peter Drucker, and Israel Kirzner, the paper argues that entrepreneurship is not simply business creation but a process of creative destruction that keeps renewing economies. It closes by pointing to the continuing need for accessible finance, simpler regulation, entrepreneurship education, and genuinely inclusive support ecosystems - particularly for first-generation, women, and rural entrepreneurs - if enterprise-led growth is to be sustained.

CH-69 Multi-Model Machine Learning Approach to Housing Unit Price Prediction and Market Segmentation

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Abstract

Accurate home price estimation is essential for banks, city planners, and individual buyers, yet many valuations still rely on limited local knowledge or simple heuristics that perform poorly in heterogeneous urban markets. This study presents a complete, modular machine learning pipeline for residential real estate analytics built on the PATE dataset, a 29-feature CSV dataset covering structural attributes (bedrooms, bathrooms, construction year, elevator access), locational and accessibility metrics (distance to transport, education, healthcare, retail, and attractions), and sentiment-derived variables (district-level happiness, sadness, fear, anger, and disgust proportions). The work addresses three questions: how accurately unit price can be predicted from observable features, whether properties can be reliably grouped into low/medium/high price bands, and which variables most influence price formation.The pipeline spans seven stages — exploratory analysis, statistical profiling, visualization, data quality assessment, cleaning and preprocessing, model training/evaluation, and deployment. Statistical profiling (mean, variance, skewness, kurtosis, coefficient of variation) and visualization (histograms, boxplots, scatter plots, correlation heatmaps, geographic scatter plots) confirmed right-skewed price distributions and revealed spatial price clustering. Data cleaning addressed duplicate records, invalid construction years, out-of-range coordinates, and zero-distance anomalies, followed by median imputation and task-specific scaling.Both library-based (scikit-learn, XGBoost) and manually coded implementations of Linear/Logistic Regression, Decision Trees, Random Forest, and Gradient Boosting/SVM were trained and compared. For regression, ensemble methods (Random Forest, XGBoost) achieved the best R^2, MAE, and RMSE, capturing non-linear feature interactions that linear models missed. For classification into price categories, Random Forest achieved the highest performance (88.2% accuracy, 0.882 macro-F1), substantially outperforming Logistic Regression and Linear SVM (~61% accuracy), indicating that price-band boundaries are not linearly separable. Manual implementations closely tracked their library counterparts, validating correct algorithmic design, though they trailed slightly in accuracy due to simplified splitting heuristics and lack of regularization.Feature importance analysis identified bedrooms, bathrooms, construction year, and elevator availability as the strongest predictors, followed by accessibility-related distances to education, healthcare, and retail. Sentiment-derived features showed modest but consistent effects, with higher happiness scores associated with higher prices. The best-performing models were packaged into a reusable MLModelPipeline object and deployed via a Streamlit web application, enabling interactive predictions for new properties.These results demonstrate that ensemble tree-based models offer the most accurate and stable framework for both price prediction and market segmentation, while manual implementations provide pedagogical insight into model mechanics. Future work includes hyperparameter optimization, SHAP/LIME-based explainability, explicit spatial submarket modeling, and deployment via a production-grade REST API.

CH-70 Quantifying the Stability–Scalability Trade-off of First-Order and Quasi-Newton Optimization Methods under Controlled Conditioning

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Abstract

The choice of an optimization algorithm can affect how reliably and efficiently a machine-learning model is trained. In this study, we compare four commonly used optimization methods: Stochastic Gradient Descent (SGD), Momentum SGD, Adam, and L-BFGS. We use controlled synthetic linear regression problems to study how sample size and problem conditioning affect optimizer stability. The experiments vary sample size, feature dimensionality, condition number, and learning rate, resulting in 324 experimental runs. We mainly measure stability by checking whether an optimizer fails to converge, while loss oscillation and training time are used as additional measures. The results show that problem conditioning has a much stronger effect on optimizer stability than sample size within the tested settings. When the condition number reached 10,000, both SGD and Momentum SGD diverged in all runs, while Adam and L-BFGS had divergence rates of 29.6% and 11.1%, respectively. Across all experiments, L-BFGS had the lowest overall divergence rate at 3.7%, but it also took considerably more time per run. Adam provided a compromise between stability and computational cost, performing more reliably than SGD and Momentum SGD while remaining much faster than L-BFGS. These findings show that the choice of optimizer can become particularly important when the optimization problem is poorly conditioned

CH-71 Federated Learning for Privacy Preserving AI

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Abstract

The rapid growth of Artificial Intelligence (AI) and Machine Learning (ML) has increased the need to process large amounts of data from multiple sources. However, traditional centralized machine learning requires data to be collected and transferred to a central server, which can create significant privacy and security risks, particularly when the data contains sensitive information. Federated Learning (FL) provides an alternative approach by allowing multiple clients to collaboratively train a shared global model while keeping their raw data locally. However, model updates exchanged between clients and the server may still contain information that could potentially reveal details about the underlying training data. Therefore, additional privacy mechanisms are required to strengthen the security of federated systems. This work presents a privacy-preserving Federated Learning framework that combines Federated Learning with Differential Privacy (DP). In the proposed approach, individual clients train machine learning models using their local datasets without sharing the original data. The locally trained model parameters are then aggregated at the server using the Federated Averaging (FedAvg) technique to construct an improved global model. Differential Privacy is incorporated during the client-side training process by applying privacy-preserving mechanisms to reduce the possibility of sensitive information being inferred from model updates. The framework was implemented using Python, PyTorch, and Opacus and evaluated using the Breast Cancer dataset. Experimental evaluation demonstrates the difference between conventional and privacy-preserving federated training. The standard Federated Learning implementation achieved a final global model accuracy of 95.61 percent, while the privacy-preserving implementation achieved 94.74 percent accuracy with a reported privacy budget of epsilon 27.5765. The accuracy difference of 0.87 percentage points shows that the selected privacy configuration preserved nearly the same model utility as standard Federated Learning. At the same time, the reported privacy budget should be considered when interpreting the privacy guarantee, since a larger epsilon represents a less stringent privacy guarantee under the same Differential Privacy definition. The proposed framework demonstrates how Federated Learning and Differential Privacy can be combined to reduce direct data exposure while maintaining collaborative model training. The approach can serve as a foundation for privacy-aware AI applications in domains where decentralized and sensitive data processing is required.

Keywords— Federated Learning, Privacy-Preserving AI, Differential Privacy, Federated Averaging, Machine Learning, Data Security, Decentralized Learning.

CH-72 What Drives Students Choice of Higher Education Institutions: An Empirical Analysis of Behavioral and Institutional Factors

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Abstract

Choosing a Higher Education Institution (HEI) is a complicated process driven by student behavioural orientations and assessment of institutional features. As HEIs face a competitive landscape and prospective students have access to a plethora of information about HEIs both in institutional and digital channels, understanding these determinants has grown in significance over time. This study investigates the students' selection of HEIs from an empirical perspective in two ways. First, it examines the effect of the Theory of Planned Behavior (TPB) on students' choices of institutional. Second, it explores the factors that influence the choice of Higher Education Institutions such as E-Advertisement, Fees, Infrastructure, Location, Training and Placement, Reputation, Social media, Program Offered, Institute Website and Artificial Intelligence (AI) as a new factor. The study employed a quantitative research methodology. The links between Attitude, Subjective Norm, Perceived Behavioral Control, Intention, and HEI selection are investigated using structural equation modeling (SEM). Empirical results show that there are significant relationships between "Attitude, Subjective Norm, Perceived Behavioural Control and Intention". There is also a positive association between intention and HEI selection. In addition, the analysis highlights the relevance of E-Advertisement, Fees, Infrastructure, Location, Training and placement, Reputation, Social Media, Program offered, and Institute Website as factors impacting students' choice of HEIs. The study also adds AI as an emerging factor of institutional information and decision support. The study adds value by combining behavioural and institutional/digital factors to gain an overarching view of student decision-making in higher education. The results have implications for HEI managers, admissions and marketing staff in devising student-centred and digitally responsive strategies.

Keywords- Higher Education Institutions, Student Preferences, Theory of Planned Behavior, Institutional Selection, Structural Equation Modeling, Artificial Intelligence

CH-73 Development of a Machine Learning Model for Assessing the Impact of Dust Accumulation on Solar Panel Performance

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Abstract

The buildup of dust on the surface of photovoltaic (PV) modules is a major environmental cause of performance deterioration since the particles deposited reduce the amount of solar irradiance that reaches the modules and as a result lower the electrical power output of the PV system. The present study introduces a data-driven machine learning approach for establishing a suitable and economically viable cleaning schedule for solar PV modules under the climatic conditions of Pune, India. In order to carry out an experimental investigation, six-month-old PV modules were used, each equipped with its own microinverter so that the electrical output of each panel could be monitored separately. The modules were cleaned at various frequencies, namely daily, weekly, every two weeks, monthly, and once every three months, and in addition a separate group of modules was left uncleaned for eight months in order to examine the gradual impact of dust accumulation.

During the entire experimental period, continuous records were kept of the main environmental and meteorological parameters, such as airborne dust concentration, solar irradiance, ambient temperature, wind speed, wind direction, and relative humidity. Together with the measured PV power output, these parameters were employed in the development of predictive models using two machine learning methods: Random Forest (RF) regression and Artificial Neural Network (ANN) modelling. The models developed showed a high degree of predictive ability, the RF model reaching an accuracy of 96.68%, slightly beating the ANN model, which achieved an accuracy of 96.61%.

The experimentally measured degradation linked to increasing dust buildup was then compared with the predicted power output in order to find the cleaning interval that offers a reasonable compromise between energy recovery and the amount of maintenance required. For the environmental conditions that existed during the study, the analysis showed an optimal cleaning interval of about 30 days. The results show that machine learning is able to effectively capture the complex relationship between environmental conditions, dust accumulation, and degradation of PV power. The proposed method provides a practical foundation for predictive maintenance and for carrying out condition-based cleaning of PV systems, with possible advantages regarding energy output, maintenance efficiency, and a reduction in unnecessary cleaning operations.

Keywords: Solar PV, Dust Accumulation, Machine Learning, Random Forest, Cleaning Optimization.

CH-74 An Architecture-Aware Deep Transfer Learning Framework for Robust Multi-Class Lung Disease Classification

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Abstract

The accurate classification of lung diseases through medical imaging like X-Ray and CT-scan is vital for early diagnosis and clinical decisions. Deep learning and transfer learning have shown significant ability to automating this classification process, although the effectiveness of various pretrained models can differ based on the dataset's characteristics. This study employs three pretrained deep learning models viz ResNet50, and DenseNet121 and Vision Transformer (ViT-B/16) to perform the multi-class lung disease classification using X-Ray images. The performance of all the models is measured using various metrics such as accuracy, precision, recall, F1-score, and validation accuracy to identify the best model for the lung disease classification. From the results of these models, it is found that DenseNet121 outperforms than the others by achieving accuracy of 92.49%, precision of 92.43%, recall of 92.49%, and F1-score of 92.45%. ResNet50 also shows good results, with accuracy of 92.05% and F1-score of 91.97%, while ViT-B/16 reaches an accuracy of 88.18%. These findings suggest that DenseNet121 and ResNet50 are more suitable for lung disease classification tasks than ViT-B/16.

CH-75 Corrosion behaviour and life cycle analysis of marine brown seaweed gel as admixture in sustainable concrete - A Review

Poonguzhali N

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Abstract

Growing interest in sustainable construction materials has gained attention towards bio-based admixtures for concrete. Brown seaweed, particularly Sargassum wightii, contains alginate, a natural polysaccharide capable of forming water-retaining gels that may act as a bio-admixture in concrete. This paper reviews the extraction of sodium alginate from Saragassum wightii, its influence on the fresh and hardened properties of cement-based materials, its possible effect on chloride-induced corrosion of reinforcement, and its environmental performance through Life Cycle Assessment (LCA). The extraction process reported in the literature—cleaning, drying, calcium chloride and formaldehyde pretreatment, acid treatment, sodium carbonate extraction, filtration, ethanol precipitation and drying, yielded a sodium alginate content of 31.7%. Reported corrosion-assessment methods, including chloride diffusion, electrical resistivity, accelerated corrosion testing and reinforcement mass loss, are converted into a testing framework suitable for the proposed bio admixture. A cradle-to-grave LCA methodology, using 1 m^3 of concrete as the unit, is formed to evaluate whether the environmental benefits of using a renewable marine resource outweigh the burdens associated with its extraction and processing. The review identifies a research gap: extraction, corrosion performance and life-cycle impact of Saragassum wightii gel have largely been studied separately other than as one integrated system, motivating the present studies.

Keywords: Marine brown seaweed, sodium alginate, bio-admixture, sustainable concrete, corrosion behaviour, life cycle assessment.

CH-76 Occupational Stress and Stress Management Practices among Employees in the Electronics Manufacturing Industry in Chennai India

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Abstract

Occupational stress has become a critical challenge affecting employee well-being, productivity, and organizational performance, particularly in the electronics manufacturing industry where employees face demanding workloads, technological complexity, and stringent production targets. This study aimed to assess the level of occupational stress among employees, identify major workplace stressors, evaluate existing stress management practices, and examine the relationship between demographic characteristics and occupational stress. A descriptive research design was adopted, and primary data were collected from 399 employees of Rax-Tech International, Chennai, using a structured questionnaire and a stratified random sampling technique. The collected data were analysed using descriptive statistics, percentage analysis, weighted average ranking, the Chi square test, and one-way ANOVA. The results indicated that workload and role ambiguity were the strongest contributors to occupational stress, followed by interpersonal conflict and organizational factors. Chi square analysis revealed significant associations between occupational stress and selected demographic variables, while one-way ANOVA identified statistically significant differences in stress levels across employee groups. Furthermore, employees reported that stress management initiatives, including counselling programmes, supervisor support, wellness activities, and effective communication, positively influenced employee well-being and reduced workplace stress. The findings highlight the need for organizations to implement evidence-based stress management strategies focusing on workload balancing, role clarity, employee assistance programmes, and supportive leadership to enhance employee satisfaction, productivity, and overall organizational effectiveness. The study provides practical implications for human resource managers and organizational policymakers in designing sustainable workplace interventions to improve organizational performance.

Keywords— Occupational Stress; Employee Well-being; Workload; Role Ambiguity; Stress Management; Electronics Manufacturing Industry; Human Resource Management.

CH-77 KAIZY: A Resource-Efficient AI Agent Architecture Using Relational Retrieval and Multi-Provider LLM Failover

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Abstract

Large-language-model-based assistants are increasingly being integrated into customer-support and information-retrieval applications. However, conventional Retrieval-Augmented Generation (RAG) deployments can introduce additional infrastructure through vector databases, embedding services, and dependence on a single model provider. These requirements may be inappropriate for applications operating under strict resource and cost constraints. This paper presents KAIZY, a lightweight conversational AI architecture designed for structured-domain applications. Instead of constructing a separate vector index, the proposed system exploits an existing MySQL database as its retrieval layer. A query-dependent field selection mechanism identifies the database attributes relevant to the user's intent and forwards only the necessary information to the language model. Frequently occurring operational requests are handled through a direct-response path, thereby avoiding unnecessary LLM calls. To improve service continuity, KAIZY incorporates a multi-provider gateway capable of traversing alternative API keys, models, and providers when failures such as rate limits, timeouts, or service unavailability occur. The architecture also protects sensitive interaction data through authenticated encryption and maintains search-oriented SHA-256 digests for indexed lookup. The prototype is designed for deployment on modest infrastructure, including a 2-vCPU and 2-GB-RAM environment. Based on the experimental configuration described in this work, the proposed pipeline achieves lower retrieval overhead and substantially smaller prompts than the considered vector-RAG baseline. The results indicate that combining relational retrieval, context reduction, deterministic response paths, and provider redundancy can provide a practical foundation for low-cost conversational AI systems. Index

Terms: AI Agents, Retrieval-Augmented Generation, Relational Retrieval, MySQL, LLM Routing, Provider Failover, Token Optimization, Data Privacy, Resource-Efficient AI.

CH-78 AI-Based Pavement Failure Prediction and Preventive Maintenance Using Machine Learning

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Abstract

Pavement deterioration is a major challenge in road infrastructure management, as repeated traffic loading, environmental conditions, pavement age, subgrade characteristics, moisture, temperature, and structural parameters can gradually reduce pavement performance. Conventional pavement maintenance practices generally depend on periodic inspection and condition assessment, which may result in delayed identification of pavement distress and increased maintenance costs. Recent studies have demonstrated the potential of Artificial Intelligence (AI) and Machine Learning (ML) techniques for pavement condition prediction and distress assessment. However, many existing approaches primarily focus on image-based crack detection or prediction using a limited number of pavement parameters, while the integration of multiple engineering parameters with preventive maintenance decision-making remains comparatively limited.

This review paper proposes an AI-based framework for pavement failure prediction and preventive maintenance planning using structured pavement data. The proposed framework considers important parameters such as soil type, subgrade condition, pavement thickness, traffic volume, moisture, temperature, road age, terrain characteristics, and other relevant environmental and structural factors. Existing research on Random Forest, XGBoost, Artificial Neural Networks, and other ML techniques is reviewed to identify suitable approaches for pavement performance prediction. Based on the reviewed studies, XGBoost is considered as a suitable candidate for developing the proposed prediction framework because of its ability to handle structured datasets and nonlinear relationships between multiple pavement parameters.

The proposed methodology involves data collection from relevant literature, engineering standards, government and road-management sources, followed by data organisation, preprocessing, parameter selection, model training, testing, and prediction. The framework is intended to predict pavement condition and failure risk and subsequently support preventive maintenance prioritisation and maintenance planning. The study also identifies the need for larger, locally relevant and field-validated datasets for reliable implementation in Indian road conditions. Future work will focus on expanding the dataset, incorporating actual field observations and longitudinal pavement-condition data, validating the ML model, and developing a practical decision-support system for road maintenance authorities.

Keywords: Artificial Intelligence, Machine Learning, Pavement Failure Prediction, XGBoost, Pavement Performance, Preventive Maintenance, Road Infrastructure

CH-79 Design and Modeling of improved MPPT control for solar powered vehicle with Battery storage

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Abstract

The growing interest in vehicles has made it more important to have charging systems that work well and use clean energy. One type of energy that is getting a lot of attention is solar power from photovoltaic panels. Solar power is good for the environment. Can be found in many places. The amount of power that solar panels produce changes a lot depending on how much sunlight there is and how hot it is. This change in power makes it harder to charge vehicles efficiently. To solve this problem this paper suggests a way to control the solar power system used for electric vehicles. The system uses a controller called an MPPT to get the most power possible from the solar panels. It also includes a battery to store energy and help keep things stable. The system has a panel setup, a controller, a special kind of converter a battery, a capacitor and the electric vehicle itself. The controller makes sure the solar panels give much power as they can even when the weather changes. It also keeps the battery charging and the voltage in the system steady. The whole system was. Tested using MATLAB/Simulink. The performance was checked under levels of sunlight by looking at the voltage, current, power, battery charge level, converter output and how well the whole system worked. The goal of this system is to use energy have fewer changes, in power and make solar powered electric vehicles more reliable. Index Terms—Solar Photovoltaic, Electric Vehicle, MPPT, Battery Energy Storage System, DC–DC Converter, MATLAB/Simulink, Renewable Energy.

CH-80 Artificial Intelligence and Machine Learning-Driven Personalization: A Bibliometric-Systematic Literature Review and Future Research Agenda

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Abstract

Artificial Intelligence (AI) and Machine Learning (ML) are increasingly transforming personalization by enabling firms to analyse consumer data, predict preferences, and deliver individualized experiences. Despite rapid growth, research on AI- and ML-driven personalization remains fragmented across disciplines, technologies, and consumer contexts. This study presents a bibliometric-systematic literature review (B-SLR) of 359 peer-reviewed articles published between 2005 and 2026. The study integrates performance analysis, science mapping through co-citation and keyword co-occurrence analysis, and systematic content analysis to identify the intellectual structure, emerging themes, and future directions of AI and ML applications in personalization. The findings reveal major research streams around algorithmic personalization, consumer trust, privacy concerns, perceived risk, and the personalization–privacy paradox. The literature also highlights consumer psychological responses, including purchase intention, engagement, satisfaction, impulse buying, and acceptance of AI-generated recommendations. Recent research increasingly focuses on generative AI, virtual influencers, personalized advertising, conversational agents, and AI-enabled customer experiences. Emerging concerns include algorithmic transparency, ethical governance, regulatory challenges, bias, and the long-term behavioral consequences of AI-mediated personalization. Based on these findings, the study proposes an integrated research framework and future research agenda to guide scholars and practitioners in understanding the evolving applications of AI and ML in personalized consumer experiences and decision-making.

Keywords: Artificial Intelligence; Machine Learning; AI-Driven Personalization; Consumer Behavior; Generative AI; Virtual Influencers; Personalization

CH-81 Marine Entrepreneurship in the Blue Economy: Emerging Opportunities, Innovative Business Models, and Challenges for Sustainable Growth

Allen Benoy, Allan Karthik

Euro Tech Maritime Academy

Abstract

The global ocean ecosystem represents a critical economic engine, generating an estimated **$2.5 trillion annually** in economic value. However, modern maritime commerce faces a profound "Blue Economy Paradox": heavy reliance on traditional, purely extractive industrial models accelerates severe anthropogenic collapse, climate volatility, and habitat degradation. To mitigate this crisis, global industries are aggressively transitioning toward regenerative systems.

While policy targets define the international regulatory rules, agile marine entrepreneurs serve as the primary vehicle driving real technological integration. Marine entrepreneurship represents the intersection of commercial maritime viability and active ecological preservation, positioning sustainable ocean industrialization not as an optional luxury, but as the absolute operational standard for the future of global trade.

This study, undertaken by **Allen Benoy and Allan Karthik** at **Euro Tech Maritime Academy**, provides a comprehensive blueprint to map out these emerging commercial pathways.

CH-82 The Influence of Social Media Marketing on Gen Z Purchase Decisions

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Abstract

Social media has become an important part of the way Generation Z discovers products, evaluates brands and makes purchase decisions. The present study develops a conceptual framework to understand how social media marketing influences the purchase decisions of Gen Z consumers in Bengaluru. The study is based entirely on secondary data collected from published research articles, conference papers, research reports and other relevant academic sources. The framework considers four major dimensions of social media marketing: social media content quality, influencer credibility, electronic word-of-mouth (E-WOM) and personalization, with Gen Z purchase decision as the dependent variable. The existing literature suggests that informative and engaging content can support product evaluation, while credible and authentic influencers can strengthen consumer trust. Similarly, online reviews and recommendations can influence perceptions and reduce uncertainty during the purchase process. Personalization can also make marketing communication more relevant and engaging when it is used appropriately. Based on the review of existing literature, the study brings these four factors together into a single conceptual framework. Since the study uses only secondary data, the findings are interpretive and conceptual rather than statistically tested. The proposed framework can provide a useful foundation for future empirical research on Gen Z consumers in Bengaluru and other markets.

Keywords: Social Media Marketing, Generation Z, Purchase Decision, Influencer Credibility, E-WOM, Personalization, Secondary Data, Conceptual Framework, Bengaluru.

CH-83 Federated Learning with Differential Privacy for Collaborative Model Training Over Heterogeneous Edge Devices

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Abstract

Federated Learning (FL) enables multiple edge devices to collaboratively train machine learning models without transferring their raw data to a centralized server. However, model updates may still expose sensitive information, while heterogeneous and non-IID client data can cause model divergence and reduce global accuracy. Communication overhead is another major challenge because edge devices may operate over bandwidth-constrained wireless networks.

This paper proposes a privacy-preserving and communication-efficient federated learning framework that jointly addresses these challenges through divergence-aware client weighting, Gaussian perturbation under Rényi Differential Privacy (RDP), top-k gradient sparsification, error feedback, and 8-bit stochastic quantization. The proposed weighting mechanism reduces the influence of clients whose label distributions significantly differ from the global distribution while preserving their participation. Before transmission, local updates are clipped and perturbed with Gaussian noise, followed by sparsification and quantization to reduce communication traffic.

The privacy accountant tracks cumulative privacy loss over 45 global communication rounds and provides a reported guarantee of $\varepsilon = 2.8$ and $\delta = 10^{-5}$. Experiments are conducted using FEMNIST with 200 non-IID clients and Dirichlet-partitioned CIFAR-10 with $\alpha = 0.5$. The proposed framework achieves 91.4% global accuracy on FEMNIST, representing a 2.3-percentage-point reduction compared with the reported non-private centralized baseline. It also reduces per-round uplink communication by 68.4% and reaches the 90% target accuracy within 45 rounds. Average local computation latency is approximately 380 ms per epoch on ARM Cortex edge profiles. The results demonstrate that privacy, heterogeneous data, communication efficiency, and edge-device computation can be addressed within a unified federated learning framework.

Keywords: Federated Learning, Differential Privacy, Edge Computing, Non-IID Data, Gradient Sparsification, Quantization, Rényi Differential Privacy, Privacy-Preserving Machine Learning.

CH-84 Adapting Quality-Controlled Class-Conditional Diffusion Augmentation for Few-Shot Hazardous Waste Subclass Classification

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Abstract

Hazardous waste classification is challenging when only a small number of labelled images are available for each subclass. This paper proposes a quality-controlled class-conditional diffusion augmentation framework for few-shot hazardous waste classification. The proposed method generates class-specific synthetic images using a diffusion model and filters unsuitable samples using semantic similarity, classifier confidence, duplicate detection, and human verification. The selected synthetic images are combined with limited real images and used for few-shot classification. The framework will be studied under 1-shot, 5-shot, and 10-shot settings and compared with real-only, conventional augmentation, and unfiltered diffusion augmentation approaches. The study aims to determine whether quality-controlled synthetic data can improve the classification of rare hazardous waste subclasses.

CH-85 AI Driven Groundwater Recovery Time Estimation and Sustainable Recharge Planning

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Abstract

Groundwater is a vital natural resource that supports domestic water supply, agriculture, industrial activities, and ecosystem sustainability. Rapid urbanization, population growth, excessive groundwater extraction, and irregular rainfall have resulted in declining groundwater levels in several regions of India. Conventional groundwater assessment methods often depend on field surveys and manual calculations, which can be time-consuming and may not provide rapid predictions. To address this issue, this project proposes an AI-Driven Groundwater Recovery Time Estimation and Sustainable Recharge Planning System that integrates Artificial Intelligence with groundwater and environmental parameters. The proposed system predicts groundwater level, estimates groundwater recovery time, assesses groundwater conditions, and recommends suitable recharge measures. The model uses parameters such as rainfall, temperature, humidity, soil type, groundwater extraction rate, number of recharge pits, previous water-table level, and current water-table level. Historical datasets are used to develop predictive models for groundwater level and recovery time estimation. The system consists of three major modules: Groundwater Level Prediction, Recovery Time Estimation, and Dynamic Recharge Pit Recommendation. A web-based application is developed using Python and Flask, allowing users to enter site-specific parameters and obtain prediction results easily. The system classifies groundwater conditions into different levels and provides future groundwater trend projections to support long-term planning. Based on groundwater conditions and extraction pressure, suitable recharge pit recommendations and groundwater management suggestions are provided. The proposed approach can reduce dependency on conventional assessment methods and provide a faster decision-support system for sustainable groundwater management. It can assist engineers, planners, researchers, and local authorities in identifying groundwater stress and planning effective artificial recharge measures. The system can further be enhanced using real-time groundwater data, GIS-based analysis, satellite information, and continuous rainfall records. Overall, the proposed system demonstrates the potential of Artificial Intelligence for groundwater conservation, recovery assessment, sustainable recharge planning, and long-term water-resource management in India.

Keywords: Artificial Intelligence, Groundwater Level Prediction, Recovery Time, Sustainable Recharge, Recharge Pits, Rainfall, Groundwater Management.

CH- 86 Development of Carbon Fibre Based Self-Sensing Concrete for Structural Health Monitoring

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Abstract

Self-sensing concrete is an advanced multifunctional cementitious material capable of monitoring changes in its mechanical or damage condition through variations in electrical properties. Among different conductive materials, carbon fibres are considered promising because they can form conductive networks within the cementitious matrix while also contributing to crack bridging and reinforcement. However, the sensing performance of carbon-fibre-reinforced concrete is influenced by several interacting parameters, including fibre dosage, aspect ratio, dispersion, fibre–matrix interaction, conductive-network formation, electrode configuration, measurement method, moisture condition and loading history. This study investigates the development of carbon-fibre-based self-sensing concrete through an integrated assessment of its mechanical and electrical behaviour. Concrete specimens with different carbon fibre contents are proposed to be evaluated using compressive loading and electrical resistance measurements through embedded copper mesh electrodes. The sensing response will be assessed using changes in electrical resistance and fractional change in resistance under mechanical loading. The study also considers the role of conductive-network formation and contact mechanisms, together with potential sources of measurement variation such as electrode contact and environmental conditioning. A comprehensive literature review is used to position carbon fibre as a practical conductive filler for concrete-scale applications. The optimum fibre dosage will be determined experimentally by considering electrical sensitivity, response repeatability, baseline stability, mechanical performance and workability. The study is expected to contribute to the development of a practical material-level sensing system that can support future applications in structural health monitoring and smart concrete infrastructure.

Keywords— Self-sensing concrete, Carbon fibre, Piezoresistivity, Electrical resistance, Conductive network, Structural health monitoring, Smart concrete.

CH-87 Experimental Study on Thermally Insulated Lightweight Concrete and Strength Prediction Using Random Forest Regressor

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Abstract

The development of lightweight and thermally insulated concrete is important for reducing structural dead load and improving building energy efficiency. This study proposes the development of lightweight concrete incorporating Lightweight Expanded Clay Aggregate (LECA), Rice Husk Ash (RHA), and Rice Husk Biochar (RHB).

LECA is considered for reducing density and thermal conductivity, while RHA and RHB are incorporated as sustainable agricultural-waste-derived materials with potential contributions to mechanical and thermal performance. The study investigates the influence of different material proportions on density, compressive strength, and thermal conductivity.

In addition, a Random Forest Regressor (RFR) is proposed to predict compressive strength from concrete mix and curing parameters. Experimental results will be used to train and validate the prediction model using statistical performance measures such as R2, RMSE, and MAE. The proposed framework aims to identify the relationship between material composition and concrete performance and to determine a suitable balance between lightweight behaviour, compressive strength, and thermal insulation. The study is expected to contribute to the development of sustainable lightweight concrete and data-driven mix optimization.

Keywords: Lightweight concrete, LECA, Rice Husk Ash, Rice Husk Biochar, thermal insulation, compressive strength, Random Forest Regressor, machine learning.

CH- 88 A Review of ANN Based Performance Evaluation of Self-Healing Concrete with Bacteria and Fungi

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Abstract

Concrete is one of the most widely used construction materials, but it is prone to cracking due to shrinkage, loading, temperature variations, and environmental effects. These cracks reduce the durability and service life of structures by allowing the penetration of water and harmful chemicals. Self-healing concrete is an innovative technology that uses biological agents such as bacteria and fungi to repair cracks automatically through the precipitation of calcium carbonate ($CaCO_3$). This natural healing process improves the strength, durability, and sustainability of concrete structures while reducing maintenance costs. Artificial Neural Network (ANN), a machine learning technique, is used in this project to predict the performance of self-healing concrete based on experimental data. The ANN model helps estimate properties such as compressive strength, crack-healing efficiency, and durability with high accuracy, thereby reducing the need for repeated laboratory testing. This study also compares the performance of bacterial and fungal self-healing concrete to identify the most effective bio-agent for practical engineering applications.

CH-89 AI Construction Cost Regression

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Abstract

Construction projects frequently experience cost overruns caused by inaccurate estimation of material quantities, wastage, and labour requirements [10], [19]. Building Information Modeling (BIM) tools such as Autodesk Revit can generate accurate, model-derived quantities of building components, while Artificial Intelligence (AI) regression techniques can learn the nonlinear relationship between these quantities and the resulting project cost [16], [17], [25]. This paper presents the design of a BIM-integrated AI cost-prediction framework for building projects, in which a 3D BIM model developed in Autodesk Revit is used to automatically extract material, labour and wastage-related quantities, which are then fed into an AI regression model to predict the total construction cost. The proposed framework is intended to reduce human error in quantity takeoff, minimise material wastage, and support faster and more reliable cost estimation during the early stages of a project. A structured literature review of BIM-based quantity takeoff, machine-learning-based cost prediction, and construction waste estimation studies is presented, followed by the identified research gap, proposed methodology, and expected outcomes of the study.

Keywords—Building Information Modeling (BIM); Artificial Intelligence (AI); regression analysis; construction cost estimation; quantity takeoff; Autodesk Revit; 5D BIM; machine learning

CH- 90 Predicting Marital Satisfaction in Indian Marriages Using Machine Learning on Synthetic Data Based on NFHS-5 and IHDS-II: A Socio-Cultural Feature Engineering

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Abstract

This study presents a machine learning framework for predicting marital satisfaction, categorized as High, Medium, or Low, in Indian marriages using socio-cultural and demographic features derived from a synthetic dataset of 10,000 records modeled on the marginal distributions of the National Family Health Survey-5 (NFHS-5) and the Indian Human Development Survey (IHDS-II). The dataset incorporates culturally relevant attributes such as marriage type, age at marriage, parental approval, caste match, dowry exchange, income level, and years since marriage, alongside demographic and household-level variables including gender, education, religion, urban or rural residence, and inter-caste or inter-religion status. A structured preprocessing pipeline was employed, comprising missing-value imputation, one-hot and ordinal encoding, construction of domain-motivated interaction terms (such as caste and parental approval, and dowry and income), numeric feature scaling, and a stratified 80:20 train-test split. Four predictive models, namely Logistic Regression, Random Forest, XGBoost, and LightGBM, were trained using stratified five-fold cross-validation with GridSearchCV for hyperparameter optimization, and evaluated on a held-out test set of 2,000 samples using accuracy, precision, recall, and F1-score. Among the models compared, Random Forest achieved the highest predictive accuracy of 90.2 percent, followed by XGBoost at 88.9 percent and LightGBM at 88.4 percent, while Logistic Regression achieved the lowest accuracy of 73.4 percent, underscoring the importance of modeling non-linear and conditional socio-cultural effects. Permutation importance analysis identified parental approval and dowry-related variables as the most influential predictors of marital satisfaction, followed by inter-caste status, years since marriage, and education level. The study further presents an operational ethical risk-management framework covering the identification of sensitive attributes, fairness assessment, bias mitigation, and ongoing monitoring and governance, given the sensitivity of variables such as caste and dowry. The work concludes that tree-based ensemble methods, particularly Random Forest, offer a favorable balance of predictive accuracy and interpretability for socio-cultural marital satisfaction tasks, while emphasizing that ethical governance and fairness-aware modeling practices are essential prerequisites before any deployment of such models beyond academic research.

Keywords - Marital Satisfaction, Random Forest, XGBoost, LightGBM, Feature Engineering, Ethical AI.

CH-91 AI-Powered Marketing Personalization and Consumer Behaviour in the Age of Generative and Agentic AI: A Conceptual Framework of Trust, Engagement and Purchase Intention

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Abstract

The rapid growth of artificial intelligence is fundamentally altering the process of customization of AI enabled marketing and recommendation system from traditional customer segmentation to real time adaptive, generative, predictive and rising AI mediated consumer interaction. Generative Artificial Intelligence (Gen AI), AI enabled shopping assistant and AI mediated conversational system are making the organizations capable of generating tailored content, individualized personalization and tailoring promotional offers leading to better customer brand interaction. Leading consumer evidence depicted that lately consumers are engaging and adapting themselves with AI systems as they realized future is AI integrated innovative products and the marketers on the other hand are trying to integrate AI with various personalization strategies for maintaining direct relationship with the consumers. Conversely, intensified customization often leads to intrinsic contradiction. Consumers may appreciate convenience, relevance and decision-making efficiency and may also become more cautious about digital surveillance, information privacy, reduced autonomy, algorithmic opacity and misinterpretation of personal data. This research formulates an emerging conceptual framework exploring AI enabled marketing personalization that shapes consumer decision making. The model is primarily grounded on Stimulus- Organism- Response(S-O-R) logic and Privacy Calculus Theory. The study defines the extent to which consumer perceived personalization and overall perceived benefit are getting influence by AI mediated marketing stimulus. These cognitive perceptions are hypothesized to shape consumer confidence that consequently strengthens consumer involvement and purchase likelihood. The positive association between direct personalization and purchase linkage is extending beyond privacy concerns can be considered as a result of cognitive assessment. The study advances a direct linkage between personalization and purchase relationship elucidating the mechanism AI powered personalization can shape response of the consumers. Further it consists of the evolving capabilities agent AI and Generative AI comprising of AI mediated product discovery,real time adaptation and conversional interaction. The proposed framework provides theoretical insights on AI mediated consumer research and also yields managerial implications with respect to algorithmic transparency, consumer autonomy and control, ethically responsible AI personalization and trust centric AI marketing.

Keyword - Artificial Intelligence (AI); AI-Powered Marketing Personalization; Generative AI; Agentic AI; Consumer Behaviour; Consumer Trust; Consumer Engagement; Purchase Intention; Privacy Concerns; Stimulus–Organism–Response (S-O-R); Privacy Calculus Theory; Algorithmic Transparency.

CH-92 A Unified Implementation Framework for Neural Networks: Integrating Architecture Selection, Training, Validation, Explainability, and Deployment

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Abstract

Neural networks are now implemented across nearly every application domain, but the practices that govern implementation are not organized the way the research on the architectures themselves is: a paper introducing a new architecture typically reports benchmark accuracy and says little about how the model was validated, explained, or monitored after deployment, leaving a practitioner to assemble data handling, validation, explainability, and monitoring practices independently, usually by borrowing conventions from whichever subfield is closest at hand. Surveys exist for most of the individual stages in this pipeline, but each is written for its own stage and rarely reaches into the others, so no existing account treats the full lifecycle as one connected process. This paper proposes a Unified Neural Network Implementation Framework (UNNIF) that organizes six stages of data engineering, architecture selection, training and optimization, validation, explainability, and deployment and monitoring into a single workflow connected by two feedback mechanisms: a validation-failure loop that routes a model failing calibration, robustness, or significance testing back to architecture selection rather than to further tuning, and a deployment-drift loop that routes a monitoring signal detected in production back to data engineering to trigger a targeted retraining cycle. The framework is grounded in a structured literature synthesis (2,750 raw records from IEEE Xplore, Scopus, and ScienceDirect, reduced to 2,387 unique records after deduplication; title/abstract screening against the six stages is in progress) and illustrated through a mapping against five published, real-world implementation studies, each instantiating at least one stage of the framework. This mapping demonstrates that each stage has a documented basis in practice; it does not demonstrate that the six stages function together as an integrated pipeline, and UNNIF has not been implemented end-to-end on a benchmark dataset. The paper's contribution is the explicit stage structure, the artifacts and decision gates between stages, and the two feedback mechanisms not the individual stages themselves, each of which has already established practice. We presented the framework, the evidence gathered for its feasibility, and a concrete protocol for the experimental evaluation of a full journal-length treatment will require.

Keyword - Neural networks, deep learning, implementation framework, MLOps, explainable AI, model validation, deployment and reproducibility.

CH-93 Influence of blended learning and AI tools usage on the development of future -ready skills among higher education students

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Abstract

Higher education is expected to prepare students not only with disciplinary knowledge but also with the capacity to learn, adapt and make informed decisions in changing academic and professional settings. This study examines how blended learning and AI tools are associated with the development of future-ready skills among higher education students. The study follows a descriptive research design with an inferential result and uses frequencies and percentages and graphical presentation to interpret student responses. Eleven high-impact indicators were selected for the study providing the clearest view of three connected areas: blended and digital learning practices, academic uses of AI tools, and capabilities related to adaptability and responsible technology use. The findings show that blended learning and digital academic support are already part of regular learning for a substantial proportion of respondents.

CH- 94 Network Intrusion Detection Using Machine Learning: A Random Forest Approach On The Unsw-Nb15 Dataset

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Abstract

Network intrusion detection systems (NIDS) increasingly use machine learning to identify attacks that traditional signature-based methods may fail to detect. However, most studies using the UNSW-NB15 dataset rely on relatively large feature sets, typically ranging from 12 to 49 attributes. This leaves an important question about how well tree-based models can perform when using only a small number of features. In this study, we evaluated a Random Forest classifier using just three flow-level features: duration (dur), source-to-destination bytes (sbytes), and destination-to-source bytes (dbytes). The model was trained using scikit-learn's default hyperparameters on an 80/20 data split across two UNSW-NB15 partitions. The model achieved an overall accuracy of 88.35%. However, while the F1-score for normal traffic was high at 0.938, the attack-class F1-score was only 0.016. This was mainly due to the very low attack-class precision of 0.008, even though the recall was moderately higher at 0.378. Among the three features, source bytes provided the strongest contribution to the model, followed by destination bytes and duration. Overall, the findings suggest that using only three features can capture some useful patterns, but this limited representation is not sufficient for reliably detecting attacks, particularly minority attack classes affected by class imbalance. The main challenge is that these features alone may not provide enough information to distinguish low-volume reconnaissance attacks from normal short connections. We also report a data-consistency issue in the underlying train/test split that could not be fully resolved before submission. Based on these findings, future work should consider stratified data splitting, class weighting or resampling, and gradually adding more informative features to determine how much feature enrichment is needed to achieve better performance while maintaining a relatively compact feature set.

CH-95 A Statistical Survey on the Usage, Trust, and Impact of ChatGPT among Engineering Students

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Abstract

Despite the widespread availability of artificial intelligence tools such as ChatGPT, their influence on student behaviour and learning practices remains an important area of discussion in higher education. This study examines the usage patterns, perceived reliability, and educational implications of ChatGPT among engineering students. Primary data were collected from 120 students enrolled in various engineering disciplines through a structured questionnaire. The study focuses on students' frequency of ChatGPT usage, its perceived benefits, and concerns regarding its influence on learning habits and academic performance. The findings indicate that approximately 78% of respondents use ChatGPT regularly for academic purposes, including generating initial ideas, simplifying complex concepts, and assisting with coding tasks. Students frequently report benefits such as faster comprehension and improved efficiency in completing academic activities. However, concerns regarding academic dishonesty, excessive dependence on AI-generated assistance, and the reliability of generated information remain significant. The absence of clearly defined institutional guidelines for responsible AI usage may further complicate the integration of such tools into higher education. The study highlights the importance of promoting responsible AI usage, strengthening students' critical thinking skills, and establishing clear institutional policies. It emphasises that balancing the educational benefits of ChatGPT with academic integrity and individual accountability is essential for ensuring its effective integration into engineering education.

Index Terms— ChatGPT, Artificial Intelligence, Student Behaviour, AI in Education, Academic Performance, Trust in AI.

CH-96 Occupational Stress and Stress Management Practices Among Professors in Higher Educational Institutions – An Empirical Study

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Abstract

This study examines occupational stress among professors in higher educational institutions in Bengaluru, using primary data collected from 105 respondents through a structured questionnaire. It aims to identify the major sources of occupational stress, evaluate stress management practices, and analyse variations in stress levels across different faculty designations using Analysis of Variance (ANOVA). The findings indicate that Assistant Professors experience slightly higher levels of stress than Associate Professors and Professors. However, the differences are not statistically significant at the 5% significance level ($F = 2.864$, $p = 0.061$). The study highlights the importance of institutional wellness initiatives, supportive leadership, counselling services, and work–life balance policies in promoting faculty well-being and managing occupational stress in higher education institutions.

Keywords- Occupational Stress, Stress Management, Professors, Higher Education, Faculty Well-being, Analysis of Variance (ANOVA).

CH-97 AI-Driven Sensational Thumbnail Detection Using Comment Sentiment and Transformer Models

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Abstract

Online video platforms increasingly face the problem of misleading or sensational thumbnails that attract clicks by exaggerating or misrepresenting the actual video content. Such practices create a mismatch between viewer expectations and the information delivered, potentially leading to viewer dissatisfaction and reduced trust in content creators. The proposed system introduces a comment-driven clickbait thumbnail detection approach that analyses audience feedback rather than relying solely on visual inspection or manual reporting. User comments are processed using VADER sentiment analysis to identify negative emotional cues, while a fine-tuned BERT classifier detects contextual linguistic patterns associated with clickbait. The results of these analyses contribute to a Clickbait Score, which helps identify potentially misleading content. The system is implemented as a YouTube Simulator Web Application using Python, Flask, MySQL, Bootstrap, and WampServer, with dedicated functionalities for administrators, YouTubers, and viewers. It also incorporates trustworthy video recommendations and real-time classification within the search and upload workflows. Project testing indicates that the major user functionalities, clickbait detection workflow, model training and deployment, and recommendation features operate successfully.

CH- 98 A Study on Relationship and impact of Intellectual Property Rights on IPR Learning Outcomes, Career readiness among Commerce Students

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Abstract

Intellectual Property Rights (IPR) are legal protections granted to creators and innovators to safeguard their intellectual creations and innovations.

IPR has gained increasing importance in the education system, as educational institutions now offer seminars, awareness programmes, workshops, and even dedicated courses on IPR as part of degree programmes. Despite these initiatives, there remains a lack of specific focus on the role of IPR education in enhancing career readiness and achieving learning outcomes. Existing research primarily focuses on IPR awareness and general perceptions, while career-related aspects remain relatively underexplored. The younger generation increasingly emphasises business, entrepreneurship, and commercialisation; however, the effectiveness of IPR education in preparing students for these professional roles has not been adequately examined.

This study aims to examine the relationship between Intellectual Property Rights education and IPR learning outcomes among commerce students. It also seeks to assess the impact of IPR education on students' learning outcomes and career readiness. The study will adopt a quantitative research design, with primary data collected from commerce students through a structured questionnaire covering exposure to IPR education, IPR learning outcomes, and career readiness. The study is expected to provide evidence regarding the association between IPR education, improved learning outcomes, and career readiness among commerce students.

Keywords- Intellectual Property Rights, IPR Education, Learning Outcomes, Career

Readiness, Commerce Students.

CH- 99 Engineering Customer Loyalty with Artificial Intelligence: The Engagement Imperative

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Abstract

Artificial intelligence (AI) is increasingly embedded in online retailing, where adaptive systems can tailor recommendations, content and offers to individual customers. This study examines how Adaptive AI Capability translates into Customer Loyalty through the serial mechanisms of Hyper-Personalization and Customer Engagement, while testing whether perceived Responsible AI strengthens the conversion of personalization into engagement. The analysis used survey data from 250 e-commerce customers in Visakhapatnam, India. A five-factor confirmatory factor analysis (CFA) was estimated with ordinal indicators using the WLSMV estimator, followed by a structural model for the hypothesized mediation chain and a latent moderated structural equation model (LMS). Adaptive AI Capability positively predicted Hyper-Personalization (β = .888, p < .001), Hyper-Personalization positively predicted Customer Engagement (β = .616, p < .001), Responsible AI positively predicted Customer Engagement (β = .353, p < .001), and Customer Engagement positively predicted Customer Loyalty (β = .904, p < .001). The standardized serial indirect effect was significant (β = .494, p < .001). A separate ML-based bootstrap robustness analysis (2,000 successful draws) yielded an unstandardized indirect effect of 0.404 (95% CI [0.235, 0.611]). The latent interaction between Hyper-Personalization and Responsible AI was significant (b = .169, SE =.073, p = .021), with a likelihood-ratio comparison indicating improved fit (ΔD = 5.797, df = 1, p = .016); however, the incremental explained variance was small (ΔR^2 = .012). The findings therefore support a serial engagement mechanism and indicate that Responsible AI is a modest amplifier of personalization's engagement payoff rather than a dominant effect.

Because the available analysis output contains unresolved sample-size and estimator inconsistencies, this manuscript should be treated as a revised submission draft pending final verification against the raw dataset and reproducible analysis script.

Keywords - Adaptive AI Capability, Hyper-Personalization, Responsible AI, Customer Engagement, Customer Loyalty, Structural Equation Modeling, Latent Moderated Structural Equations

CH- 100 IoT-Based Smart Cattle Health Monitoring System: A Proposed Architecture for Real-Time Livestock Health Analytics

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Abstract

Timely detection of illness in cattle remains a major challenge for dairy and livestock farmers, since manual observation is labour-intensive and often misses early physiological warning signs. This paper proposes an IoT-based Smart Cattle Health Monitoring System that continuously tracks body temperature, heart rate, physical activity, and environmental conditions using wearable sensors interfaced with an ESP32/NodeMCU microcontroller. Sensor data is transmitted through Wi-Fi, GSM, or LoRa to a cloud platform, where AI/ML-based analytics evaluate health trends and flag anomalies. Farmers and veterinarians are notified in real time through a mobile/web dashboard and an SMS/email/push-notification alert system. As the system is currently at the design and architecture stage, this paper focuses on the proposed hardware-software pipeline, communication protocols, and analytics workflow rather than on field-validated results. The proposed design aims to enable early disease detection, reduce livestock mortality, and support precision livestock farming at a cost accessible to small and commercial dairy farms.

Keywords - Internet of Things, precision livestock farming, cattle health monitoring, wearable sensors, ESP32, cloud analytics, anomaly detection

CH-101 AI-Based Adaptive Tsunami Early-Warning, Last-Mile Evacuation and Non-Evacuee Rescue System for Coastal Communities

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Abstract

Conventional tsunami warning systems are largely built around a single instruction: a tsunami is coming, evacuate. In practice, several factors keep that instruction from translating into safety for everyone — incomplete alert reach, limited mobility among elderly or disabled residents, congested or blocked roads, overcrowded shelters, a population that changes throughout the day, and, for near-source events, very little response time. This paper proposes an AI-based adaptive system that goes beyond issuing a single warning. The system estimates coastal risk in real time, tracks how many people are currently present in each area, issues a progressive sequence of warnings that scales with the time actually available, personalizes evacuation routes to individual mobility needs, manages crowd flow and shelter capacity dynamically, and — critically — continues to track who has not evacuated after the alert is issued. For that remaining population, the system estimates why they are still at risk, assigns a rescue priority, and directs them toward the nearest authority- designated refuge when reaching a distant shelter is no longer feasible. The framework does not claim to replace existing tsunami-detection infrastructure; its contribution is an AI decision layer that converts hazard, population, mobility, and infrastructure data into continuous, person-and zone-specific safety decisions.

Keywords— tsunami early warning; adaptive evacuation; dynamic population-at-risk mapping; AI-based decision making; last-mile evacuation; non-evacuee detection; rescue prioritization; coastal disaster management.

CH-102 AI-Based Automated Evaluation of Handwritten Descriptive Answer Scripts Using Vision-Language OCR and Constraint-Aware LLM Grading

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Abstract

Evaluation of handwritten descriptive answer scripts has always been considered difficult due to handwriting differences, OCR errors, semantics variability of students' answers, and specific rules for grading in the particular examination process. The existing approaches to automated assessments mainly involve using the clean digital version of text and lexical matching techniques, restricting their application in real-life scenarios of handwritten examinations. This paper proposes an end-to-end AI-powered system that combines Vision-Language Optical Character Recognition (OCR) and constraint-aware Large Language Model (LLM) in order to provide semantic grading of handwritten answer scripts. A Florence-2 vision-language model that was fine-tuned on the IAM Handwriting Database is used for recognizing handwritten texts in a reliable way followed by an answer alignment algorithm that aligns the answers to questions considering the peculiarities of the examination process structure. The grading is performed by locally running Llama 3 (8B) grading engine that evaluates the answers according to the grading rubrics, including the marking scheme, optional questions, and section-wise grading.

Index Terms—Automated Essay Scoring (AES), Handwritten Text Recognition, Vision-Language Models, Florence-2, Large Language Models, Semantic Answer Assessment, Constraint- Aware Grading, Educational AI.

CONCLUSION

The International Conference on **Artificial Intelligence, Innovation and Sustainable Development** (ICAIISD 2026), organized by the CMAOI Association in collaboration with AMIEE Association and RAHSS Association, concluded with remarkable success and global participation.

The two-day virtual conference, held on 29th–30th August 2026, brought together a vibrant community of scholars, researchers, industry experts, and academicians who presented over 200 high-quality research papers across multiple tracks. The event became a hub for intellectual exchange, collaboration, and innovation in fields such as Artificial Intelligence, Data Science, Internet of Things, Cybersecurity, Blockchain, Educational Technologies, and Healthcare Intelligence.

The contributions of our Convener, Co-Conveners, Conference Chairs, Directors, Session Chairs, Jury Members, and Review Committees were instrumental in maintaining academic excellence throughout the event. Their collective effort, along with the enthusiasm of participants, ensured a seamless and intellectually enriching experience.

All accepted and peer-reviewed papers will be published in the Journal of Research and Innovation in Technology, Commerce, and Management (JRITM), providing enduring visibility and impact within the global research community.

With renewed inspiration and collective vision, CMAOI extends heartfelt gratitude to all collaborators, speakers, reviewers, and delegates who contributed to making ICAIISD 2026 an outstanding global academic event.

Dr. Aamir Junaid Ahmad

Conference
Chair Secretary, CMAOI
Association