"SHAPING THE FUTURE WITH INTELLIGENT SOLUTIONS"

AI-SI 2025

IEEE INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE INNOVATION

26-28 AUGUST 2025
KUALA LUMPUR

Seri Pacific Hotel Kuala Lumpur

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WELCOMING MESSAGE

WELCOMING MESSAGE
PROF. TS. DR. NAZ'RI MAHRIN
DEAN OF FACULTY OF ARTIFICIAL INTELLIGENCE, UTM

Assalamualaikum warahmatullahi wabarakatuh,
Salam Sejahtera and warm greetings to all.

On behalf of Universiti Teknologi Malaysia (UTM) and the Faculty of Artificial Intelligence (FAI), it is my distinct honour to welcome you to the 1st IEEE International Conference on Artificial Intelligence for Sustainable Innovation (IEEE AI-SI 2025). This inaugural conference is especially meaningful for us, as it represents the first international gathering hosted by our faculty in collaboration with IEEE. It is a milestone that reflects our shared commitment to advancing impactful research and innovation, aligned with UTM's vision as a global university shaping the future through education, research, and innovation.

Though newly established, the Faculty of Artificial Intelligence is dedicated to becoming a leading hub for AI-driven discovery and innovation. We are committed to nurturing interdisciplinary collaborations and promoting the ethical and responsible use of AI to address the world's most pressing challenges, particularly in driving sustainable solutions.

We are also deeply grateful for the generous support of our sponsors and partners, whose contributions have made this conference possible. Your trust and collaboration not only strengthen the impact of this event but also demonstrate the value of academia-industry partnerships in shaping the AI ecosystem. Together with the support of the IEEE Computer Society Malaysia Chapter, our sponsors, and the wider academic and professional community, this conference embodies our shared aspiration: to create a vibrant platform for intellectual exchange, cross-disciplinary collaboration, and meaningful innovation
.
I encourage all participants to make the most of this opportunity—to engage actively in the discussions, to share and explore bold ideas, and to forge lasting networks that will continue beyond this conference.

Thank you, and I wish you an inspiring and fruitful conference.

Prof Ts. Dr. Naz'ri Mahrin
Dean, Faculty of Artificial Intelligence
Universiti Teknologi Malaysia

WELCOMING MESSAGE

WELCOMING MESSAGE BY CONFERENCE CHAIR,
ASSOC. PROF. TS. DR. NOOR AZURATI AHMAD @ SALLEH

Assalamualaikum warahmatullahi wabarakatuh,
Salam Sejahtera and a very good morning to all.

It is my great pleasure to welcome you to the 1st IEEE International Conference on Artificial Intelligence for Sustainable Innovation (IEEE AISI2025). This inaugural gathering is more than an academic milestone. It is a platform for us to reflect on how artificial intelligence can be harnessed responsibly to support sustainability, resilience, and inclusive growth. At this moment in history, when societies face complex environmental and economic challenges, it is vital that technological progress is guided by foresight and purpose.

We are privileged to have with us two world-renowned keynote speakers, Prof. Chang D. Yoo from KAIST and Prof. Lam Kwok Yan from NTU Singapore. Their perspectives will help us examine how AI can contribute meaningfully to solving some of the most pressing global issues. We are also hosting a leadership forum with representatives from MESOLITICA, TM, and CAIRO-UTM, where ideas from academia, industry, and policy will converge in charting sustainable pathways for AI.

To complement these discussions, the programme features five specialised workshops. Delivered by experts from CAIRO-UTM, Infineon Technologies, Mesolitica Sdn Bhd, and Mastercard, they will expose participants to practical applications ranging from workplace innovation and edge intelligence to generative AI and digital security. These sessions reflect our belief that knowledge must not remain theoretical, but be tested, applied, and scaled for real impact.

The strong response to this conference, with over 52 paper submissions from 17 countries demonstrates both the global relevance of our theme and the commitment of researchers worldwide to align AI with sustainable innovation. Each presentation and dialogue is a contribution towards ensuring that AI is developed and applied with responsibility and integrity.

On behalf of the organising committee, I thank our sponsors, partners, and contributors for their invaluable support. May this conference inspire you to share ideas, build collaborations, and create solutions that will shape the future of AI for the greater good.

Assoc. Prof. Ts. Dr. Noor Azurati Ahmad @ Salleh
Chair, IEEE AISI2025

PROGRAMME SCHEDULE

Day 1 (Tuesday, 26 August 2025)

08:15 – 08:45	:	Arrival of Participants and Registration
08:45 – 09:00	:	The arrival of VVIP
09:00 – 10.00	:	**Opening Ceremony**
09:05 – 09:10	:	Doa Recitation
09:10 – 09:20	:	**Welcoming Speech by YBrs. Prof. Ts. Dr. Ali Selamat** Deputy Vice Chancellor (Student Affairs & Alumni), UTM
	:	**Officiating Address by YBhg. Datuk Prof. Dr. Azlinda Azman** Director General of Higher Education, Department of Higher Education, Ministry of Higher Education Malaysia
09:45 – 10:00	:	Souvenir Presentation & Photo Session
10:00 – 10:30	:	*Refreshment*
10:30 – 11:15	:	**Keynote Speech 1 : Prof. Chang D. Yoo** Korea Advanced Institute of Science & Technology (KAIST), Korea
11:20 – 13:00	:	**Parallel Technical Session 1A, 1B & 1C**
13:00 – 14:00	:	*Lunch & Networking*
14:00 – 15:00	:	**Industry Forum Session by** Mesolitica Sdn. Bhd, Telekom Malaysia Berhad & CAIRO–UTM
15:00 – 17:20	:	**Parallel Technical Session 2A & 2B**
17:20 – 18:00	:	*Refreshment*

Day 2 (Wednesday, 27 August 2025)

08:45 – 09:00	Arrival of Participants and Registration
09:00 – 10:00	**Keynote Speech 2: Prof. Lam Kwok Yan** Nanyang Technical University, Singapore
10:00 – 10:15	*Refreshment*
10:15 – 11:15	**Parallel Technical Session 3A & 3B**
11:15 – 13:00	**Parallel Technical Session 4A**
13:00 – 14:00	*Lunch & Networking*
14:00 – 15:45	**Parallel Technical Session 5A & 5B**
16:00 – 17:00	**Closing and Award Ceremony**
17:00 – 17:30	*Refreshment*

SPEAKERS & PANELLISTS

KEYNOTE SPEAKER

PROF. CHANG D. YOO
KOREA ADVANCED INSTITUTE OF SCIENCE & TECHNOLOGY (KAIST)

KEYNOTE SPEAKER

PROF. LAM KWOK YAN
NANYANG TECHNICAL UNIVERSITY, SINGAPORE

PANELLIST 1

MR. KHALIL NOOH
CO-FOUNDER & CEO, MESOLITICA SDN BHD

PANELLIST 2

MR. MUHAMMAD QUSAIRY MOHAMAD
GENERAL MANAGER, ARTIFICIAL INTELLIGENCE, TELEKOM MALAYSIA

PANELLIST 3

ASSOC. PROF. TS. DR. MOHD IBRAHIM SHAPIAI@ABD RAZAK
DIRECTOR, CAIRO-UTM & FOUNDER, PINTARAI

WORKSHOPS
VENUE: UNIVERSITI TEKNOLOGI MALAYSIA (UTM) KUALA LUMPUR
JALAN SULTAN YAHYA PETRA, UNIVERSITI TEKNOLOGI MALAYSIA, 54100 KUALA LUMPUR, WILAYAH PERSEKUTUAN KUALA LUMPUR

Day 3 (Thursday, 28 August 2025)			
09:00 - 11.00	**WORKSHOP 1** **AI @ Workplace** **Nenny Ruthfalydia Rosli** *CAIRO-UTM*	**WORKSHOP 2** **AI & Edge Deep Learning with Jetson Nano** ***Assoc. Prof. Ts. Dr. Mohd Ibrahim Shapiai @ Abd Razak*** *CAIRO-UTM*	**WORKSHOP 3** *(online -hybrid)* at DEWAN JUMAAH, UTM KL **Edge AI in Action: Tools, Techniques, and Real-World Demos** ***Yogesh Shankar,*** *System Application Engineer, Infineon Technologies*
11.00 – 13.00			**WORKSHOP 4** *(online -hybrid)* **Solo to Scale: Building Multi-Agent AI Systems with n8n and MaLLaM** ***Fahmi Fauzi*** *Generative AI Developer, Mesolitica Sdn Bhd*
14.00 - 16:00			**WORKSHOP 5** *(online -hybrid)* **Cybersecurity Beyond the Card: Protecting Your Identity in the Digital Economy** ***Cassie Roberts,*** *Solutions Consulting APAC Lead* ***Apurva Jain,*** *Products Manager* *Mastercard*

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KEYNOTE SPEAKER

Professor Dr. Chang D. Yoo
Professor, School of Electrical Engineering,
Korea Advanced Institute of Science and Technology (KAIST)
Director, Artificial Intelligence & Machine Learning Lab (AIM)

Generative AI Revolution: Promise, Peril and the Path Forward

Generative AI has rapidly evolved from a research curiosity to a powerful force reshaping industries and society. This talk will examine the current state of generative AI, encompassing large language models and the emergence of multimodal systems that can interpret and generate text, images, and other media. We'll also examine how diffusion models are transforming creative and scientific fields. While these technologies offer exciting opportunities, they also raise significant challenges: the energy and resource demands of development, the risks of bias and misuse, and the ethical complexities of synthetic content. This session will offer a balanced view—highlighting the promise of generative AI for innovation and sustainability, while addressing the critical concerns that must shape its future.

Professor Chang D. Yoo is a renowned academic in Artificial Intelligence and Machine Learning at KAIST, South Korea. He holds a Ph.D. from MIT (2006) and leads the Artificial Intelligence & Machine Learning Lab (AIM). His research spans deep learning, computer vision, multimedia signal processing, speech/audio processing, and robotics. Professor Yoo has made impactful contributions to premier AI conferences including NeurIPS, CVPR, and ECCV. He is known for pioneering work in high-quality region proposal networks, graph neural networks for few-shot learning, and multimodal AI systems.

KEYNOTE SPEAKER

Professor Dr. Lam Kwok Yan
Associate Vice President (Strategy and Partnerships),
Nanyang Technological University, Singapore
Executive Director, Digital Trust Centre Singapore &
Singapore AI Safety Institute

Building Digital Trust and Safety in AI-Driven Societies

The rapid adoption of digitalization in almost all aspects of economic activities has led to serious concerns in security, privacy, transparency and fairness issues of digitalized systems. These issues will result in negative impacts on people's trust in digitalization, which need to be addressed in order for organizations to reap the benefits of digitalization. The typical value proposition of digitalization such as elevated operational efficiency through automation and enhanced customer services through customer analytics require the collection, storage and processing of massive amount of user data, which are typical cause for data governance issues and concerns on cybersecurity, privacy and data misuses. AI-enabled processing and decision-making also lead to concerns on algorithm bias and distrust in digitalization. In this talk, we will brief review the motivation of digitalization, discuss the trust issues in digitalization, and introduce the emerging areas of Trust Technology which is a key enabler in digital transformation and for developing and growing the digital economy.

Professor Lam Kwok Yan is a leading authority in cybersecurity, digital trust, and AI safety with over three decades of academic and industry experience. He is currently Associate Vice President (Strategy and Partnerships) at Nanyang Technological University (NTU), Singapore, where he also serves as Professor at the College of Computing and Data Science. Professor Lam is Executive Director of both the Digital Trust Centre Singapore and the Singapore AI Safety Institute. He has served as a cybersecurity consultant to INTERPOL and has founded several award-winning deep-tech startups in AI and data privacy. His research spans distributed systems, quantum computing, federated learning, privacy-preserving AI, and satellite IoT security. In 2022, he was inducted into the Singapore Cybersecurity Hall of Fame.

INDUSTRY FORUM SESSION

The forum "Accelerating AI Adoption for Sustainable Impact" highlights the efforts of leading Malaysian innovators, including TM Berhad's AI computing infrastructure such as GPU-as-a-Service (GPUaaS) and AI applications, Mesolitica's culturally tailored large language models such as MaLLaM for regional linguistic needs, and CAIRO UTM's applied research in AI and robotics together with talent development initiatives. These collective efforts are pivotal in strengthening Malaysia's dynamic AI ecosystem, advancing sustainable impact through essential infrastructure, sovereign AI solutions, and comprehensive talent development to secure the nation's digital future.

Khalil Nooh
Co-Founder & CEO, Mesolitica Sdn Bhd

Muhammad Qusairy Mohamad
General Manager, Artificial Intelligence,
Telekom Malaysia Berhad

Assoc. Prof. Ts. Dr. Mohd Ibrahim Shapiai@Abd Razak
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Founder, PINTARAI

Dr. Norshaliza Kamaruddin
Moderator
Senior Lecturer, Faculty of Artificial Intelligence, UTM

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CONFERENCE VENUE

The AI-SI 2025 Conference will be held at the prestigious Seri Pacific Hotel Kuala Lumpur, a 5-star business hotel ideally situated and directly connected to the World Trade Centre Kuala Lumpur. This venue combines exceptional accessibility being steps from PWTC LRT station with elegant facilities and modern conferencing amenities, making it the perfect setting for this distinguished international gathering. For more details, please visit the official Seri Pacific Hotel website (https://www.seripacifichotel.com/)

Getting There

- From KLIA / KLIA2
  - Take KLIA Ekspres (28 minutes) to KL Sentral
  - From KL Sentral, take the Kelana Jaya LRT Line to PWTC Station (≈15 minutes)
  - Walk a few minutes to the hotel

- From KL Sentral
  - Direct LRT (Kelana Jaya Line) to PWTC Station (≈15 minutes)
  - Alternatively, a Grab car ride takes ≈15 minutes
  -
- Nearest Public Transport
  - PWTC LRT Station (Kelana Jaya Line) – walking distance
  - Putra KTM Komuter Station – nearby

- By Car / Ride-Hailing (Grab)
  - From KLIA: ≈50–60 minutes (depending on traffic)
  - From KL Sentral: ≈15 minutes

PRESENTATION SESSIONS SCHEDULE

PRESENTATION SESSIONS | TUESDAY 26 AUGUST 2025

SESSION 1A:
AI FOR INDUSTRY, INFRASTRUCTURE, AND SMART SYSTEMS
11:20 - 13: 00 | VENUE: PACIFIC BALLROOM A
Session Chair: Dr Norshaliza Kamaruddin Session
Co-Chair: Dr Yusnaidi Md Yusof

11:20 – 11:40

1571164197 | Title: Modeling Household Intentions to Reduce Food Waste Using Interaction-Based Machine Learning
Authors : Normaisharah Mamat; Norul Hajar Nordin; Wan Noor Hamiza Wan Ali Accepted; Noor Jannah Zakaria; Aznilinda Zainuddin; Nor Azizah Mohd Yusoff

Household food waste poses a major barrier to achieving global sustainability, particularly Sustainable Development Goal (SDG) 12.3, which aims to halve per capita food waste by 2030. While public campaigns and regulations have raised awareness, predicting household food waste behavior remains challenging due to complex, non-linear interactions among demographic and behavioral factors. Existing approaches often fail to capture these dynamics effectively. This study proposes the Household Food Waste Intention Predictor (HF-WIP), a machine learning-based framework designed to model and predict intentions to reduce household food waste. Using data from 505 Malaysian households and nine key attributes, the study evaluates a range of linear and non-linear models including Support Vector Regression (SVR), Neural Networks, and ensemble methods with an emphasis on interaction-based feature engineering. Among the models, SVR with a radial basis function (RBF) kernel achieved the best performance (RMSE: 0.8187; R2: 0.061), effectively capturing the non-linear patterns in food waste behavior. The inclusion of interaction terms, such as between education and income, provided additional predictive value. The HF-WIP framework offers a scalable, data-driven approach to support policy-making, personalized awareness programs, and smart technologies that promote sustainable food waste management. By identifying key behavioral drivers, this study contributes actionable insights toward achieving SDG-aligned household food waste reduction strategies.

11:40 – 12:00

1571159631 | Title: Swarm-Based Hyperparameter Tuning for LSTM in Collision Risk Index Prediction Using AIS Data
Authors : I Made Dwi Putra Asana; I Made Oka Widyantara; Linawati Linawati; Dewa Wiharta; Nyoman Gunantara, Gun; I Gusti Agung Komang Diafari Djuni Hartawan; Dhimas Widhi Handani

Accurate prediction of the Collision Risk Index (CRI) is essential for enhancing maritime safety, particularly in congested navigational environments. This study proposes a novel swarm-based hyperparameter optimization framework by integrating the Particle Swarm Optimization with Hummingbird Flight (PSO-HBF) algorithm into Long Short-Term Memory (LSTM) networks for CRI prediction using Automatic Identification System (AIS) data. PSO-HBF introduces biologically inspired search mechanisms that dynamically regulate exploration and exploitation, improving search efficiency in high-dimensional parameter spaces. Experimental evaluation was conducted using real-world AISdatasets, comparing PSO-HBF with standard PSO and Ant Colony Optimization (ACO) across three independent runs.Results show that PSO-HBF consistently achieved the lowest test loss of 0.002344, representing a 0.38% reduction compared to the best result of PSO and ACO at 0.002353. Despite the marginal absolute difference, PSO-HBF converged in only six iterations—33% fewer than the baselines—and exhibited greater hyperparameter exploration diversity, enhancing robustness and avoiding premature convergence. Moreover, although PSO-HBF incurred slightly higher computation time per iteration due to its adaptive dynamics, it achieved the shortest total optimization time overall due to earlier convergence. These findings confirm the effectiveness of PSO-HBF in balancing accuracy, convergence speed, and computational cost. The proposed framework presents a reliable and efficient approach for hyperparameter tuning in deep learning-based maritime risk modeling, and opens promising directions for real-time, explainable AI-driven CRI mitigation systems.

12:00 – 12:20

1571165595 | Title: Random Forest-Based Classification of Railway Wheel Defects: a Comparative Data Perspective
Authors : Nurfitri Muhamad Nasir; Siti Armiza Mohd Aris; Yung Yaw Tay

This paper presents a comparative study of machine learning performance in classifying defective and non-defective railway wheels using two datasets: (1) the original dataset and (2) an augmented dataset created by adding synthetically generated data to the original dataset. The study focuses on two distinct categories which are defective (all fail) conditions and non-defective (all pass) conditions, based on three key features namely flange thickness, flange height, and flange inclination (Qr). A Random Forest (RF) classifier was employed, and both datasets were evaluated under the same experimental pipeline using standard classification metrics including accuracy, precision, recall and F1-score. To enable a direct comparison, synthetic data was generated using Kernel Density Estimation (KDE), which produced additional samples for both classes while preserving the original statistical distribution. Results show that the classifier achieved 100% performance in both classes, indicating that the original dataset was already highly informative. However, KDE-based synthetic data augmentation is a preferred approach as it effectively addresses data scarcity and imbalance, thereby enhancing the reliability and future readiness of predictive models in railway maintenance systems.

12:20 – 12:40

1571149228 | Title: SmartFire Vision: Advancing Fire Detection in Smart Cities by Hybrid Deep Learning Technique
Authors: Asma Iqbal; Muhammad Azhar; Muhammad Shafqat Ali; Muhammad Usman; Waqas Ahmad Wattoo; Muhammad Farhan

Recently, the risk of fire has globally been increased due to climate change, urbanization and tremendous growth of the population. Conventional smoke and fire detectors face challenges in detecting and providing useful information about the location, spreading speed, and the size of a fire. With the boom of AI-based techniques, deep learning models have shown promising results in addressing such challenges. This study presents a novel approach for smoke and fire detection in video sequences, utilizing an integrated Vision Transformer (ViT) and DEtection TRansformer (DETR) model. Our approach leverages the Removing Inefficient Attention Heads technique within ViT to enhance feature extraction efficiency and accuracy. Concurrently, DETR provides precise object localization and context understanding. The combined features of ViT and DETR are fused and classified using a fully connected neural network, incorporating a thresholding mechanism to reduce false alarms and an integrated alarm system for rapid response. The proposed model was trained on the Furg fire dataset and the results have validated the performance of our algorithm by achieving an overall accuracy of 91.37%, recall of 85.27%, precision of 88.55%, and an F1-score of 86.64%.

12:40 – 13:00

1571160390 | Title: Determinants of Deployment Smart Road Asset Management for Real-Time Pavement Defects Detection
Authors: *Raftah Abdul Razak; Noor Irza Mohd Zaki; Mohd Khairi Abu Husain*

Effective road maintenance is critical for maintaining infrastructure quality, ensuring road safety and extending its service lifespan. However, traditional pavement defect detection methods at Pasir Gudang Highway are a reactive approach, time-consuming, labor-intensive, and lack real-time monitoring capabilities. The adoption of smart road asset management (SRAM) can address these challenges; however, its deployment remains limited. This study examines the key determinants that influence the deployment of SRAM for real-time pavement defect detection on the Pasir Gudang Highway, with the aim of transitioning from conventional to proactive maintenance. A quantitative approach was employed, utilising a structured questionnaire survey distributed among authorities, road maintenance professionals, engineers, and contractors involved in the Pasir Gudang Highway project. Data were analysed using both descriptive and inferential statistics to identify significant factors influencing adoption. Results indicate that perceived usefulness, including high productivity, accuracy, and reliability of output, as well as ease of operation, are the most influential determinants of SRAM deployment. The operational challenges and drawbacks of the current system have a significant and direct impact influencing the determinants. The findings provide actionable insights for policymakers and road authorities to facilitate SRAM adoption by addressing critical barriers and leveraging enabling factors. This study contributes to the literature on smart infrastructure and road management by highlighting the prerequisites for successful technology integration in road maintenance.

SESSION 2A:
POLICY AND GOVERNANCE FOR RESPONSIBLE AND ETHICAL USE OF AI
15:00 - 17:20 | VENUE: PACIFIC BALLROOM A
Session Chair: Assoc Prof Dr Mohd Rizal Mohd Isa (UPNM)
Session Co-Chair: Dr Fiza Abdul Rahim

15:00 – 15:20

1571160237 | Title: Towards a Shariah-Based AI Adoption Model for Islamic Public Services in Malaysia
Authors : Nor Faizal Paiman; Hazlifah Mohd Rusli; Haslina Md. Sarkan; Yazriwati Yahya; Faizura Haneem Mohamed Ali; Mohd Nazri Kama

Islamic public service organization in Malaysia face significant operational inefficiencies in areas such as fatwa issuance, halal certification, and zakat distribution. While Artificial Intelligence (AI) offers a viable solution, its adoption is hindered by the absence of a suitable governance framework. Existing technology adoption models, though useful, are not designed to incorporate the foundational ethical and religious principles of Islamic governance. This paper addresses this critical gap by proposing a Shariah-Based AI Adoption Model. Through a conceptual analysis grounded in literature, national policy guidelines, and insights from Islamic domains, this study extends the established Technology-Organization-Environment (TOE) framework. It integrates a mandatory Shariah Governance and Ethical Dimension that explicitly aligns AI evaluation with Maqasid al-Shariah—the preservation of faith (din), life (nafs), intellect (aql), lineage (nasl), and wealth (mal). The resulting model provides organizational leaders with a structured, value-centric framework to guide responsible AI adoption, ensuring modernization enhances service delivery without compromising religious integrity.

15:20 – 15:40

1571160078 | Title: A Holistic Framework for Data Governance: Advancing Data-Driven Decision-Making in Organization
Authors : Norhadiyati Binti Mohd Mokhtar; Nurulhuda Firdaus Mohd Azmi

In the age of digital transformation, organizations increasingly rely on data-driven decision-making to enhance operational effectiveness and competitiveness. However, fragmented data management, regulatory non-compliance, and ineffective decision-making often result from the absence of a holistic data governance framework. Focusing on Malaysian organizations, this study investigates the development and evaluation of a holistic data governance framework aimed at embedding governance principles into strategic decision-making. This study uses a mixed-method approach to collect empirical data on current governance structures, decision-making authority, and corporate data culture. It does this by combining quantitative surveys with qualitative focus groups with professionals in the sector. In order to ensure data integrity, security, and strategic value creation, the suggested holistic framework aims to integrate data governance principles into organizational procedures. According to the results, companies that have well-organized data governance frameworks are better able to make data-driven decisions, comply with regulations, and better align with their corporate goals. This study advances both theory and practice by providing a methodical framework for putting data governance into effect in businesses, especially in developing nations. Policymakers, data governance professionals, and organizational leaders who want to use data as a strategic asset might use the suggested framework as a guide. Future studies should examine how well this paradigm works in other industries and how it affects organizational performance over the long run.

16:00 – 16:20

1571159478 | Title: A Study on the Application of AIGC in Children's Food Packaging Design Supported by the AIRAI Cloud
Authors : Li yixuan Y LI, Yixuan; Maslin Masrom

Optimization methods are crucial for improving the performance of 5G and 6G networks, primarily by enhancing key aspects such as beamforming and transmission power. These methods enable the efficient use of the available spectrum, leading to increased data rates, lower latency, and improved reliability, all of which are fundamental for supporting the applications envisioned for these networks. By optimizing beamforming, networks can achieve more precise directional signal transmission, reducing interference and increasing capacity. Similarly, power optimization ensures that the transmission power is used judiciously, extending battery life in user devices and reducing overall energy consumption. These improvements are essential for meeting the ever-growing demand for higher data throughput and better quality of service in modern wireless communication systems. This article explores how optimization methods can be applied to fine-tune transmission power of beamforming antennas with various transmit and receive patterns, ultimately maximizing overall channel capacity. We employed these optimization techniques to identify the highest achievable total channel capacity by identifying the optimal beamforming steering vectors for both transmitters and receivers. Among the seven optimization methods evaluated, Genetic Algorithm, Hill Climbing, and Shotgun Hill Climbing consistently demonstrated superior performance—achieving up to 99.7% accuracy—making them the most effective approaches when considering both accuracy and execution time. The goal of this approach is to improve the efficiency and performance of 5G and 6G networks while also minimizing energy consumption.

16:20 – 16:40

1571154742 | Title: A Two-Phase Evolutionary Framework to Boost Adversarial Robustness in Neural Networks
Authors: Charanarravindaa Suriess; Nurul Maziah Mohd Barkhaya; Rathosivan Gopal

As artificial intelligence–generated content (AIGC) technologies advance rapidly, their role in visual design has expanded from simple image synthesis to enabling creative workflows and seamlessly integrating into design systems. However, existing research has largely focused on AIGC's core image-generation capabilities, with scant systematic examination of workflow efficiency, targeted adaptability, and practical deployment in specific design contexts. This study leverages AIRAI Cloud — a cloud-deployed AIGC visual platform underpinned by Stable Diffusion — to propose and empirically validate an AI-assisted workflow framework specifically designed for children's food packaging. The platform empowers users, regardless of local hardware limitations, to navigate every critical creative phase, from initial concept ideation to visual prototype realization, while ensuring robust scalability and configurable adaptability. Empirical results indicate that AIRAI Cloud substantially improves designers' ideation efficiency, shortens iteration cycles, and enhances the effectiveness of visual communication with stakeholders. Compared to conventional design workflows or off-the-shelf AIGC solutions, the AIRAI platform demonstrates superior process alignment and integration value in targeted consumer product design tasks. This study addresses a critical gap in research on AIGC deployment pathways and system-level validation within professional design settings, offering empirical evidence and a platform-based framework to support AI-assisted methodologies in consumer visual design workflows.

16:40 – 17:00

1571160147 | Title: AI in Education: Exploring the Benefits, Risks, and Future Potential: a Bibliometric Analysis
Authors : Jehad M Shehab, Dr. Jehad; Nurazmallail Marni; Diaya Ud Deen Deab Mahmoud Al Zitawi; Fahrul Irfan Ishak; Mehmet Akif Kılıç

This study takes a close look at how artificial intelligence (AI) is shaping education around the world. By analyzing 135 peer-reviewed articles published between 2020 and 2024 and using tools such as VOSviewer and Biblioshiny, it explores the trends, key players, and recurring themes that define this fast-growing field. The data, drawn from Scopus and filtered through the PRISMA 2020 framework, shows that interest in AI surged around 2021, especially with the rise of tools like ChatGPT, adaptive learning systems, and AI-powered feedback platforms. While many studies highlight the benefits of these tools—such as personalized learning and greater access—others raise concerns about ethics, academic integrity, bias, and data privacy. Most research has come from countries such as the United States, China, and the UK, with a strong focus on healthcare and higher education. However, there is a noticeable gap in research from underrepresented regions, as well as in areas such as teacher training and the ethical use of AI in diverse cultural settings. Forecasts suggest that unless new innovations or research directions emerge, interest in this field could decline by 2027. This review offers a clear, data-backed picture of where we are now and where we might go next. It calls for more inclusive and ethically grounded research, rooted in both global perspectives and local values. AI has the potential to transform learning, but to do so meaningfully, it must serve not just efficiency, but also equity, responsibility, and the human spirit of education.

17:00 – 17:20

1571160941 | Title: AI-Driven Behavioral Inference from Open Energy Data: Implications for Public Data Governance
Authors : Yanis Fadili; Valérie Fernandez; Thomas Houy; Guillaume Guérard

Open data initiatives in smart cities are designed to promote transparency and improve public services. However, recent advances in machine learning allow behavioral inferences to be drawn from anonymized datasets. This paper applies Dynamic Time Warping (DTW) to residential electricity consumption data from a public-government repository to detect patterns of presence and absence. The analysis does not rely on personal identifiers, but instead focuses on temporal similarity across consumption curves. Our contributions include (1) one of the first exploratory applications of DTW to French open energy data for behavioral inference, (2) a comparative evaluation of four DTW implementations, and (3) a governance framework supported by operational recommendations and illustrated by an adaptive cycle.

11:20 – 11:40

1571149102 | Title: Caries Detection in Dental Imaging Using Vision Transformer and Explainable AI
Authors : Ifra Shabbir; Muhammad Azhar; Muhammad Shafqat Ali; Chan Kit Ling; Waqas Ahmad Wattoo; Asma Iqbal

Dental caries, commonly known as tooth decay or cavities, have long posed a significant challenge to oral health. Early identification is essential for effective treatment and for preventing further damage to teeth. Traditionally, dentists relied on visual examinations to diagnose cavities by looking for obvious signs of decay. However, due to the increasing patient-to-dentist ratio and the advancement of artificial intelligence, deep learning techniques have gained prominence in recent years. Despite their potential, the black-box nature of these deep learning models can lead to ambiguity in their decision-making processes. To tackle this issue, a study was conducted using explainable AI in human-centric medical applications to identify cavities in dental images and provide clear visualizations for diagnosis. Our approach integrates Vision Transformer (ViT) with Local Interpretable Model-Agnostic Explanations (LIME), where LIME is utilized to visually elucidate the classifications made by the ViT model. The Vision Transformer effectively extracts relevant features from dental images, while LIME offers interpretable visual explanations for the AI model's decisions, helping dentists understand the factors influencing their diagnoses. Experimental results demonstrate the efficacy of our approach in cavity detection, facilitating early intervention and ultimately improving oral health outcomes through explainable AI.

11:40 – 12:00

1571148767 | Title: Optimizing Beamforming and Transmit Power for Improving mmWave Wireless Network Performance
Authors : Parmida Geranmayeh; Eckhard Grass

Optimization methods are crucial for improving the performance of 5G and 6G networks, primarily by enhancing key aspects such as beamforming and transmission power. These methods enable the efficient use of the available spectrum, leading to increased data rates, lower latency, and improved reliability, all of which are fundamental for supporting the applications envisioned for these networks. By optimizing beamforming, networks can achieve more precise directional signal transmission, reducing interference and increasing capacity. Similarly, power optimization ensures that the transmission power is used judiciously, extending battery life in user devices and reducing overall energy consumption. These improvements are essential for meeting the ever-growing demand for higher data throughput and better quality of service in modern wireless communication systems. This article explores how optimization methods can be applied to fine-tune transmission power of beamforming antennas with various transmit and receive patterns, ultimately maximizing overall channel capacity. We employed these optimization techniques to identify the highest achievable total channel capacity by identifying the optimal beamforming steering vectors for both transmitters and receivers. Among the seven optimization methods evaluated, Genetic Algorithm, Hill Climbing, and Shotgun Hill Climbing consistently demonstrated superior performance—achieving up to 99.7% accuracy—making them the most effective approaches when considering both accuracy and execution time. The goal of this approach is to improve the efficiency and performance of 5G and 6G networks while also minimizing energy consumption.

12:00 – 12:20

1571158644 | Title: Semantic IoT-Based Audiobooks for Dyslexic Learners: Personalized Narration and Real-Time Adaptation
Authors : Nguyễn Xuân Nam; Huong Thanh Do; Huy Viet Vuong; Tu Pham Vu Minh; Mai Phuong Ngo; Tien Dat Ngo

An integrated AI-powered personalized learning system for children with dyslexia is proposed. The system combines advanced Text-to-Speech (TTS), adaptive artificial intelligence, and real-time emotion recognition to tailor narration according to each learner's cognitive load and affective state. To address the deficiencies of current solutions—namely, the absence of individualized support, fragmented service platforms, and oversimplified diagnostic frameworks—the Semantic IoT–Based Audiobook System incorporates an early dyslexia screening module, an actionable reporting service, and a natural language processing–driven tutoring component underpinned by ontology-based reasoning. In a 20-week pilot involving 30 participants, the system achieved a 22.2% increase in reading fluency (72 → 88 WPM), a 6.0% improvement in pronunciation accuracy (86 → 92%), a 14.0% enhancement in attentional focus, and an 84.2% elevation in emotional engagement. These quantitative outcomes demonstrate the system's efficacy in delivering low-latency, privacy-preserving, personalized interventions.

12:20 – 12:40

1571128403 | Title: Cloud-Based Machine Learning for Responsible Research in Cardiovascular Disease (CVD)
Authors : Yuxuan Zhu; Wan Mohd Hirwani Wan Hussain

Cardiovascular disease (CVD) remains a leading global cause of morbidity and mortality, presenting substantial challenges to healthcare and research communities. Machine learning (ML) offers transformative potential for responsible CVD research by improving precision, scalability, and the ability to uncover patterns within complex datasets. This study examines the role of cloud-based ML platforms in integrating electronic health records, imaging, and genomic data to enhance research efficiency. By leveraging scalable computational resources and enabling real-time collaboration, these platforms process large-scale datasets, thereby improving predictive accuracy and supporting robust model training and validation across diverse populations. However, persistent challenges include algorithmic bias, data quality inconsistencies, and the environmental impact of energy-intensive computing. To address these, we propose a comprehensive governance framework comprising researcher training in ethical AI practices, rigorous validation protocols to ensure reproducibility, and collaborative hubs to standardize best practices and minimize redundancy. This framework aims to mitigate bias, enhance data integrity, and promote sustainable computing, providing a scalable model for ethical ML deployment. Our findings underscore the critical role of cloud-based ML in advancing responsible CVD research and offer a policy-ready blueprint for interdisciplinary innovation. Future efforts should focus on quantifying the framework's impact, integrating emerging technologies such as quantum computing, and aligning with global policies to broaden its application and societal benefits.

12:40 – 13:00

1571149539 | Title: DeepMyco: Large Language Models for Scaling Mycoremediation
Authors : Danika Gupta

The textile industry is a major contributor to global water pollution, with dye effluent comprising up to 20% of water pollution. This research introduces a novel approach that integrates machine learning with mycoremediation to enable scalable, low-cost dye decontamination. We developed the first public dataset of mycoremediation results by extracting data from over 2,900 research papers using large language models. From this, we built algorithmic models to recommend robust fungal strains and forecast remediation efficacy over time. Experimental validation using Trametes versicolor demonstrated successful decolorization under varied real-world conditions and confirmed predictive accuracy (Root Mean Square Error as low as 0.03). A follow-up hydroponic trial showed healthy plant growth in remediated water, supporting the method's biological safety. This research bridges AI and experimental science, offering an open-source, replicable solution to industrial dye pollution and a foundation for further innovation in bioremediation at scale.

15:00 - 15:20	**1571137802	Title:** Optimizing Visual Comfort: Dialux-Based Redesign of Computer Lab Lighting Design **Authors :** Marvin A. Radaza; Alaine Tess A. Cabije; Joecyn N Archival; Deolinda E. Caparroso; Marlito V. Patunob; Emelie C. Villaceran This study examines the crucial role that lighting design plays in improving visual comfort and efficiency in computer laboratories, using Dialux software to simulate and optimize visual comfort levels. With lighting inadequacy often causing discomfort and lower productivity, this research aims to develop customized solutions aligned with the guidelines of illuminance levels ranging from 300 to 500 lux. Through a critical evaluation of the uniformity of lighting and the elimination of glare, the findings present the importance of adhering to lighting standards within learning spaces. The focus is on a user-driven approach, using feedback loops to more effectively harmonize lighting designs with user ergonomic standards and preferences. Additionally, the research examines smart lighting technology to enhance energy efficiency while enriching the learning environment. By exploring issues such as glare management and uneven illumination, this study provides insights of particular value in addressing gaps within the existing literature on lighting design, thereby compelling subsequent research to build upon and transfer these findings across a range of learning spaces.
15:20 – 15:40	**1571154845	Title:** Hyper-Automated AIOps for Unified Operations Orchestration in Industry **Authors :** Milankumar Rana; Nandita Giri; Sakhita Sree Gadde Modern IT operations face unprecedented complexity due to hybrid cloud architectures, IoT ecosystems, and microservices-based applications. Organizations have difficulties due to fragmented visibility, contextual inadequacies, and manual corrective processes in progressively remote systems. This paper introduces OmniOrchestrate, a pioneering hyper-automated AIOps solution that amalgamates operations orchestration using knowledge graphs, generative AI, and closed-loop automation. The framework systematically captures and makes operational knowledge available, increases operational data with contextual intelligence, addresses important challenges by means of extensive visibility across several environments, enables comprehensive automation from detection to remediation, and promotes continuous improvement via adaptive learning. Empirical evaluations of twelve shipping, e-commerce, supply chain, and retail sector companies show notable improvements in a 79.3% decrease in manual tickets, a 62.2% decrease in mean time to detect (MTTD), a 50.5% decrease in mean time to repair (MTTR), and a 66.7% increase in auto-remediation rates. OmniOrchestrate shows to be above conventional AIOps and human operations with a detection accuracy (F1 score) of 0.93, a root cause accuracy of 93%, and a corrective success rate of 89%. Case studies catered to every sector show how well the architecture performs in real-world scenarios, including a shipping container monitoring disturbance repaired in 17 minutes and an e-commerce platform maintaining performance throughout a 215% increase in traffic. Combining fully autonomous remedial capabilities with conventional monitoring systems, the framework provides a complete plan for next-generation IT operations that helps businesses to properly control complexity and improve operational resilience and efficiency in the fast-changing technological environment of today.
16:00 – 16:20	**1571149129	Title:** Deep Neural Networks for Block-Level Video Enhancement: Transforming LR AVS to HR HEVC Video **Authors :** Mehmood Nawaz Converting one video bitstream to another video bitstream is a challenging task in the heterogeneous transcoder due to different video formats. In this paper, we propose a region of interest (ROI)-based super-resolution technique to convert low-resolution AVS video to high-definition HEVC video. The proposed method uses visual characteristics, transform coefficients, and motion vectors to classify a low-resolution video frame into small blocks, which are further classified as blocks of most interest (BOMI), blocks of less interest (BOLI), and blocks of noninterest (BONI). The BONI blocks are considered background blocks and remain unchanged. A deep learning-based super resolution (SR) method is then applied to the BOMI and BOLI blocks to enhance the visual quality. The proposed method saves 20 - 30% computational time and obtains appreciable results compared to the original low-resolution frames. We have tested our method on different official video sequences with resolutions of 1K, 2K, and 4K. Our method has efficient visual performance compared to the other methods.
16:20 – 16:40	**1571141675	Title:** Harnessing AI and IoT for Smart Water Infrastructure: a Scalable Framework for Industry 4.0 Adoption **Authors :** Siti Daleela Mohd Wahid; Wan Mohd Hirwani Wan Hussain; Mohamad Rohieszan Ramdan In response to Malaysia's uneven progress in Digital Water Transformation (DWT), this conceptual paper proposes a scalable, AI–IoT-integrated framework aimed at modernizing the nation's water infrastructure. While states like Selangor have made strides in deploying smart meters, AI-based analytics, and real-time IoT monitoring, many regions still grapple with high Non-Revenue Water (NRW), outdated systems, and fragmented governance. Anchored in Systems Theory, Institutional Theory, and Change Management Theory, this study synthesizes global case studies, national policy mandates (AIR2040), and Selangor's empirical success to develop a six-pillar framework encompassing technological infrastructure, institutional alignment, workforce development, financial innovation, data governance, and cultural transformation. It offers explicit technical models, including neural networks, edge computing, and SCADA-integrated IoT, to support predictive maintenance and demand forecasting. By addressing both controllable and structural barriers to adoption, the framework provides actionable pathways for policymakers and industry leaders to accelerate DWT in alignment with SDG 6 and SDG 13. This paper contributes to bridging Malaysia's digital divide in the water sector by outlining a roadmap for building a smart, sustainable, and resilient water future.
16:40 – 17:00	**1571153217	Title:** Edge-Mesh-Ledger: Federated AI and Blockchain Framework for Scalable Global Sustainability Solutions **Authors :** Daozheng Qu; Yanfei Ma We propose Edge–Mesh–Ledger (EML), a unified framework for decentralized sustainability analytics that combines TinyML, federated learning, reinforcement coordination, and blockchain verification. We evaluate EML across five edge-IoT datasets using four key metrics—energy-weighted MAE, modularity, privacy budget, and on-chain gas cost. DropHead-pruned GNNs are combined with LoRA adaption and DPFedYogi optimization in EML to provide individualized and private microcontroller training. System-wide hyperparameters are dynamically adjusted by a population-based reinforcement learning controller in the fog layer to maximize communication overhead, accuracy, and energy consumption. Zk-rollup-based smart contracts on the blockchain are used to verify and settle final results, allowing for inexpensive, auditable carbon-credit tracking. Experiments on five datasets from edge IoT networks demonstrate that EML decreases gas cost by 95.2%, improves energy-weighted MAE by 18.4%, and increases modularity by 27.1% when compared to state-of-the-art baselines, all while maintaining constant power consumption under scaling. These findings show how EML may p

1571142386 | Title: AI in Operational Strategy: GPT & Perplexity Models in BofA's 2025 Branch Closure Case Study
Authors : Yara Mohammed; Manar Alsaid; Gahangir Hossain

17:00 –
17:20

The dynamic landscape of banking operations increasingly benefits from artificial intelligence, enhancing decision-making capabilities. In this study, we implemented two models: one under GPT framework and another using Perplexity, to leverage their powerful computational abilities to analyze and interpret financial data and operational trends. We employed sophisticated attention mechanisms and multi-head attention within these Large Language Models (LLMs) to investigate the strategic reasons behind the anticipated 2025 closures of Bank of America branches [12]. Using unstructured data, this study adopts a mixed-method framework that combines mathematical theories with advanced prompt engineering to compare the effectiveness of ChatGPT and Perplexity AI. By applying this approach, the study aims to highlight how each model performs in analyzing complex, real-world information and uncovering meaningful insights related to branch closures. The comparative analysis confirms that Perplexity AI outperformed ChatGPT by providing more precise and contextual relevant insights that are crucial for strategic decision-making in the banking sector. These results highlight the advanced capabilities of LLMs equipped with attention technologies in processing complex, multivariable datasets effectively. The implications of our research extend beyond just operational strategies within banks. They offer substantial insights that could revolutionize customer service management and investment strategies, contributing to a more nuanced understanding of evolving market dynamics. The study underscores the transformative potential of advanced LLMs in banking, recommending their broader adoption to effectively navigate and adapt to the rapid digital transformations in the industry.

11:20 – 11:40

1571158364 | Title: HIV-1 Drug Efficacy Identification via Informative Knowledge Graph Selection on Graph Neural Network

Authors : Felza Ridho; Mohammad Isa Irawan, Sr.; Mohammad Iqbal; Dwi Wahyu Indriati

Human immunodeficiency virus type-1 (HIV-1) cases have recently grown, remaining a worldwide problem. The only action to deal with HIV-1 disease is to take the drug resistance or HIVDR. The formulation of HIVDR is based on antiretroviral therapy (ART) personalization until we know its efficacy. In this work, we aim to accurately assess the efficacy of HIV drugs (HIVDE) by learning from informative clinical and treatment data alone. Hence, we propose an integration method between a metaheuristic algorithm for selectively choosing important clinical and treatment features and graph neural networks for HIVDR identification. Once the important features are in hand, we attempt to draw their contextual connectivities or knowledge graphs. After careful design, the proposed method is a combination of a harmony search algorithm for feature selection, a graph encoder with angular distance for knowledge graph (KG) construction, and graph convolutional networks for the HIVDE identification. Since this work application is limited, we evaluated the proposed method on a particular public HIVDR dataset. Interestingly, the patient response feature has shown no effect in identifying the efficacy of HIV drugs. Furthermore, the feature selection and the KG construction succeed in boosting the identification, which also outperforms the baseline methods.

11:40 – 12:00

1571162131 | Title: Contextualizing AI Agent Evaluation: Proposed Framework for Japanese Businesses

Authors : Ryo Toyoda; Hidenori Kiyomoto; Seiichi Komayama; Hisashi Shigetani; Makoto Fukui

Evaluation is a crucial step in ensuring the quality, safety, and security of Artificial Intelligence agents. However, evaluation frameworks are often generic and fail to consider cultural contexts and nuances such as in Japan. This research addresses this limitation by proposing a "Culturally Attuned Framework for AI Agent Evaluation" tailored for Japanese business environments. The research methodology involved three key steps: (1) establishing a baseline by combining IBM's consolidated AI evaluation categories and Japan's AI Safety Institute (AISI) principles, (2) identifying and analyzing Japanese cultural business philosophies through a scoping literature review, and (3) integrating the identified Japanese philosophies such as Kaizen (continuous improvement), Hinshitsu (holistic quality), and Shinrai (relational trust) into the baseline. The resulting framework provides a context-aware evaluation model that combines Japanese business culture with accepted technical and ethical standards for AI. The implications for Japanese businesses, AI developers, and designers, as well as future directions, are also discussed.

12:00 – 12:20

1571155109 | Title: AI in the Islamic Education to Enhance Personalized Learning: Applications and Future Aspirations

Authors : Jehad M Shehab, Dr. Jehad; Nurazmallail Marni; Mehmet Akif Kılıç; Siti Suhaila Ihwani; Fahrul Irfan Ishak

Optimization methods are crucial for improving the performance of 5G and 6G networks, primarily by enhancing key aspects such as beamforming and transmission power. These methods enable the efficient use of the available spectrum, leading to increased data rates, lower latency, and improved reliability, all of which are fundamental for supporting the applications envisioned for these networks. By optimizing beamforming, networks can achieve more precise directional signal transmission, reducing interference and increasing capacity. Similarly, power optimization ensures that the transmission power is used judiciously, extending battery life in user devices and reducing overall energy consumption. These improvements are essential for meeting the ever-growing demand for higher data throughput and better quality of service in modern wireless communication systems. This article explores how optimization methods can be applied to fine-tune transmission power of beamforming antennas with various transmit and receive patterns, ultimately maximizing overall channel capacity. We employed these optimization techniques to identify the highest achievable total channel capacity by identifying the optimal beamforming steering vectors for both transmitters and receivers. Among the seven optimization methods evaluated, Genetic Algorithm, Hill Climbing, and Shotgun Hill Climbing consistently demonstrated superior performance—achieving up to 99.7% accuracy—making them the most effective approaches when considering both accuracy and execution time. The goal of this approach is to improve the efficiency and performance of 5G and 6G networks while also minimizing energy consumption.

12:20 – 12:40

1571155234 | Title: Human Centered Design in 3D Character Modeling with Ethical Framework for AI

Authors : Ferric Limano

Artificial intelligence (AI) is reshaping education, offering opportunities to make learning more personal, responsive, and effective. In Islamic education, AI could transform traditional teaching by tailoring learning experiences to individual students. This paper systematically reviews existing studies on AI applications in personalized learning, highlighting the theories, tools, and future directions driving this field. The findings show that AI can move education beyond standardized models, creating adaptive pathways that boost motivation and deepen learning. Yet practical integration in Islamic contexts remains limited. To address this, we propose a conceptual case study for Quran memorization classes. This framework combines spaced repetition algorithms and speech recognition to support tajweed accuracy, alongside teacher dashboards that track each student's progress and needs. Such an approach could enhance retention, improve pronunciation, and allow teachers to focus on spiritual mentoring. However, challenges remain, including speech recognition accuracy across dialects, cultural sensitivities, and ethical safeguards to preserve teacher authority and human connection. This study bridges theory and practice, offering educators and policymakers a practical pathway for using AI meaningfully in Islamic education. It suggests that while AI holds transformative potential, its success depends on context-specific design, ethical grounding, and close collaboration between technologists and educators to truly enrich learning in ways that honour human and spiritual development.

12:40 – 13:00

1571156633 | Title: Digitalizing Prevention and Detection of Violence Against Women and Girls Through Machine Learning

Authors : Mohammed Younsi; Mohammed Ismaili; Omer Diaaeldin Abdalla Ismail; Yousra Chtouki

Violence against women and girls (VAWG) remains a pervasive human-rights violation. To address this challenge, we present an end-to-end framework that combines geospatial analysis, predictive modelling, and a natural-language chatbot to both detect and prevent VAWG incidents. Unlike prior work that only forecasts overall crime counts, our system estimates the most likely time and location of future incidents by learning spatial and temporal patterns. We implement DBSCAN clustering and kernel density estimation (KDE) to identify geographic hotspots in Cambridge, Massachusetts, and train a Random Forest regressor with spatial–temporal features to predict incident timing and location. Baseline models (linear regression and XGBoost) are included to justify model choice. An NLP-powered chatbot built with LangChain and LangGraph retrieves statistics from structured reports; its retrieval and grounding fidelity were evaluated on 20 queries, achieving 87% retrieval accuracy and 82% grounding. The framework incorporates fairness metrics (demographic parity and equalised odds) and mitigation strategies (re-weighting and synthetic augmentation), as well as technical privacy safeguards (HTTPS/TLS for data transfer, AES-256 at rest, and planned differential-privacy mechanisms). We further discuss cross-city generalisability through domain adaptation and federated learning. The results demonstrate the potential of machine learning to transform reactive responses into proactive interventions, while emphasising the importance of fairness, privacy, and stakeholder validation.

13:00 – 13:20

1571144345 | Title: The GREEN Way to Net Zero: AI-Enabled Agents for Sustainability and Innovation Management

Authors : Soo Beng Khoh; Magnus Penker

Achieving Net Zero by 2050 is one of the most pressing challenges of our time. Many organisations struggle to move beyond environmental, social, and governance (ESG) compliance towards embedding sustainability as the way of doing business in the future. This paper introduces a novel, AI-enabled 5-Step G.R.E.E.N. Framework designed to guide organisations from sustainability intent to measurable impact. It demonstrates how sustainability-oriented innovation projects can naturally evolve into a comprehensive innovation management system that is ISO 50001 compatible. The incorporation of generative artificial intelligence (AI) fosters creative agency, systematic ability to innovate, and system thinking whereby contextual ecosystem. Almost at

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13:00 – 13:20

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SESSION 3A:
AI FOR INDUSTRY, INFRASTRUCTURE, AND SMART SYSTEMS
10:15 - 11:35| VENUE: PACIFIC BALLROOM A
Session Chair: Dr Siti Maherah Hussin

10:15 – 10:35

1571159400 | Title: Smart Blood Pressure System to Support Pregnant Women at High-Risk for Preeclampsia
Authors : Ahmad Fais Fison; Noor Azurati Ahmad; Yusnaidi Md Yusof; Amira Anisa Rahman Putra; Azizul Azizan; Ansariadi Ansariadi

Preeclampsia is a complex pregnancy condition characterized by high blood pressure, often leading to damage to organs and tissues. Early detection and management of preeclampsia significantly reduce the risk of serious complications including seizures, liver failure and heart disease in both mother and baby. This paper aimed to provide tracking of blood pressure levels in high-risk pregnant women. It leverages mobile app integration and AI-powered CNN model and multi-layer architecture to accurately detect abnormal blood pressure readings, which are crucial in preventing severe complications for preeclampsia. In addition, it includes features such as alarms and reminders to establish regular monitoring of blood pressure. This Blood Pressure Monitoring System serves as a valuable tool in supporting pregnant women at high-risk for preeclampsia, enabling early detection and effective management of the condition. Using K-fold Cross-validation measurement, this system accurately predicts blood pressure values with a clinically acceptable range in conformation of the minimal MAE and RMSE values.

10:35 – 10:55

1571171568 | Title: Improving Interpretability in Alzheimer's Prediction via Joint Learning of ADAS-Cog Scores
Authors : Nur Amirah Abd Hamid; Ibrahim Shapiai; Muhammad Thaqif Iman Mohd Taufek; Mohd Shahrizal Rusli; Daphne Teck Ching Lai

Accurate prediction of clinical scores is critical for early detection and prognosis of Alzheimer's disease (AD). While existing approaches primarily focus on forecasting the ADAS-Cog global score, they often overlook the predictive value of its sub-scores (13-items), which capture domain-specific cognitive decline. In this study, we propose a multi-task learning (MTL) framework that jointly predicts the global ADAS-Cog score and its sub-scores (13-items) at Month 24 using baseline MRI and longitudinal clinical scores from baseline and Month 6. The main goal is to examine how each sub-scores—particularly those associated with MRI features—contribute to the prediction of the global score, an aspect largely neglected in prior MTL studies. We employ Vision Transformer (ViT) and Swin Transformer architectures to extract imaging features, which are fused with longitudinal clinical inputs to model cognitive progression. Our results show that incorporating sub-score learning improves global score prediction. Subscore-level analysis reveals that a small subset—especially Q1 (Word Recall), Q4 (Delayed Recall), and Q8 (Word Recognition)—consistently dominates the predicted global score. However, some of these influential sub-scores exhibit high prediction errors, pointing to model instability. Further analysis suggests that this is caused by clinical feature dominance, where the model prioritizes easily predictable clinical scores over more complex MRI-derived features. These findings emphasize the need for improved multimodal fusion and adaptive loss weighting to achieve more balanced learning. Our study demonstrates the value of sub-score-informed modeling and provides insights into building more interpretable and clinically robust AD prediction frameworks. (Github repo provided)

10:55 – 11:15

1571149474 | Title: Enhancing Lane Detection Systems by Leveraging Segment Anything Integrated with Dual Attention Mecha
Authors : Aisyah Aiza Rosli; Ibrahim Shapiai; Noor Jannah Zakaria

This paper presents a lane detection system that combines a Fully Convolutional Network (FCN) with dual attention mechanisms and a segmentation-guided preprocessing strategy to enhance detection accuracy in structured driving environments. The proposed architecture integrates Squeeze-and-Excitation (SE) channel attention and spatial attention modules to refine feature representation and focus on relevant lane-specific regions. Additionally, Meta's Segment Anything Model (SAM) is employed during preprocessing to generate object-aware masks that guide the network toward lane-relevant features. The model is trained and evaluated on the TuSimple dataset using TensorFlow 2.x on Google Cloud Vertex AI. Experimental results demonstrate strong generalization, with training and validation losses converging below 0.08 and an average test accuracy of 96.4%, outperforming conventional FCN-based approaches. The incorporation of attention mechanisms and SAM preprocessing significantly improves lane boundary localization, highlighting the system's potential for robust application in autonomous driving scenarios. While the current model demonstrates high accuracy, achieving real-time performance for practical ADAS deployment remains a challenge, with current latency estimations indicating a need for further optimization. Future work will include model training with other data sets to improve the model performance for intricate driving experience and comprehensive ablation studies to isolate each component's gain, which will be part of the investigation to find the best method to improve the high latency produced by this current developed model.

11:30 – 11:50

1571155486 | Title: AI Impact on Housing Industry Innovation: a Bibliometric Analysis
Authors : Abdalrahim Shehab; Khairul Anwar Mohamed Khaidzir; Heba A M Shehab; Mehmet Akif Kılıç

In the realm of architectural design, artificial intelligence (AI) is swiftly undergoing a transformation that is redefining the way in which structures are conceived of, optimized, and adapted for future demands. Based on 212 publications that were published between the years 2020 and 2024 and were subjected to peer review, this study provides a focused bibliometric evaluation of the function that artificial intelligence plays in architectural design within the housing business. Through the utilization of the PRISMA framework and the VOSviewer software, the analysis is able to map publishing trends, highlight prominent contributors, and identify the research subjects that have the most significant impact. With regard to generative design, performance simulation, and sustainability-driven layout optimization, the findings point to a significant increase in the number of uses of artificial intelligence. The findings, on the other hand, indicate that there are deficiencies in user-centered integration and that there are no ethical criteria for decision-making that is aided by AI. In addition to providing a framework for future collaboration between architects, technologists, and policymakers, this article provides a targeted overview of current research paths, recommends areas that have not been investigated yet, such as adaptable design for climate resilience, and makes suggestions for topics that need further investigation. This review contributes to a more in-depth knowledge of how artificial intelligence is altering the creative and technical processes of home building.

11:50 – 12:10

1571159557 | Title: AI Applications in Architectural Design: a Bibliometric Analysis
Authors : Abdalrahim Shehab; Khairul Anwar Mohamed Khaidzir; Heba A M Shehab

Artificial intelligence (AI) is starting to play a major role in how we approach architectural and housing design. From improving efficiency to enabling smarter, data-driven decision-making, AI is changing the way buildings are imagined, planned, and constructed. This study takes a closer look at how AI is being used in this space by reviewing existing research through a bibliometric lens. Using the Scopus database, 637 articles were initially gathered based on keywords related to AI, architecture, and housing. After filtering by date range (2005–2024), language, and subject relevance, 106 articles were selected for detailed analysis. The PRISMA framework helped guide a transparent and structured selection process. To better understand the landscape, tools like VOSviewer and Biblioshiny were used to analyze keywords, citations, authorship patterns, and institutional contributions. Results showed a major spike in research activity around 2018, followed by a gradual decline. Common themes included architectural design, BIM (Building Information Modelling), machine learning, and generative design. China emerged as a major contributor, with universities like the Macau University of Science and Technology and Tsinghua University leading the way. The most influential articles often focused on combining BIM with AI, exploring deep learning models for design automation, and developing generative design solutions. Keyword and co-citation analysis revealed two main clusters one tied to traditional design methods and the other to AI-driven innovation indicating a growing connection between architecture and emerging technologies. In short, this review shows how the field is evolving, with AI pushing the boundaries of what is possible in design and construction. It also points out areas that remain underexplored, offering direction for future research and practice.

12:10 – 12:30

1571159776 | Title: AI in Enhancing Student Academic Performance: a Bibliometric Analysis
Authors : Jehad M Shehab, Dr. Jehad; Nurazmallail Marni; Diaya Ud Deen Deab Mahmoud Al Zitawi; Mehmet Akif Kılıç

This study takes a closer look at how artificial intelligence (AI) is being used to improve student academic performance. Using a bibliometric approach, it analyzes 103 academic articles published between 2015 and 2024, all sourced from the Scopus database. These articles were selected based on specific keywords related to AI, education, and student outcomes, following the PRISMA framework to ensure a transparent and systematic review. Visualization tools like VOSviewer and Biblioshiny were used to map out key trends, authors, and topics in the field. The results show a sharp rise in interest over the past decade, especially around 2021. Key themes in the literature include machine learning, adaptive learning technologies, AI-driven feedback, and intelligent tutoring systems. Countries like China and the United States are leading in research output, with many studies focusing on how AI can personalize learning, predict performance, and support classroom engagement. Newer tools such as chatbots and virtual classrooms are also becoming more common. One of the most notable findings is how this area of research brings together different disciplines education, computer science, and psychology. While there's growing excitement around the potential of AI in schools, the study also points out some important challenges, like ethical concerns, teacher preparedness, and unequal access to technology. What sets this study apart is its big-picture perspective. Instead of looking at individual tools or case studies, it maps the overall research landscape, showing who's doing the work, what topics are trending, and where the gaps are. These insights can help guide future studies and support better decisions around using AI to support students in meaningful ways.

12:30 – 12:50

1571125269 | Title: AI-Driven Smart Classrooms: a Bibliometric Analysis of Adaptive Learning Environment
Authors : Hassan Abuhassna; Wei Lun Wong; Pan Qi; Fareed Awae

The integration of Artificial Intelligence (AI) into educational contexts has given rise to smart classrooms—technology-enhanced environments that support adaptive, sustainable, and personalized learning. This study presents a bibliometric analysis of global research on AI-driven smart classrooms published between 2014 and 2024, guided by the PRISMA 2020 framework. Using Scopus as the primary data source, a total of 200 publications were analyzed for trends in publication volume, geographic distribution, institutional affiliation, authorship, and keyword co-occurrence. Results show a significant rise in publications from 2021 onward, with China, India, and the United States emerging as leading contributors. Institutions such as Carnegie Mellon University and Beijing Normal University were identified as major research hubs. Key contributors, including Vincent Aleven and Kenneth Holstein, played a central role in shaping the discourse through influential studies on AI-enhanced teaching systems. Keyword analysis revealed a thematic evolution from general digital learning concepts to advanced AI applications such as adversarial learning, knowledge graphs, and personalized analytics. This study provides a comprehensive overview of the field's development and offers direction for future research aimed at harnessing AI to foster sustainable and adaptive learning ecosystems.

14:00 – 14:20

1571152795 | Title: Integrating Business Analytics in Healthcare Supply Chain Management: a Systematic Literature Review

Authors : Nur Azaliah Abu Bakar; Surya Sumarni Hussein; Hasimi Sallehudin

This study presents a systematic literature review on the integration of business analytics in healthcare supply chain management, synthesizing 30 peer-reviewed articles published between 2021 and 2025. Using the SALSA framework and PRISMA guidelines, the review examines technology adoption, methodological approaches, and practical outcomes. Findings show that tools such as big data analytics, artificial intelligence, machine learning, blockchain, and simulation improve visibility, inventory control, resilience, and decision-making. However, implementation is often limited by organizational, technological, and ethical barriers. While frameworks like Organizational Information Processing Theory and the Resource-Based View are frequently applied, few studies explore interdisciplinary or long-term impacts. Future research should emphasize qualitative insights, cross-sector comparisons, and governance readiness. This review provides a timely synthesis of post-pandemic advancements and offers strategic guidance for data-driven transformation in healthcare supply chains.

14:20 – 14:40

1571167162 | Title: Integrated E-Procurement Trend with Generative AI for Green Purchasing Policy

Authors : Wan Abdul Fattah Wan Abdullah; Rozana Zakaria; Siti Maherah; M Faizal Zukarnaini; Loganathan Ratana Singaram; Jawa Gara

Procurement is a process that involves acquiring, managing, and organising products and services. All governments and public sectors engage in public expenditures through procurement procedures, including direct purchases and quotations, closed tenders, open tenders, and direct talks, depending on the circumstances. Green Purchasing Policy (GPP) is a plan of action and/or a policy commitment that will assist an organisation in implementing green purchasing in procurement. E-Procurement is the use of electronic devices and facilities, and online applications for the administration, coordination, and enhancement of an acquisition procedure. Relatively, public procurement has the ability to contribute to the consumption and production of diverse products and services in a sustainable manner. Thus, this study highlights the trend of research for the potential development of an integrated e-procurement decision-making tool for GPP to determine the effectiveness of incorporating green procurement practices into the organisational operations of procurement assessment. A bibliometric analysis is used for the methodology in determining the target selective literature. This study summarised eight common factors recognised as influencing the trend.

14:40 – 15:00

1571146506 | Title: A Novel Approach to Improve Latency and Accuracy of NLP Models Involving Quantum Inspired Algorithms

Authors : Saravanakumar C Shanmugam; Midhun Chakkaravarthy; Mohan BV

Today NLP struggles with hallucination, bias, unsustainable compute demands and deep reasoning. Quantum-Inspired Algorithms offer a path forward by enabling more efficient optimization, compact embeddings, and scalable architectures. As model size and complexity grow, industry must be prepared for hybrid approaches that integrate Quantum-inspired techniques to ensure performance, adaptability and efficiency. Without demanding Quantum machines and by involving Quantum Algorithms we propose a unique way to reduce the dimensional matrix of NLP such that the size of the matrix is reduced without compromising the accuracy as well as an effective semantic chain-up is created thus allowing the NLP models to be so powerful with reduced latency and improved accuracy. Its applications could be taken up into numerous use cases like personalization bringing humanized approach in every way. The magnitude of our approach to put in use will be wherever NLP is involved.

15:00 – 15:20

1571156454 | Title: Deep Learning-Based Tree Crown Delineation in UAV RGB Imagery of Kalimantan Tropical Regrowth Forest

Authors : Geraldio R Safitri; Emir Husni; Rahadian Yusuf; Hendrika Marselina Yuniatris Da Rato

Accurate tree crown delineation is critical for sustainable forest management, enabling the monitoring of forest health, carbon sequestration, and biodiversity. Unmanned aerial vehicles (UAVs) offer a cost-effective and scalable solution for high resolution tree crown mapping, particularly in dense and complex environments like tropical regrowth forests. Although various models have been developed to automate the task, tropical regrowth forest with mixed species, overlapping tree crowns, and the presence of low vegetation makes tree crown extraction a challenging task. In this study, we developed an improved tree delineation system to address these challenges by replacing the backbone of Mask R-CNN to enhance its sensitivity and implemented PointRend to improve the delineation performance of the model. Furthermore, to distinguish between low vegetation and tree crowns we introduce CHM zonal cleaning, a spatial-based crown cleaning method in the delineation system. The delineation model was tested on four different forest plots to assess both its performance and errors. Results demonstrated that the ResNeXt model outperformed the ResNet baseline, achieving 9.15% increase in sensitivity (recall) and 5.25% improvement in overall performance (F1 score). Finally, CHM (Canopy Height Model) zonal cleaning introduced in the system reduced misclassification errors in low vegetation areas by 61.44% compared to initial predictions. This study highlights the potential of the proposed delineation system as an efficient assisting tool for supporting sustainable forest management in the tropical regrowth forests.

15:20 – 15:40

1571160658 | Title: Advantages of Applying AI in Designing Environmentally Sustainable Buildings: a Bibliometric Analysis

Authors : Abdalrahim Shehab; Khairul Anwar Mohamed Khaidzir; Heba A M Shehab; Mehmet Akif Kılıç

As the need for sustainable architecture grows, AI is becoming an increasingly valuable tool in the design of greener, more efficient buildings. This study takes a closer look at how AI is being used in environmentally sustainable building design by analyzing 135 research articles published between 2015 and 2024. Using data from the Scopus database, the study applies bibliometric tools like VOSviewer and Biblioshiny to uncover major trends, active contributors, key research areas, and influential publications. The process followed the PRISMA method to ensure clarity and structure. The results show that research in this area is growing fast at an average annual rate of nearly 85%. China is currently leading in terms of publication output, with the U.S. and the U.K. following closely behind. Popular topics include architectural design, machine learning, Building Information Modeling (BIM), and digital twin technologies, showing that AI is being used across both design and technical performance workflows. The most cited article by Tan et al. (2023) focuses on federated learning, highlighting the growing interest in AI that protects data privacy while improving design outcomes. The study also shows a healthy level of international collaboration, with more than a quarter of the papers involving authors from different countries. Institutions like Tongji University and Imperial College London stand out as major research hubs. Thematic mapping and co-citation analysis reveal a clear shift toward integrating AI with sustainability, automation, and creative design strategies. This review is driven by four questions: What are the main trends? Who is leading the research? Which tools and topics are most common? And where are the opportunities for future work? The answers offer useful guidance for researchers, designers, and policymakers looking to explore or invest in AI-driven sustainable architecture.

10:15 – 10:35	**1571155162	Title:** Operationalizing ISO/IEC 42001: Requirements and Conformance Evidence for AI Management Systems **Authors :** Kassem Saleh; Hanady M Abdulsalam The increasing development and deployment of artificial intelligence (AI) applications across critical sectors has amplified the need for robust AI governance and effective risk management frameworks. ISO/IEC 42001:2023 is the first international standard specifically designed to establish, implement, maintain, and continuously improve an AI Management System (AIMS). This paper explores the requirements outlined in ISO/IEC 42001 standard and provides a structured and systematic mapping of these requirements to specific types of supporting evidence necessary for operationalization and audit readiness. Through a clause-by-clause semantic and textual analysis of the standard, we identify the necessary documentation, controls, and operational records that can serve as verifiable evidence of conformance to the standard. The proposed mapping aims to assist organizations in implementing, operationalizing the standard and maintaining conformance to it. The mapping is used to enhance transparency, and to facilitate compliance with ethical, legal and regulatory obligations. The paper concludes with practical insights for implementers and auditors, providing the basic foundation toward auditable and trustworthy AI governance.
10:35 – 10:55	**1571141831	Title:** MaelNet: Memorable Anomaly Election Learning Detecting Anomalies in Time Series Data Using DualNet **Authors :** I Komang Ari Mogi; Ary Mazharuddin Shiddiqi; Baskoro Adi Pratomo; Choiru Zain; Muhammad Ismail; Anggito Anju Hartawan Manalu Detecting anomalies in time series data is critical for identifying unusual patterns across a wide range of applications. This study introduces MaelNet, an innovative Dual-Net Transformer model enhanced with reinforcement learning, designed to address challenges such as data imbalance and the evolving nature of temporal anomalies. MaelNet comprises two fast learners—an Anomaly Transformer and a DC Detector—alongside a slow learner that employs a Modified Non-Stationary Transformer. Importantly, the input to the slow learner differs from that of the fast learners: the time step input is initially masked, allowing the model to capture the inherent bias in time series data. This design enhances anomaly detection by dynamically modeling both biased and unbiased temporal sequences. Evaluated on five real-world datasets (SMAP, SMD, SWaT, PSM, and MSL), MaelNet surpasses existing Transformer-based baselines, achieving an F1-score improvement of 3.84% and a reduction in false positive rate by 1.109%. These findings underscore the effectiveness of MaelNet's dual-attention architecture and adaptive reinforcement learning in capturing complex temporal dynamics.
10:55 – 11:15	**1571160438	Title:** A Privacy-Aware Framework for Distributed AI in Regulated Environments **Authors :** Sowjanya Pandruju With the extensive growth in terms of data and AI adoption across various fields such as finance, healthcare and insurance, data security and privacy have become significant barriers to innovation. This paper provides a privacy-aware framework for distributed AI as a possible solution which is integrated with cloud-native architectures. By leveraging decentralized model training without sharing raw data, this solution offers a compliant and secure framework for deploying machine learning at scale. A scalable and cost-effective system architecture is proposed that aligns with data protection regulations while maintaining high performance and model accuracy. This approach empowers organizations to leverage AI responsibly, unlocking the potential of sensitive data without compromising privacy.
11:15 – 11:35	**1571141156	Title:** Integrating Artificial Intelligence in Language Education: a Systematic Literature Review **Authors :** Pan Qi; Nurul Farhana Jumaat; Hassan Abuhassna AI integration in language education has significantly improved students' language proficiency and created an engaging learning environment. However, some challenges continue to hinder the development of AI. While existing literature reviews tend to focus narrowly on specific AI technologies and language skills, to address this gap, this study aims to conduct a comprehensive systematic literature review to critically analyze AI integration in language education, exploring its contributions to language learning. We methodically selected and analyzed 27 papers from 226 documents based on the WOS and Scopus databases. Our findings indicate that the main challenges are limited sample size, technical difficulty, ethical issues, short research duration, etc. To address these challenges, more empirical research with a larger sample size and a long-term duration is needed to validate the effect of AI tools in language education. Accordingly, both students and instructors should undergo systematic training to tackle technical issues. Finally, combining AI technologies with human instructions is recommended as a future direction to ensure the accuracy of feedback and address ethical considerations.

1571162796 | **Title:** Artificial Neural Network Approach for Unit Commitment with Renewable Energy Integration
Authors: Siti Maherah Hussin; Madihah Md Rasid; Norazliani Binti Md sapari; Dalila Mat Said; Rozana Zakaria; Mohammed Khaled Hussein Omar

11:35 – 11:55

AThe integration of renewable energy sources (RES) into power generation systems presents both opportunities and challenges. Traditional methods of power generation scheduling, such as Mixed-Integer Linear Programming (MILP), often struggle to accommodate the variability and uncertainty associated with RES. This study addresses these challenges by developing an Artificial Neural Network (ANN)-based unit commitment optimization model to enhance the efficiency and reliability of power generation scheduling while incorporating solar and wind energy. A comprehensive dataset covering one year of wind power, solar power, and load profiles was collected to train the ANN model. This dataset was further supplemented with detailed operational attributes, cost coefficients, and generator constraints to improve model accuracy and performance. The proposed model is tested on a modified IEEE-14 bus system across various planning intervals: one-day, one-week, and one-month. For further evaluation, the ANN-based approach is compared with the traditional MILP method. The results demonstrate that the ANN-based unit commitment model can effectively schedule generator outputs across different timeframes in the presence of renewable intermittency and achieves a cost saving of approximately $51 compared to the MILP approach. These findings underscore the potential of AI-based models for efficient and flexible scheduling in renewable-integrated power systems.

1571131594 | **Title:** Exploring the Key Drivers of CO2 Emissions in Australia
Authors: Safa Ghannam

11:55 – 12:15

Accurately identifying the key drivers of carbon dioxide (CO2) emissions is crucial for developing effective mitigation strategies. This study develops and evaluates a range of statistical methods, machine learning models, and interpretability techniques namely, Spearman correlation, mutual information, random forest, XGBoost, and SHAP, to analyze the impact of 38 economic, energy, and environmental factors on CO2 emissions in Australia between 1982 and 2022. The study captures both linear and non-linear relationships with SHAP applied to enhance transparency and explain the contribution of individual features. The results indicate that consumption, gas usage, and transport are the most significant contributors to CO2 emissions, followed by total greenhouse gas emissions (excluding land use change and forestry), electricity supply, energy consumption, and coal. Additionally, oil consumption, GDP, and AUS Energy Growth-QLD play significant roles in shaping emission patterns in Australia. Of these models, random forest outperforms XGBoost, achieving the highest accuracy (R2 = 0.99) with the lowest error, demonstrating its superior ability to capture complex interactions. These findings demonstrate the strength of ensemble models combined with interpretable analysis and provide actionable insights for policymakers, enabling data-driven strategies for carbon reduction and sustainable economic planning.

1571141757 | **Title:** Large Language Models Application in Oil and Gas: Advances, Case Studies, and Future Directions
Authors: Shamsu Abdullahi; Kamaluddeen Usman Danyaro; Haruna Chiroma; Shamsuddeen Muhammad; Abubakar Zakari; Mujaheed Abdullahi; Umama Umar; Noor Amila Wan Abdullah Zawawi

12:15 – 12:35

Large-scale language models (LLMs) are becoming increasingly common in the oil industry, where they are being applied to tasks such as seismic data interpretation, reservoir analysis, and predictive maintenance. This study examines the current state of LLM applications in the sector and highlights recent advances, practical implementations, and domain-specific adaptations. Despite the promising developments, problems such as limited domain-specific data, hallucination risks, and interpretation problems continue to impede widespread adoption of LLMs in the sector. To address these problems, the study proposes effective research directions tailored to oil and gas, including aligning LLM deployment with operational needs and promoting cross-disciplinary collaboration. This review provides concise but comprehensive resources for researchers and industry professionals to promote LLM-driven oil and gas innovation.

14:00 – 14:20

1571149273 | Title: E2Net: Enhanced Ensemble Networks for Dynamic Long-Term Time Series Forecasting
Authors : Agung Mustika Rizki; Ary Mazharuddin Shiddiqi; Ahmad Saikhu; Choiru Zain; Muhammad Ismail; Anggito Anju Hartawan Manalu

Time series analysis is a critical area of data analytics with applications across diverse domains such as economics, healthcare, technology, and environmental monitoring. Despite its importance, forecasting models face considerable challenges when dealing with dynamic and nonstationary data, particularly in long-term prediction tasks. To address these challenges, this paper introduces the Enhanced Ensemble Network (E2Net)—an innovative architecture specifically designed for dynamic, long-term time series forecasting. E2Net extends the dual-network framework by integrating multiple fast learners and a single slow learner to improve predictive accuracy and generalization. The fast learners employ a negative correlation learning strategy to promote diversity and capture different aspects of the data distribution. In parallel, the slow learner utilizes a self-supervised learning mechanism to extract robust feature representations. To further enhance performance, E2Net incorporates reinforcement learning to derive optimal policies for combining the outputs of the fast learners. This architecture enables E2Net to dynamically adapt to multivariate data patterns while maintaining computational efficiency. Extensive experiments on multiple benchmark datasets, including comparisons with state-of-the-art models such as MANTRA and iTransformer, demonstrate that E2Net consistently outperforms existing approaches, achieving notable improvements across various sequence lengths.

14:20 – 14:40

1571141524 | Title: Using the K-Nearest Neighbor and Explainable Artificial Intelligence to Classify Arrhythmias
Authors : Adam Mohd Khairuddin; Siti Armiza Mohd Aris; Ku Nurul Fazira Ku Azir; Azizul Azizan

In this study, the Shapley Additive Explanations (SHAP) and the Local Interpretable Model-Agnostic Explanations (LIME) techniques were adopted to improve the interpretability of a k-nearest neighbor (k-NN) model that was developed to classify 17 distinct classes of electrocardiogram (ECG) arrhythmias. The proposed framework consisted of the following four key stages: (1) data pre-processing, (2) feature extraction, (3) classification, and (4) model explanation. The MIT-BIH Arrhythmia database was employed to train and evaluate the classification model. Results of the study indicated that the model demonstrated high performance, achieving a precision of 98.00%, recall of 99.00%, F1-score of 98.00%, and overall accuracy of 98.31%. Furthermore, the integration of the SHAP and the LIME techniques not only successfully provided both global and local interpretability but also offered valuable insights into the decision-making process of the k-NN model. The results of the SHAP technique indicated that energy, mean, and power spectral entropy were the top 3 features that contributed to the global interpretation of the classification model. The comparison showed that the SHAP consistently assigned identical feature-importance values to similar instances, whereas the results of the LIME technique were inconsistent for the local interpretation.

14:40 – 15:00

1571166113 | Title: Enriching Clickstream Analytics with Generative AI: a Scalable Serverless Architecture for Real-Time
Authors : Vivek Venkatesan; Chakkaravarthy Arunachalam; Rajesh Kumar Kanji

Understanding user behavior through clickstream data is essential for optimizing digital experiences and conversion funnels. Traditional session analysis methods rely on static rules or manual reconstruction, which are time-consuming and hard to scale. This paper presents a scalable, serverless architecture that integrates generative AI to extract session-level intent and behavioral summaries from Adobe Analytics data. The system combines AWS Glue for aggregation, AWS Lambda for orchestration, and Claude via AWS Bedrock for large language model inference. Deployed in a Fortune 500 financial enterprise, it processes over 200,000 sessions daily, achieving 87% precision in manual validation, subsecond inference latency, and a 40% reduction in enrichment costs through prompt optimization. Unlike prior approaches, this work uniquely delivers real-time, AI-enriched session intelligence using prompt-based reasoning within a cost-efficient, cloud-native pipeline. The enriched data significantly enhance analyst workflows by automating narrative generation, improving segmentation, and enabling intent-aware dashboards. This architecture establishes a blueprint for modern behavioral analytics that combines scalability, interpretability, and operational efficiency.

15:00 – 15:20

1571158781 | Title: Unsupervised Clustering Techniques for Semantic Output Generation by Large Language Models
Authors : Emelie C. Villaceran; Alaine Tess A. Cabije

Large Language Models (LLMs) are transforming education through personalized learning and intelligent tutoring. However, their outputs often lack semantic coherence, limiting pedagogical effectiveness. This study applies clustering techniques—K-Means and Agglomerative Hierarchical Clustering (AHC)—to organize survey responses from 396 participants at Cebu Technological University, focusing on seven pedagogical constructs: Rethinking Assessment and Examinations (RAE), Generic Skills (GS), Preparing Students for the AI-Driven Workplace (PS), Balanced AI Adoption (BA), Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Intention to Use LLMs (IU). Descriptive analysis revealed high mean scores for GS (4.02), PS (3.96), and BA (3.88), indicating favorable perceptions. Correlation analysis showed strong relationships, with GS and PS (r = 0.887) and BA and PS (r = 0.878) being most correlated. K-Means clustering identified three optimal clusters, supported by silhouette scores (0.303) and decreasing within-cluster variance. ANOVA confirmed significant differentiation among clusters, with PS (F = 605.08, p < 0.0001) as the most influential variable. Cluster profiles revealed distinct attitudinal patterns, from high engagement to skepticism. These findings validate clustering as a tool for organizing educational survey data, enhancing the interpretability of LLM-related perceptions and informing adaptive, AI-enhanced learning environments.

15:20 – 15:40

1571156423 | Title: Integrating Computer Vision & Machine Learning for Townscape Assessment: a Systematic Review
Authors : Tariq Jameel; Uznir Ujang; Suhaibah Azri; Usman Mehmood

Townscape assessment plays a crucial role in preserving the urban character and identity but is based on subjective human judgement. This often overlooks spatial patterns and relationships. Machine Learning (ML) and Computer Vision (CV) offer an objective and data-driven approach to evaluating urban environments. This systematic literature review, conducted using the PRISMA method, explores 634 studies on the application of ML and CV techniques in assessing townscapes. Thematic studies on urban morphology, streetscape, and townscape assessment were extracted. The four-criterion rubric (C1—C4) with Inter-Rater Reliability and Flies Kappa (κ) was used to quantify the bias. Key findings reveal significant gaps, including the absence of standardised datasets and the absence of the use of ML and CV for the assessment of the townscape. The heat maps showed a gap in the standardisation of the dataset and the assessment framework. This helped develop a conceptual framework for the evaluation of the townscape. Furthermore, these insights may inform future research by promoting standardised frameworks and improving the integration of ML in townscape assessment, ultimately contributing to the preservation and enhancement of urban character and identity.

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Thank you for your unwavering commitment and for making this endeavour truly remarkable

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