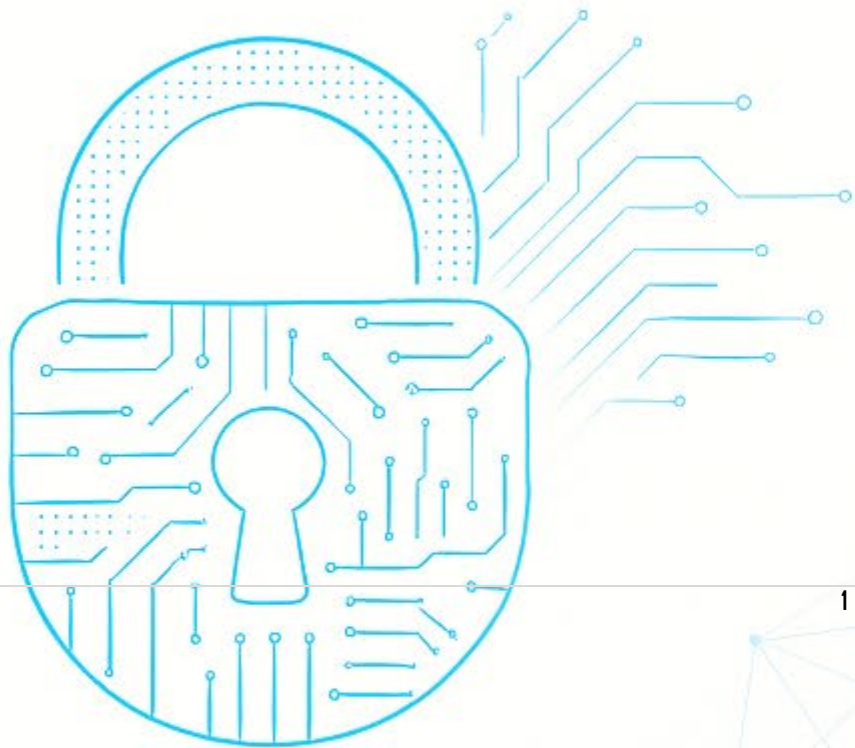


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**The abstracts are arranged according to the presentation sequence.*



Welcome Message from the Chair



Assalamualaikum, Salam Sejahtera and a very warm welcome to everyone.

It is my honour, as the Dean of the Faculty of Computing and Informatics, Universiti Malaysia Sabah, to address all esteemed participants at the AMICT 2025 Conference and International Doctoral Symposium 2025. This annual event continues to represent our faculty's enduring commitment to academic excellence, innovation, and global research engagement.

AMICT 2025 has brought together brilliant minds to share knowledge, challenge ideas, and present impactful research that addresses real-world technological challenges. From artificial intelligence to immersive technologies, smart systems, and data-driven innovations – the breadth of topics discussed here reflects the faculty's mission to nurture forward-thinking talents and researchers who can contribute to the digital future.

To all presenters, I encourage you to use this platform not only to share your findings, but also to build networks, seek collaborations, and explore cross-disciplinary opportunities. The future of technology lies not in isolated domains, but in the convergence of ideas, expertise, and innovation.

The inaugural AMICT 2023 was successfully held online on December 11th and 12th, 2023, attracting significant global interest. A total of 29 papers were accepted for presentation, showcasing cutting-edge research and contributions in the fields of machine intelligence and cybersecurity. This year, we received 162 submissions, with 58 papers accepted and registered for the AMICT conference, along with eight papers for the International Doctoral Symposium 2025. This indicates a substantial increase in the number of papers compared to 2023.

Finally, I want to thank the organizing committee for their dedication and hard work; without them, this event wouldn't have happened. I also appreciate all keynote speakers, reviewers, and participants for their vital contributions to AMICT 2025. Special thanks to Asian Supply Base Sdn Bhd (ASB), Drachen Welle Engineering Sdn Bhd (DWE), and Bena Sama Contractor for their sponsorships, and to the IEEE Sabah Subsection for acting as the technical sponsor.

May this conference inspire new perspectives, foster lifelong partnerships, and spark innovations that will benefit Malaysia, the region, and the world.

I wish everyone a productive and enriching experience throughout the conference.

ASSOC. PROF. TS. DR. MOHD HANAFI AHMAD HIJAZI

Message from the Co-Chair



On behalf of a dedicated team of outstanding individuals from the organizing committee, representing both public and private higher education institutions locally and globally, I am delighted to welcome all participants to the International Conference on Machine Intelligence and Cybersecurity Technologies (AMICT) 2025 and International Doctoral Symposium 2025.

Both conference and symposium come at an opportune and critical time, as researchers in computer science and information technology transition from conventional theoretical approaches to modern advancements in machine learning and cybersecurity. This highly anticipated event marks a significant milestone for all stakeholders, promoting and showcasing cutting-edge AI research and innovation, which is currently the primary driver in advancing our knowledge economy and shaping a smarter society.

We believe the rapid growth of AI and cybersecurity industries, along with their innovative applications, will continue to transform the way we live, fostering stronger global connections and shared aspirations for peace and prosperity.

I would like to take this opportunity to express my sincere gratitude to the organizing committee for their unwavering dedication in making this international conference a success. My heartfelt thanks also go to our keynote speakers, presenters, and all participants who have made the effort to join us here in Kota Kinabalu, Sabah, as we collectively shape, influence, and direct the future of ICT research and innovation.

A special note of appreciation goes to IEEE Sabah Subsection for serving as the technical sponsor of AMICT. This collaboration reflects our commitment to establishing AMICT as a premier ICT academic event held annually and jointly organized by both public and private lecturers across the country.

Finally, I wish all participants a productive and enriching experience at this international conference, and I look forward to seeing you again in 2026.

ASSOC. PROF. TS. DR. CHIN KIM ON

Conference Venue



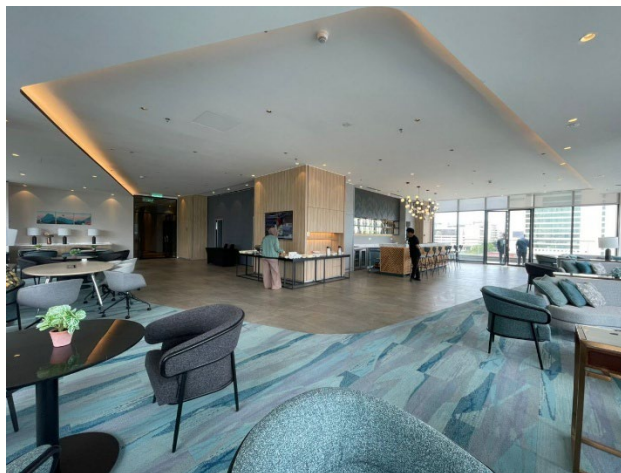
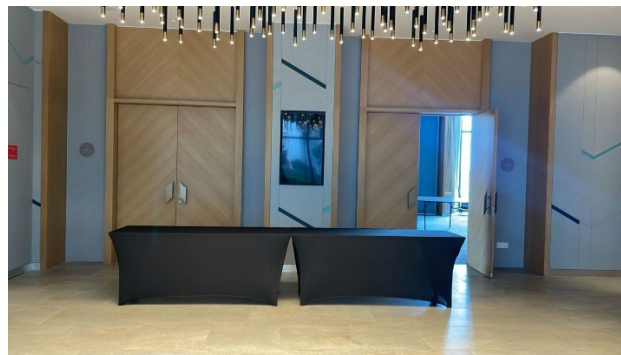
Level 6,

Citadines Waterfront Kota Kinabalu, Sabah

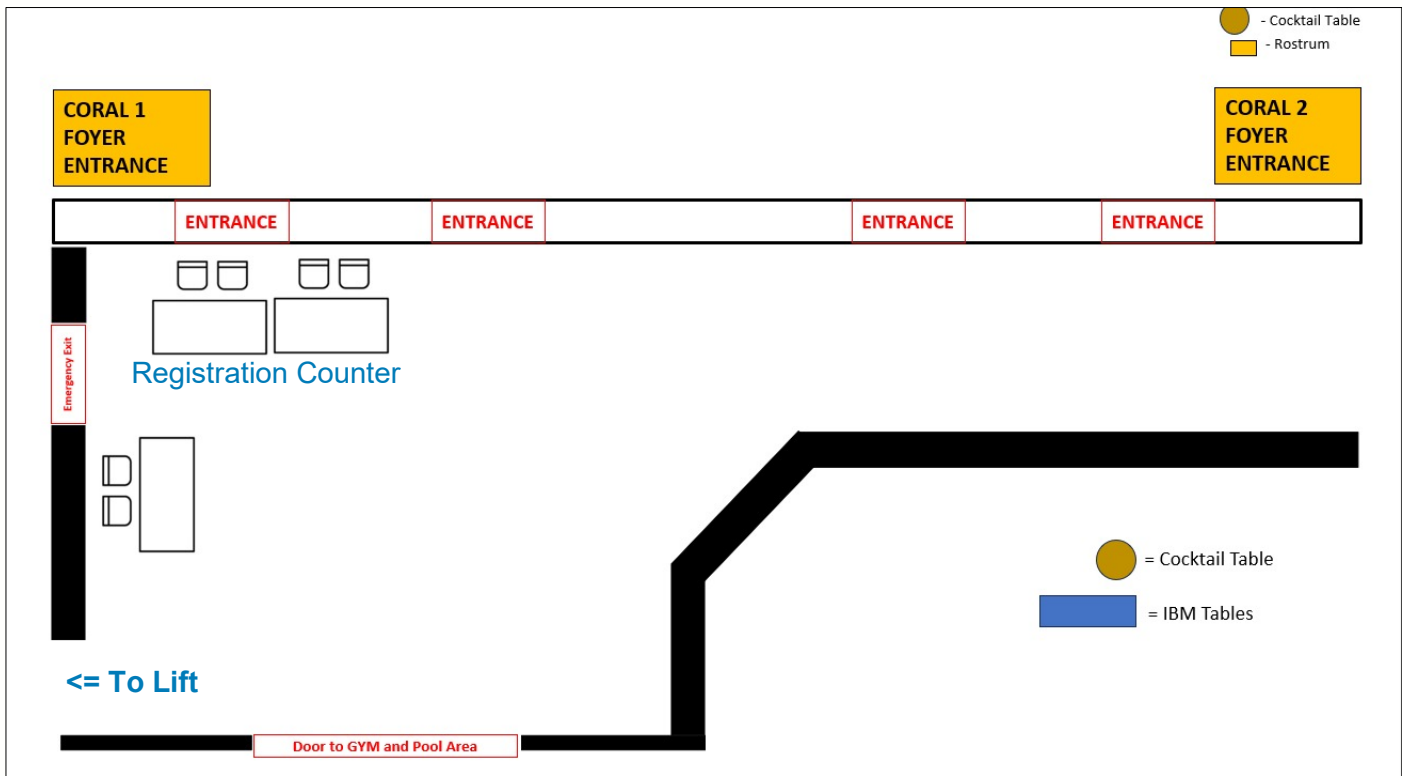
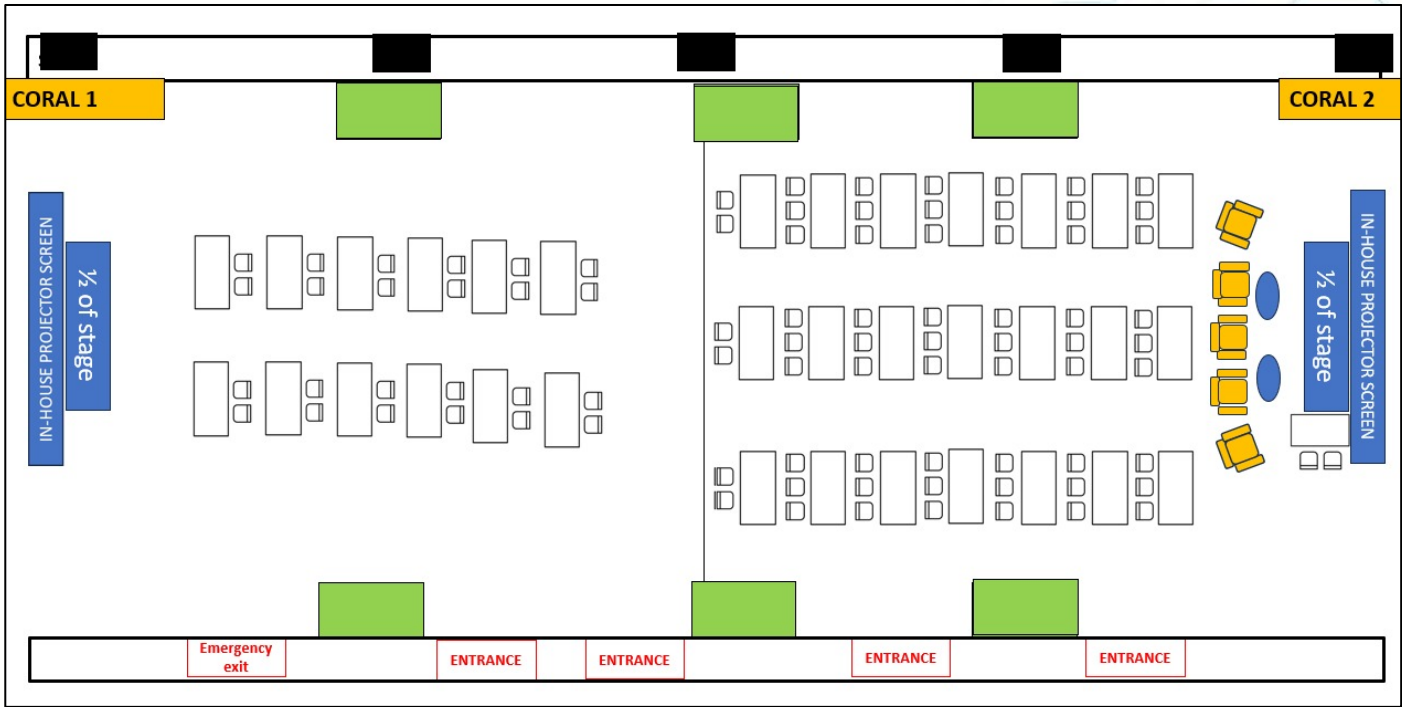
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Floor Plans



Organizing Committees

HONONARY CHAIRMAN:

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CHAIRMAN

Associate Professor Ts. Dr. Mohd Hanafi bin Ahmad Hijazi

CO-CHAIRMAN:

Associate Professor Ts. Dr. Chin Kim On

SECRETARY:

Dr. Nur Faraha Hj Mohd Naim

SECRETARIAT:

Dr. Mohammad Fadhli bin Asli

Mr. Mohd. Fadzli bin Sarudi

Mdm. Faridah binti Adam

TREASURER:

Dr Salmah Fattah (Chair)

Mdm. Dayangku Syafiqah binti Pg Anak

IT AND MEDIA:

Dr. Tan Soo Fun

TECHNICAL:

Associate Professor Dr. Leau Yu Beng (Chair)

Ms. Nordaliela Mohd. Rusli

Dr. Hassan Jamil Syed

PUBLICATIONS:

Dr. Lai Po Hung (Chair)

Dr Florence Sia Fui Sze

Dr. Ashraf Osman

PUBLICITY:

Dr. Norazlina Khamis (Chair)

Mohd Nazri Bin Suin

Mdm. Ezy @ Norol Atikah Sabtu

SPONSORSHIP:

AP. Dr. Muzaffar Hamzah (Chair)

Mdm. Molly Donna

Dr. Nooralisa Binti Mohd Tuah

Dr. Nuraini Binti Jamil

Mdm. Dg. Senandong Binti Ajor

PROGRAM CHAIR:

Dr Zaidatol Haslinda Abdullah Sani (Chair)

LOCAL ARRANGEMENT:

Dr. Norhayati Daut (Logistic)

Mr. Fadzli bin Bahal (Conference Audio Visual Technician)

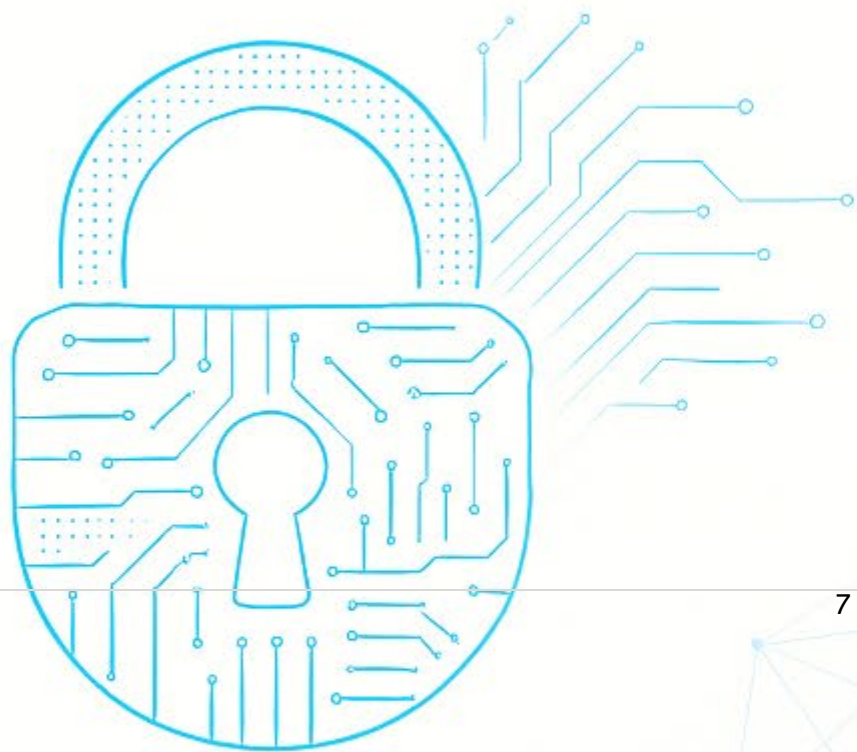
DOCTORAL SYMPOSIUM COMMITTEES:

Dr. Nooralisa Mohd Tuah

Dr. Jackel Vui Lung Chew

Ms. Junainah Bt Yunus

Mdm. Junaidah Binti Lamjan



Presentation Information

For Everyone

- The registration and info desk for the conference is near the Coral 1 room.
- **Time Zone: Kuala Lumpur Time (UTC/GMT+8).** Please double check your Presentation Time, and adjust times to device's time zone.
- **Language:** English.
- **Nov. 20:** Opening remarks, keynote speeches, parallel sessions, and onsite registration.
- **Nov. 21:** For Webex (online presenters).
- Each Keynote Speech is within 45Mins, (35–40 minutes presentation, 10–5 minutes for Q&A).
- The time allocated to each presenter is 10–12 minutes, followed by a 3–5 minutes Q&A session.
- Group Photo will be at the evening break time on Nov. 20, and there will be a session group photo time at the end of each session.
- **Punctuality:** To ensure the conference runs smoothly, the organizing committee requests your cooperation in arriving on time. Any updates to the program will be announced in the conference room before or after the keynote sessions.
- Please keep all your belongings with you at all times. The conference organizer is not responsible for any lost personal items.

For Onsite Presenters:

- Each presenter must prepare and submit their slides to the Secretariat by the latest on the conference registration day, preferably

15–30 minutes before their presentation. Presenters may also upload their slides to the session laptop provided, using a thumb drive.

- Please enter the session room and meet your Session Chair / Rapporteur in advance before the session starts.
- The session room will be equipped with a laptop, projector, and laser pointer. To save time, it is suggested not to use your own laptop.
- We suggest you keep a copy of your PPT slides file in your email.
- **Conference Identification Tags:** Please always wear your identification tag throughout the conference, as it serves as your access to the presentation and lunch sessions.
- **Dress Code:** Smart Casual is recommended throughout the conference.
- **Smoking Policy:** The hotel is designated as a smoke-free venue.

For Online Presenters:

- Please join the presentation 15 minutes early using the provided Webex link. Breakout sessions will be organized and shared during the conference event.
- Rename yourself with Paper ID+Name, (eg. PID+103+John or PID+UPC12+Amin), before entering meeting room.
- Certificates will be emailed after the conference.

CONFERENCE SCHEDULE

Day 1 – [20th November 2025 PHYSICAL]

Time	Programme	Venue
8:00 AM – 9:00 AM	Registration of Participants	Registration Counter
9:00 AM – 9:45 AM	<i>Keynote Speaker 1</i> Prof. Aripriharta Universitas Negeri Malang, Indonesia	Coral Hall 1
9:45 AM – 10:30 AM	<i>Keynote Speaker 2</i> Assoc. Prof. Ts. Dr. Norliza Binti Katuk School of Computing, Universiti Utara Malaysia	Coral Hall 2
	<i>Keynote Doctoral Symposium</i> Dato' Seri Amir Hussien CEO Drachen Welle Engineering Sdn Bhd	Sunrise
10:30 AM – 11:00 AM	Morning Coffee Break	Refreshment Area
11:00 AM – 1:00 PM	<i>Doctoral Symposium</i>	Sunrise
	Parallel Sessions 1	Coral Hall 1 Coral Hall 2
1:00 PM – 2:00 PM	Lunch Break	Dining Area
2:00 PM – 3:30 PM	Parallel Sessions 2	Coral Hall 1 Coral Hall 2
3:45 PM – 4:00 PM	Arrival of VVIP & Guests	Coral Hall 1
4:00 PM – 5:00 PM	<i>Welcoming Address and Closing Session by</i> YBhg. Prof. Datuk Dr. Kasim Hj Mansor, JP Vice-Chancellor, Universiti Malaysia Sabah	Coral Hall 1
5:00 PM – 5:30 PM	Coffee Break	Refreshment Area
END OF DAY 1		

Day 2 – [21st November 2025 ONLINE]

Time	Programme	Venue
8:30 AM – 9:00 AM	Registration of Participants	Webex Link
9:00 AM – 11:00 AM	Parallel Sessions 3 (4 Breakout Sessions)	Webex Link
11:00 AM – 11:30 AM	Wrap-up Ceremony by AMICT2025 Chairman Assoc. Prof. Ts. Dr. Mohd Hanafi bin Ahmad Hijazi Group Photo Session	Webex Link
END OF DAY 2		

Keynote Speakers



Prof. Aripriharta

Universitas Negeri Malang (UM), Indonesia

Speech Title:

Optimizing the Future: Multi-Objective Approaches to Sustainable Energy Intelligence

Time: 09.00a.m. – 9.45a.m, Room: Coral 2

Bibliography:

Prof. Aripriharta is a Professor of Electrical Engineering and Informatics at the Universitas Negeri Malang, Indonesia. He earned his Bachelor's and Master's degrees in Electrical Engineering from Brawijaya University, Indonesia, and completed his Ph.D. in Electronic Engineering at the National Kaohsiung University of Applied Sciences (NKUAS), Taiwan. His research spans Intelligent power electronics and its applications, Internet of Things (IoT), and AI-based optimization, with a strong focus on sustainable development. He is the originator of the Queen Honeybee Migration (QHBM)—an innovative, nature-inspired method for solving multi-objective optimization problems. Prof. Aripriharta, Ph.D. has published extensively in international journals and conferences, contributing to the advancement of smart and sustainable technologies. His interdisciplinary work integrates engineering rigor with philosophical depth, addressing the ethical, educational, and social implications of technological progress. Beyond his technical contributions, he is actively engaged in academic policy development, scientific writing mentorship, and leadership training in higher education. He has delivered numerous keynote and serves as a reviewer for leading journals including those under IEEE, Elsevier, and Springer. Renowned for his clarity in conveying complex ideas, Prof. Aripriharta, Ph.D. often blends metaphor, Islamic philosophical thought, and reflective narrative in his writings—positioning him as a distinctive and respected voice in both academic and public intellectual circles.

Abstract:

Modern energy systems are becoming increasingly complex due to the growth of decentralized generation, the integration of renewable sources, and the digitalization of infrastructure. These changes introduce new challenges related to sustainability, resilience, and operational efficiency. This keynote address highlights the role of multi-objective optimization (MOO) as a strategic approach to achieving sustainable energy intelligence. Conventional power grids are often rigid and centralized, lacking the flexibility needed to manage intermittent resources and dynamic demand. In contrast, intelligent energy systems must navigate trade-offs across multiple conflicting objectives—balancing cost, carbon emissions, energy autonomy, system resilience, and community-level needs. The talk introduces the Queen Honeybee Migration (QHBM), inspired by the natural migratory behaviour of honeybee queens, and explores its applications in optimizing energy systems. Particular focus is placed on scenarios in energy-constrained rural and urban contexts, where energy constraints intersect with social vulnerability. This approach supports the visions of Industry 4.0 and Industry 5.0, while contributing directly to Sustainable Development Goals (SDGs) related to clean energy, sustainable infrastructure, inclusive communities, and climate resilience.



Assoc. Prof. Ts. Dr. Norliza binti Katuk

School of Computing, Universiti Utara Malaysia (UUM), Malaysia

Speech Title:

Activating Adaptive Human Digital Shields: Rethinking Cybersecurity for Resilience in Smart Environments

Time: 09.45a.m. - 10.30a.m, Room: Coral 2

Bibliography:

Norliza Katuk is an associate professor of cybersecurity at the School of Computing, Universiti Utara Malaysia. She obtained her Bachelor's degree in Information Technology from Universiti Utara Malaysia in 2000, a Master's degree in Computer Science from Universiti Teknologi Malaysia in 2002, and a Doctoral degree in Information Technology from Massey University, New Zealand, in 2012. As the Deputy Director for Global Engagement at the Centre for International Affairs and Cooperation (CIAC), she leads international partnerships and academic mobility initiatives that enhance the university's global presence. Her research interests include information security and privacy, cybersecurity awareness, Internet technology, IoT, disaster management, e-learning, and human-computer interaction. A prolific scholar, Norliza has published widely in international journals and is a reviewer for several esteemed publications. She also has experience editing and writing books, further contributing to the academic discourse in her fields. Additionally, she serves as the Chief Editor of the Journal of Information and Communication Technology (JICT).

Abstract:

In today's rapidly evolving digital landscape, the rise of smart environments presents unprecedented opportunities and exposes us to increasingly sophisticated cybersecurity threats. While tools like AI and automation play a critical role in defence, human vulnerabilities continue to pose significant risks, whether through unintentional errors or targeted manipulation. This talk introduces the concept of the **Adaptive Human Digital Shield**, a modern approach to cybersecurity that leverages human adaptability, awareness, and collaboration as integral components of digital resilience. The talk explores how individuals, organizations, and researchers can address key challenges such as phishing, social engineering, and the tension between usability and security. We can build secure and adaptive systems for the dynamic threat landscape by aligning human behaviour with advanced technical defences and fostering stakeholder collaboration. Practical strategies for enhancing human engagement, embedding security into organizational culture, and designing smarter, human-centric systems will be discussed. Balancing innovation and security is essential to fostering trust and resilience in smart environments. We can create sustainable systems that empower technology to be a force for progress rather than a vector for threats by aligning human behaviour with advanced technical defences and fostering collaboration across stakeholders.



Dato' Sri Haji Amir Hussein

Speech Title:

Writing the Self: The Philosophy Behind a PhD

Time: 09.45a.m. - 10.30a.m, Room: Sunrise

Bibliography:

Dato' Sri Haji Amir Hussien is an accomplished corporate leader and policy strategist with extensive experience in business development, technology, and governance. He is currently pursuing a Doctor of Philosophy in Business Studies (Foreign Direct Investment) at Universiti Utara Malaysia, following an MBA from Universiti Kebangsaan Malaysia and a Bachelor's degree in Business Administration from the University of Arkansas, USA. His leadership journey includes serving as Chairman of Perbadanan Labuan (2018–2022) and subsequently as Chairman of its Advisory Committee (2022–2023), where he played a pivotal role in shaping development policies, promoting sustainable growth, and fostering stakeholder collaboration for Labuan Island. Currently, he is the Chairman of Quantum Two International Ltd and Director of Drachen Welle Engineering Sdn. Bhd., where he leads initiatives in global payments innovation and engineering solutions. Dato' Sri Amir is also actively involved in numerous social and non-governmental organizations, reflecting his dedication to community development, education, and national progress. His outstanding contributions have earned him several national honors, including the Sri Sultan Ahmad Shah Pahang (S.S.A.P.) and Darjah Indera Mahkota Pahang (D.I.M.P.).

Abstract:

The pursuit of a PhD is often misunderstood as a race for titles, credentials, or recognition. In truth, it is a long conversation between the self and knowledge a test of patience, discipline, and clarity of thought. "The Philosophy Behind a PhD" revisits what this journey truly means: not the accumulation of information, but the cultivation of wisdom. This paper reflects on the original spirit of philosophia, the love of wisdom, and how it has quietly shaped the idea of the modern doctorate. It examines the growing tension between genuine curiosity and institutional expectation, and between thinking deeply and producing quickly. Through this lens, the PhD is seen not as a destination, but as a transformation of how we question, reason, and engage with truth. In the end, the philosophy behind a PhD is simple yet profound: it is the courage to think beyond certainty, the humility to keep learning, and the responsibility to use knowledge in service of others.

Onsite Presentation (20th November 2025)

Parallel 1a - Coral Hall 1 Session Chair: AP. Dr. Muzaffar Hamzah Rapporteur: Ms. Amanda Aiza Amran		
Time	Paper ID	Paper Title
11:00 – 11:15	18	Leveraging GPT-4o's Multimodal Capabilities for Enhanced Video Anomaly Detection in Complex Scenarios Presenter: Choo Yen Lee
11:15 – 11:30	37	Real-Time Facial Emotion Annotation for Autism Spectrum Disorder (ASD) Therapy Using Kernel-Based Clustering and Hybrid CNN Models Presenter: Raseeda Hamzah
11:30 – 11:45	65	Enhancing Bone Fracture Detection in Medical Imaging: Implementing Transfer Learning and Adversarial Training Presenter: Mohd Hanafi Ahmad Hijazi
11:45 – 12:00	UPC-9	GRU Outperforms Probabilistic Transformers in Forecasting Malaysian Currency Exchange Rates Presenter: Choo Yen Lee
12:00 – 12:15	106	Optimized Evacuation Route Planning in High-Rise Buildings Using Dijkstra and Ant Colony Algorithms Presenter: Yuseni Wahab
12:15 – 12:30	UPC-8	Enhancing CNN Model Re-Classification through Image Segmentation and Enhancement Techniques for Bornean Orangutan Nest Presenter: Amanda Aiza Amran
12:30 – 12:45	109	Regression-based Finish Time Prediction of 100km Trail Running using Structured Athlete Performance Presenter: Mohd Shamrie Sainin
12:45 – 13:00	107	MobileNet-based Tuberculosis Segmentation in Chest X-Rays: An Accuracy-Efficiency Trade-off Analysis Presenter: Ashraf Ibrahim

Onsite Presentation (20th November 2025)

Parallel 1 b - Coral Hall 2 Session Chair: Dr Salmah Fattah Rapporteur: Dr. Nur Faraha Hj Mohd Naim		
Time	Paper ID	Paper Title
11:00 – 11:15	29	Deployment of Data-Driven Virtual Flow Meter in Cloud and Standalone Environments Presenter: Nik Nur Wahidah Nik Hashim
11:15 – 11:30	73	A Scientometric Analysis by Visualising Research on Deep Learning of Diabetic Retinopathy Presenter: Ahmad Faiz Ghazali
11:30 – 11:45	112	Developing a Big Data Analytics Maturity Model Based on the ADIBA Framework Presenter: Norhayati Daut
11:45 – 12:00	77	What Religion is ChatGPT? Analyzing Inter-faith Bias In The World's Most Popular AI Presenter: James Mountstephens
12:00 – 12:15	42	Transformer-Based Language Models: A Technical Survey of Architectures, Applications, and Critical Challenges Presenter: Seyed Hamid Talebian
12:15 – 12:30	104	Virtual Flow Metering For Data-limited Wells Using Machine Learning For Multiphase Flow Prediction In Commingled Testing Environments Presenter: Nik Nur Wahidah Nik Hashim
12:30 – 12:45	75	Low-Altitude Sensing Standards: Institutional Support for Intelligence and Security Presenter: Toh Chia Ming
12:45 – 13:00	105	Enhancing Dermatological Diagnostics: Lightweight Segmentation Models for Skin Lesions Presenter: Salmah Fattah / Ashraf Ibrahim

Onsite Presentation (20th November 2025)

Parallel 1 c - Sunrise		
Session Chair: Dr Jackel Chew		
Time	Paper ID	Paper Title
11:00 – 11:15	DS-1	A Classification Model For Predicting Stroke Rehabilitation Success Presenter: Nur Shada Nadherah Binti Abdul Ghani
11:15 – 11:30	56	Conceptual Framework For Understanding The Impact Of Internet Of Things For Filing System In Public Sectors Presenter: Joses Kodoh
11:30 – 11:45	59	Optimization Of Multi-Layer Leach In Wireless Sensor Networks Using Genetic Algorithm Presenter: Sam Lie Lie
11:45 – 12:00	DS-2	Evaluating Custom Cnn Vs. Vgg16 On Fer-2013 For Facial Emotion Classification Presenter: Nur Fatin Nabilah Binti Azhar
12:00 – 12:15	79	A Systematic Literature Review On Technology Acceptance Determinants For Student Personalized Scheduling System Among University Student Presenter: Mohd Azam Bin Mad Suliman
12:15 – 12:30	32	Exploring Older Adults' Perceptions Of Augmented Reality Applications For Cultural Tourism: A Focus Group Study Presenter: Nur Amira Suhada Binti Suhaimi
12:30 – 12:45	33	Teachers' Perception, Knowledge, And Attitude On Augmented Reality: A Survey Study Presenter: Puteri Dian Irdina Binti Mohd Yusni
12:45 – 13:00	DS-3	A Lightweight Privacy Preservation In Named Data Networking Through Name Rotation Mechanisms Presenter: Mohammad Shahrul Mohd Shah

Onsite Presentation (20th November 2025)

Parallel 2 a - Coral Hall 1		
Session Chair: AP. Ts. Dr. Leau Yu Beng		
Rapporteur: Ms. Nordaliela Mohd. Rusli		
Time	Paper ID	Paper Title
14:00 – 14:15	UPC-20	A Cutting-Edge Approach to Phishing Email Detection using Machine Learning Presenter: Gohar Rahman
14:15 – 14:30	UPC-19	Effective Two Factor Role-based Access Control for Cloud Computing using Twofish encrypted JAR file Presenter: Gohar Rahman
14:30 – 14:45	110	Sentiment Insights and Usability Evaluation for KADUMALIN Translation System Presenter: Suraya Alias
14:45 – 15:00	78	Decentralised Proximal Policy Optimisation for Traffic Signal Control Presenter: Matthew Laurentius Bansing
15:00 – 15:15	UPC-40	A Survey on Metaheuristic Approaches for Muskingum Flood Routing Model Parameter Estimation Presenter: Jackel Vui Lung Chew



Onsite Presentation (20th November 2025)

Parallel 2 b – Coral Hall 2		
Session Chair: AP. Ts. Dr. Chin Kim On		
Rapporteur: Mdm. Faridah binti Adam		
Time	Paper ID	Paper Title
14:00 – 14:15	UPC-10	Integrating Carbon Footprint Awareness into an E-Barter Application for Sustainable Consumption in Malaysia Presenter: Choo Yen Lee
14:15 – 14:30	111	User-centered Mobile Application Design for Smart Waste Collection Presenter: Norazlina Khamis
14:30 – 14:45	UPC-36	Design and Development of 'Kimaragang Words': A Game-Based Learning Mobile Application for Local Language Engagement Presenter: Victor B. Pangayan
14:45 – 15:00	21	Leveraging Immersive Technologies to Transform Food Security: Applications, Challenges and Future Directions Presenter: Khairul Shafee Kalid
15:00 – 15:15	34	Trustworthiness in Image Pre-Processing Techniques for Stroke Classification Using DenseNet and LIME Presenter: Christopher Ijok / Daphne Teck Ching Lai



Online Presentation (21st November 2025)

Parallel 3 a - Webex - Room 1 Session Chair: Dr Lai Po Hung Rapporteur: AP. Ts. Dr. Chin Kim On		
Time	Paper ID	Paper Title
9:00 – 9:15	83	Envisioning Multiple Contexts of a Historical Landmark Using Augmented Reality: The Chimney Tower Presenter: Dinna @ Nina Mohd Nizam
9:15 – 9:30	66	FloodApp: Real-Time Integrated Mobile Application for Flood Monitoring, Detection, and Alerts Presenter: Muhammad Aqil Mohd Sabri
9:30 – 9:45	103	Food-as-Medicine Recommender Systems: A Vision for Generative AI-Powered Grocery Guidance Presenter: Kapil Kumar Reddy Poreddy
9:45 – 10:00	UPC-25	A Taxonomy of AI-Driven and IoT-Based Solutions for Smart Traffic Management Presenter: Khalid Yahya Ahmed
10:00 – 10:15	108	Deep Learning Models for Low-Dose CT Denoising: A Forward Survey (2022-2025) Presenter: Wang Zhang
10:15 – 10:30	UPC-34	Federated Learning Strategies for Image Analysis in the Healthcare Sector Presenter: Aitana Pastor Osuna
10:30 – 10:45	115	Sentiment Analysis in Public Health: Leveraging Expert-Annotated Social Media Data Presenter: Daimler Benz Alebaba

Online Presentation (21st November 2025)

Parallel 3 b - Webex - Room 2 Session Chair: Dr. Zaidatol Haslinda Abdullah Sani Rapporteur: Dr. Norhayati Daut		
Time	Paper ID	Paper Title
9:00 – 9:15	41	A Remote Sensing Image Object Detection Method Based on Multi-scale Transformer Presenter: Zhou Jinghe
9:15 – 9:30	5	Feeling the Frame: Deep Multimodal Learning for Emotion-Aware Image Captioning Presenter: Lakshmi Ethirajan
9:30 – 9:45	84	Machine Learning for Circular Economy: Predicting Product Lifecycle and Optimizing Waste Management Presenter: Mohammad Anisur Rahman
9:45 – 10:00	93	AI-Powered Personalized Therapy for Children with Autism: A Reinforcement Learning Approach Presenter: Mahdia Amina
10:00 – 10:15	95	Optimizing Diabetes Prediction Using Ensemble Learning Techniques for Enhanced Accuracy Presenter: Arifa Ahmed
10:15 – 10:30	97	AI-Powered Precision Intervention: Ending America's Opioid and Substance Abuse Crisis Through Predictive Analytics Presenter: Md Habibur Rahman

Online Presentation (21st November 2025)

Parallel 3 c – Webex – Room 3 Session Chair: Dr Tan Soo Fun Rapporteur: Ms. Nordaliela Mohd. Rusli		
Time	Paper ID	Paper Title
9:00 – 9:15	116	Sabah Smart Science and Technology Park: A Strategic Framework for Regional Innovation and Economic Transformation Presenter: Uda Hashim
9:15 – 9:30	36	Enhancing Phishing Detection Through Machine Learning Presenter: Bahman Sassani
9:30 – 9:45	39	Security in Software-Defined Networking Migration: Challenges, Proposal and Future Perspective Presenter: Tan Saw Chin
9:45 – 10:00	53	Binary Flaw Detection: A Security Analysis Paper Presenter: Fahad Amin
10:00 – 10:15	UPC-35	A Hybrid Data Collection Framework for Anomaly Presenter: Kimsreng Lim
10:15 – 10:30	UPC-29	Automating IoT Vulnerability Severity Prediction from Its Textual Descriptions Presenter: Samira Baho
10:30 – 10:45	UPC-11	Automated Attendance System using Surveillance Cameras Presenter: Rafi Jusar Wishnuwardana

Online Presentation (21st November 2025)

Parallel 3 d - Webex - Room 4 Session Chair: Dr. Florence Sia Fui Sze Rapporteur: AP. Ts. Dr. Leau Yu Beng		
Time	Paper ID	Paper Title
9:00 – 9:15	30	High-Accuracy Potato Leaf Disease Classification Using Transfer Learning with ResNet50 Presenter: Abhishek Bajpai
9:15 – 9:30	UPC-30	The Challenge of Generalization: Preserving Sarcasm Detection in a Multitask Model Across Different Linguistic Contexts Presenter: Mohd Suhairi Md Suhaimin
9:30 – 9:45	90	Blockchain for Transparent and Efficient Carbon Credit Trading Presenter: Rakibul Hasan
9:45 – 10:00	99	AI-Driven ESG Scoring for Sustainable Investment Decisions Presenter: Rakibul Hasan
10:00 – 10:15	101	Leveraging Machine Learning for Predictive Sustainability Analytics: Optimizing Resource Management in Manufacturing Presenter: Arifa Ahmed
10:15 – 10:30	102	AI-Powered Medical Imaging: Enhancing Diagnostic Accuracy in Radiology Presenter: Mahdia Amina
10:30 – 10:45	67	Performance Analysis of MTCNN for Face Detection Presenter: Jeswin Joison

Abstracts

Session 1 a

18

Leveraging GPT-4o's Multimodal Capabilities for Enhanced Video Anomaly Detection in Complex Scenarios

Arsouski Sasa, Tan Yi Ze, **Choo Yen Lee**

Abstract – Video anomaly detection refers to the identification of unexpected events in video streams that deviate from typical patterns. In our research we use OpenAI's GPT-4o and GPT-4o mini models' multimodal capabilities to explore a unique method for video anomaly detection. Methodology presented in this paper employs prompt-based labelling that relies on structured prompts to direct the GPT-4o, and GPT-4o-mini multimodal models' analysis, enabling effective video labelling and behavior classification for video anomaly detection tasks. We compare our method with the state-of-the-art techniques for detecting anomalies in videos, including the divide-and-conquer strategies, rule-based reasoning, two-stream frameworks, and context feature improvement. The performance of the method proposed in our research was evaluated on a specially selected subset of the Shanghai Tech and UCSD datasets. Additionally, we provide insight into the advantages and disadvantages of each technique for video anomaly detection and compare results with suggested prompt-based labelling methods used with GPT-4o and GPT 4o-mini multimodal models. Results evaluation show that our method achieves results that are similar or better compared to traditional models. However, there is potential for further refinement, such as real-time detection, optimized response structuring, and model fine-tuning. Our method provides the groundwork for incorporating multimodal AI models into practical anomaly detection tasks and opens the possibility for further deep evaluations on real-life datasets to confirm the system's reliability and scalability across a range of applications.

Keywords – Video anomaly detection, GPT-4o, GPT-4o-mini, multimodal models, prompt-based labelling, behavior classification, deep learning.

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Real-Time Facial Emotion Annotation for Autism Spectrum Disorder (ASD) Therapy Using Kernel-Based Clustering and Hybrid CNN Models

Raseeda Hamzah, Muhammad Asyraf Suhaile, Khyrina Airin Fariza Abu Samah, Wan Nur Azhani W. Samsudin, Nur Nadiah Asyikin

Abstract – This research introduces the real-time representation of facial emotion annotation system to help children with Autism Spectrum Disorder (ASD) in the therapy process. The system utilizes Kernel-based similarity to clustering the faces into three emotions which are angry, sad and happy. YOLOv8 is used in detecting faces along with three AI Convolutional Neural Network (CNN) pre-trained models comparison comprising InceptionV3, MobileNetV2 and Xception in the categorization of emotions. The test accuracy of InceptionV3 is 63.76 %, MobileNetV2 61% and Xception 56.56 %. The models were good when it came to specific emotions such as happiness but not when the specific emotion was subtle such as fear and disgust. Experiments show that the used of hybrid variant which are the combination of all three CNN architecture, performed best with test accuracy of about 80.1%. The hybrid method exploits InceptionV3 as the feature extractor with robust capability, MobileNetV2 as the lightweight processing and Xception as the detailed analyzer. The advantage of this combination is that both accuracy and stability were enhanced and were efficient in real time applications.

Keywords – Kernel-based similarity, YOLOv8, MobileNetV2, Xception, InceptionV3.

Session 1 a

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Enhancing Bone Fracture Detection in Medical Imaging: Implementing Transfer Learning and Adversarial Training

Mohd Hanafi Ahmad Hijazi, Nurin Afiqah Abdul Hamid, Khadijah

Abstract – The demand for efficient and robust medical image analysis poses significant challenges in accurately detecting bone fractures within specific anatomical regions. Deep learning (DL) models are often vulnerable to adversarial attacks and exhibit limited generalization across diverse datasets, raising concerns about their reliability in clinical settings. This paper aims to compare the performance of U-Net and ResNet50 architectures for bone fracture detection in X-ray images under varying data conditions. Using transfer learning and adversarial training with the Fast Gradient Sign Method (FGSM), three experiments were conducted: training on clean, pre-processed datasets; training on adversarial examples; and training on a combination of clean and adversarial datasets. Two pre-processing techniques, Gaussian Filter and Canny Edge Detection were also applied on the datasets. The performance was evaluated using accuracy, precision, recall, and F1-score. Results show that U-Net outperformed ResNet50 across all experiments and achieved an accuracy of 80%, and F1-score of 80% with adversarial training on combined Gaussian Filter datasets, demonstrating great robustness and generalization capability. On the other hand, ResNet50 showed limited adaptability to adversarial perturbations, especially when processing edge-based features. This paper highlights the effectiveness of adversarial training in enhancing model robustness and highlights U-Net's potential as a reliable tool for bone fracture detection.

Keywords – Medical Images analysis, Bone Fracture Detection, Deep Learning, Adversarial Training, Transfer Learning.

UPC-
9

GRU Outperforms Probabilistic Transformers in Forecasting Malaysian Currency Exchange Rates

Arsouski Sasa, Haarshan A/L Mohan, **Choo Yen Lee**

Abstract – Probabilistic Transformers (PT) have emerged as the latest architecture for time series forecasting, claiming their ability to capture complex patterns and provide uncertainty estimates. However, their effectiveness in the foreign exchange (FX) market is still not fully explored. This paper investigates the performance of Probabilistic Transformers, Standard Transformer Encoder in forecasting Malaysian currency exchange rates and compares against traditional forecasting models such as Gated Recurrent Units (GRU), Long Short-Term Memory (LSTM) networks, and XGBoost. In experiment, presented in this paper, we utilized dataset of Malaysian Ringgit (MYR) exchange rates, covering 21 years of historical data on MYR's exchange rates relative to 14 major foreign currencies. In addition, we add 21 years of history of the EUR to GBP and EUR to USD exchange rates to the dataset. We have implemented Grid Search hyperparameter tuning to optimize each model's performance. Experimental results show that GRU models achieved the best forecasting performance among all tested models, demonstrating the lowest Mean Squared Error, while Probabilistic Transformer has shown higher MSE compared to other models including Standard Encoder Transformer, LSTM, and XGBoost. The key contribution of this research reveals the limitations of Probabilistic Transformers when applied to high volatile dataset. It also shows that recurrent models especially GRU are better at understanding trends and fluctuations of the high volatile datasets.

Keywords – Time series forecasting, foreign exchange market, GRU, LSTM, probabilistic transformer, Deep Learning, hyperparameter tuning.

Session 1 a

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Optimized Evacuation Route Planning in High-Rise Buildings Using Dijkstra and Ant Colony Algorithms

Yuseni Wahab, Norazlina Khamis, and Abd Samad Hasan Basari

Abstract – This research addresses the optimization of evacuation paths in high-rise buildings by applying shortest path algorithms. In emergencies, panic often disrupts orderly evacuation, making reliable route guidance crucial. The work compares two classical algorithms—Dijkstra's Algorithm and Ant Colony Optimization (ACO)—to determine safe and efficient escape routes. The process consists of six main stages: examining the original floor layout, converting it into a two-dimensional plan, constructing a distance matrix, and subsequently generating a graph model. Both algorithms are then executed on this model to compute possible escape paths. A MATLAB-based simulation was employed to evaluate their performance. Findings showed that the two methods produced identical shortest distances and directions, though node labeling differed. This result indicates that ACO is a viable substitute for Dijkstra in evacuation modeling. The study highlights the value of integrating optimization and AI-based approaches into emergency decision-support systems to improve safety in complex buildings.

Keywords – Evacuation Route Optimization, Shortest Path Algorithms, Ant Colony Optimization (ACO).

UPC-
8

Enhancing CNN Model Re-Classification through Image Segmentation and Enhancement Technique for Bornean Orangutan Nest

Amanda A. Amran, Kim On Chin, Po Hung Lai, Alfred Rayner, Soo See Chai, Chiou Sheng Chew

Abstract – This study presents a comprehensive multi-stage pipeline designed to improve the classification of orangutan nests in aerial images, which is a challenging task due to the small size of the nests and the complex, cluttered backgrounds in the imagery. The proposed method integrates three preprocessing techniques, namely GrabCut segmentation for background removal, HSV Color Filtering for enhancing relevant features, and Bilateral Filtering for noise reduction, to prepare the images before classification. Several pretrained convolutional neural networks (CNNs) have been evaluated, including AlexNet, EfficientNet-BO, Inception-ResNet-v2, Inception-v3, and SqueezeNet, to identify the most suitable model for this task. To address the issue of misclassification, a targeted image enhancement step was applied, involving resizing, sharpening, denoising, and RGB reconstruction of the misclassified samples. Experimental results demonstrated that SqueezeNet, when combined with Bilateral Filtering and the proposed enhancement techniques, achieved the highest classification accuracy and F1-score of 97.95%. This highlights the potential of lightweight CNN architecture coupled with focused preprocessing for ecological image analysis. Future research will aim to expand this pipeline to handle multi-species nest datasets and explore real-time classification capabilities in field applications.

Keywords – Image segmentation, image enhancement, deep learning, classification, re-classification.

Session 1 a

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Regression-based Finish Time Prediction of 100km Trail Running using Structured Athlete Performance

Mohd Shamrie Sainin

Abstract – Finish times prediction in trail running offers valuable support to athletes, coaches, and event organizers in planning and performance assessment. This study presents a benchmarking analysis using a newly compiled exploratory dataset comprising 100 trail runners. The benchmark dataset consists of 18 structured features, including demographic attributes (age and gender), performance indices (ITRA and UTMB scores), race history (number of 50km and 100km events), and recent performance times. Time-based features were normalized, and missing values were replaced using sentinel values and binary indicators. Furthermore, the study introduces the integration of recent race finish times alongside elevation gain to enhance model accuracy. Thirteen regression-based models were evaluated to explore the predictive power of these features. Among them, Support Vector Regression (SVR) demonstrated the better results compared to other regression models on the actual race dataset, with an R^2 score close to zero (-0.018), 256.25 minutes on Mean Absolute Error (MAE), and 294.84 minutes on Root Mean Squared Error (RMSE). These results provide promising indicators in race time prediction using limited data and contribute to future research in endurance sports analytics.

Keywords – Trail Running, Finish Time, Prediction, Regression Models.

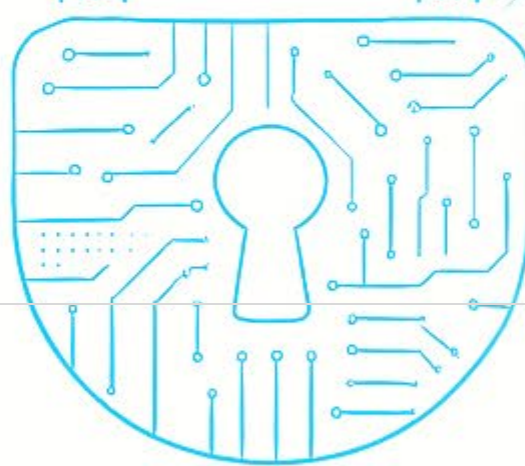
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MobileNet-based Tuberculosis Segmentation in Chest X-Rays: An Accuracy-Efficiency Trade-off Analysis

Ashraf Osman Ibrahim, Razan Alharith, Altahir A. Altahir Mohammed, Yu-Beng Leau, Chin Kim On, Imam Much Ibnu Subroto

Abstract – This study systematically evaluates four MobileNet architectures MobileNetV1, MobileNetV2, MobileNetV3, and MobileNetV4 for the segmentation of tuberculosis (TB) lesions in chest X-ray images. We focus on the critical balance between segmentation accuracy and computational efficiency, assessing model performance using key metrics including F1-Score, mean Intersection over Union (mIoU) and recall. Computational needs are measured in terms of the number of parameters, floating-point operations (FLOPs), and inference time. We have observed that there exists a significant trade-off: MobileNetV2 is the fastest in terms of segmentation accuracy and can be chosen when precision is a necessity. In the meantime, MobileNetV3 is more successful with lowest possible parameter count, and is therefore especially well adapted to resources constrained environments (like mobile devices, real time clinical settings). These findings underline the fact that the choice of models must be guided by the individual requirements and limitations of the target application. Future studies will aim at testing these architectures with more extensive and more heterogeneous clinical data, and explore superior ways to optimize the models in order to find a better balance between accuracy and efficiency, and eventually improve the creation of affordable and reliable tuberculosis diagnostic models.

Keywords – Tuberculosis, MobileNet, Segmentation, Chest X-rays, Computational Efficiency, Computer-Aided Diagnosis (CAD).



Session 1 b

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Deployment of Data-Driven Virtual Flow Meter in Cloud and Standalone Environments

Nik Nur Wahidah Nik Hashim, Tareq Aziz Hasan Al-qutami, Mohd Hafizulazwan Mohd Nor

Abstract – This paper presents a practical framework for deploying data-driven Virtual Flow Metering (VFM) systems to estimate multiphase flow rates in oil and gas operations. The framework covers the full model lifecycle, from data ingestion and preprocessing to online inference and monitoring. This work also supports two deployment modes which are cloud-based and on-site edge execution. The cloud platform allows centralized access and integration with enterprise systems, while the edge deployment runs locally using internal infrastructure. Gradient Boosting and Random Forest Regressors were trained and deployed in both environments. Field testing showed prediction accuracy within operational limits, with Mean Absolute Percentage Error (MAPE) below 10 percent for all tested configurations. The paper outlines key design decisions, deployment steps, and practical lessons learned from implementation, providing guidance for applying VFM systems under varying infrastructure and operational conditions.

Keywords – Virtual Flow Monitoring, Machine Learning Deployment, Edge Computing, Cloud Deployment.

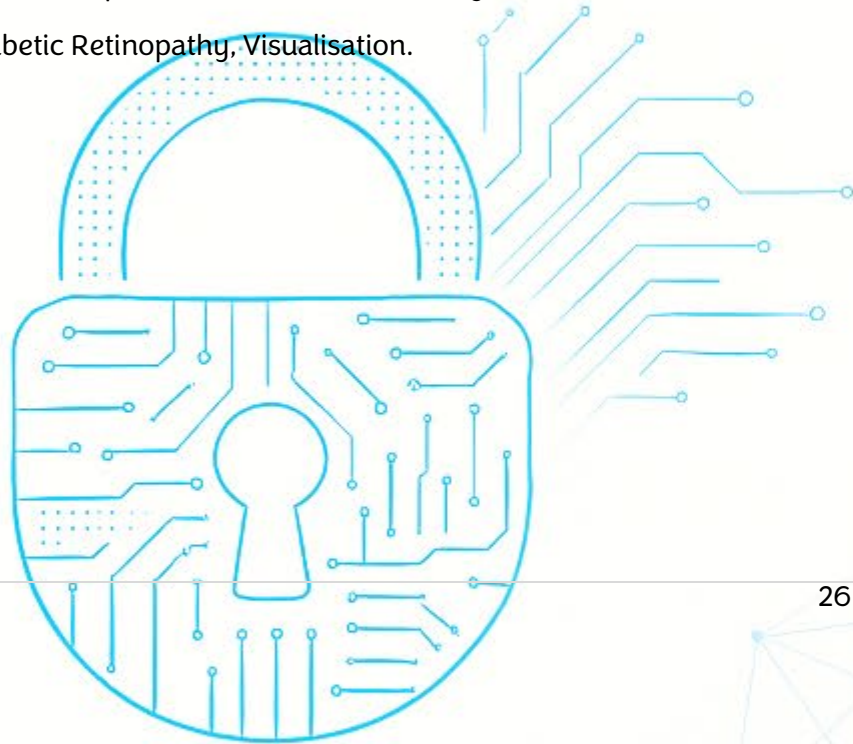
73

A Scientometric Analysis and Visualisation of Research on Deep Learning for Diabetic Retinopathy

Ahmad Faiz Bin Ghazali

Abstract – Deep learning (DL) has become a cornerstone of diabetic retinopathy (DR) image processing, enabling significant advancements in diagnosis, segmentation, and classification. Despite rapid progress, systematic evaluations of this research domain remain limited. This study presents a comprehensive bibliometric analysis of DL-based DR image processing using 2,252 publications indexed in the Web of Science (WoS) database from 2016 to 2024. The analysis, conducted with VOSviewer and WoS tools, explores publication trends, prolific authors, leading institutions, influential journals, and collaboration networks. Results indicate exponential growth in research output, driven by the evolution of deep learning architectures and the adoption of open-source frameworks. Co-occurrence and co-citation analyses highlight research hotspots in ophthalmic imaging, transfer learning, and advanced network architectures. The findings provide an intellectual mapping of the field, offering insights for researchers, practitioners, and policymakers to guide future developments in DL-based DR analysis.

Keywords – Deep Learning, Diabetic Retinopathy, Visualisation.



Session 1 b

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Developing a Big Data Analytics Maturity Model Based on the ADiBA Framework

Norhayati Daut, Naomie Salim, Muhammad Aliif Ahmad, Nuremira Ibrahim, Norazlina Khamis

Abstract – The effective adoption of Big Data Analytics (BDA) is essential for organizations seeking to remain competitive in a rapidly evolving digital landscape. Existing BDA maturity models provide valuable high-level readiness guidance but often lack a direct connection to the detailed processes required for full-scale implementation. This paper addresses the gap by proposing a domain-based BDA maturity Model (BDA-MM) derived from the ADiBA (Accelerating Digital Transformation through Big Data Adoption) framework. The research objective is to translate the framework's 13 components into measurable dimensions grouped into five domains: Culture, Business, Data, Analytics, and Deployment. The methodology involved consolidating the framework, defining maturity dimensions, and outlining a questionnaire-based assessment instrument. The proposed model evaluates organizational adoption across four maturity levels – Pre-adoption, early adoption, corporate adoption, and visionary, supported by a scoring mechanism that maps survey responses to maturity profiles. The model conceptually offers a more structured and diagnostic approach to evaluating BDA adoption by linking implementation components to maturity dimensions, forming a validated basis for subsequent empirical investigation.

Keywords – Big Data Maturity Model, Big Data Analytics Maturity Model, Maturity Model, Organizational Adoption.

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What Religion is ChatGPT? Analyzing Inter-faith Bias In The World's Most Popular AI

James Mountstephens

Abstract – It is challenging to develop an AI tool that will satisfy all users when personal, political, and religious preferences vary widely. As more people use AI to find knowledge, ethical issues, which include bias in responses, arise. By their nature, LLMs depend on training data selection and a post-training alignment process which both have the potential to introduce bias. ChatGPT is still the most popular AI used worldwide and OpenAI founder Sam Altman has publicly expressed the desire for neutrality in ChatGPT responses, but is this possible in both principle and practice? Bias is a complex issue and can be both explicit and implicit. Recent research has uncovered explicit religious bias in earlier versions of ChatGPT in response to neutral, closed questions. The novel contribution of the research presented here is to update and extend this recent work with i) the addition of open questions, both positive and negative, ii) the identification and analysis of the criteria used by ChatGPT to evaluate religions, and iii) testing of newer GPT models for the existence of explicit religious bias. Three experiments were conducted. The first experiment required ChatGPT to explicitly grade six major religions and bias was inferred from consistently higher grades for any one religion. The second two experiments required ChatGPT to name the single religion it would either chose or reject, and were evaluated according to frequency of positive and negative mentions for religions in open responses. The findings confirm that the latest versions of ChatGPT still have a clear religious bias in favor of Eastern religions and Buddhism in particular. The significance of this bias will depend on one's own belief system.

Keywords – ChatGPT, AI Ethics, Bias, Religion, Artificial Intelligence.

Session 1 b

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Transformer-Based Language Models: A Technical Survey of Architectures, Applications, and Critical Challenges

Seyed Hamid Talebian, Ashraf Osman Ibrahim, Hassan Jamil Syed

Abstract – Transformer-based Large Language Models (LLMs) have changed how we process natural language. They offer new ways to understand and generate text. This survey examines current research on transformer architectures. We look at their core principles, real-world applications, and technical challenges. We reviewed over 200 recent scientific publications to analyze key innovations. These include attention mechanisms, parameter scaling methods, and training procedures. We assess how models perform in healthcare, education, and software engineering. We also examine ongoing challenges such as computational sustainability, algorithmic bias, and factual consistency. Our investigation shows that the field has reached a turning point. The focus must shift from adding more parameters to sustainable development, safety assurance, and broader societal considerations. We present a research framework that prioritizes computational efficiency, cross-modal integration, and ethical deployment practices.

Keywords – Large Language Models, Transformer Architecture, Natural Language Processing, Attention Mechanisms, Responsible AI, Computational Efficiency.

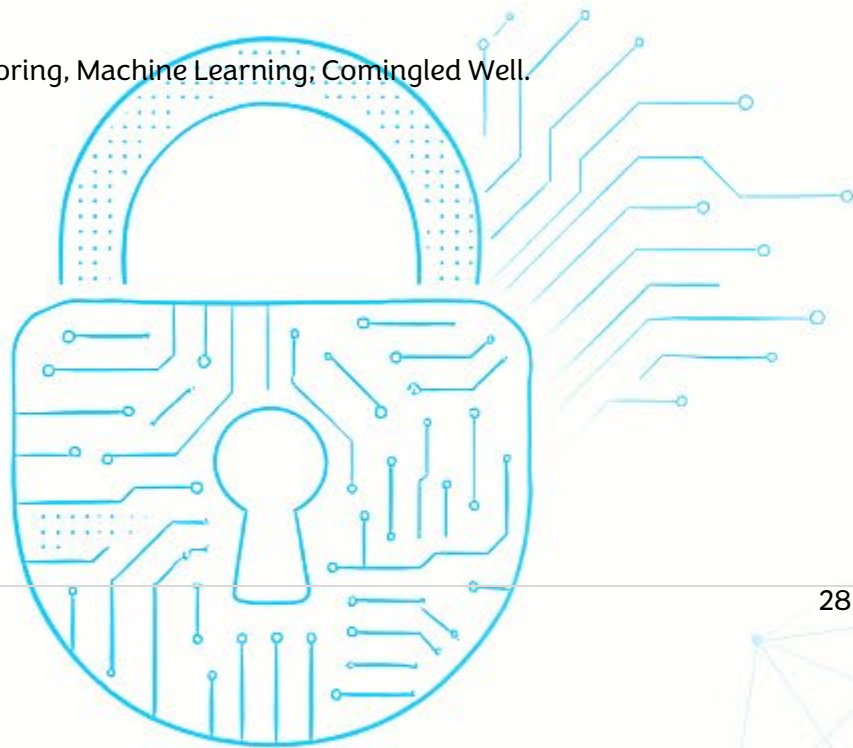
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Virtual Flow Metering For Data-limited Wells Using Machine Learning For Multiphase Flow Prediction In Commingled Testing Environments

Nik Nur Wahidah Nik Hashim, Tareq Aziz Hasan Al-qutami

Abstract – This study presents a data-driven Virtual Flow Metering (VFM) framework for upstream oil and gas operations with limited historical well-test data, particularly in commingled environments where wells are tested intermittently using shared MPFM infrastructure. Using standard wellhead measurements (FTHP, FLP, PDGP, PDGT, CV), machine learning models including Gradient Boosting Regressor, Random Forest Regressor, and K-Nearest Neighbors were developed and validated through time-based splits, cross-validation, and jackknife resampling. Results from a representative well showed that gas prediction accuracy improved by 56.7% for GBR and 46.2% for KNN after outlier removal, though this refinement reduced accuracy for oil and water, underscoring the trade-off in optimizing multi-target regression models under small-data constraints. Ensemble models provided the most consistent performance, and total liquid prediction emerged as a stable proxy in noisy, low-sample environments. The study demonstrates that lightweight supervised models can provide reliable multiphase flow estimates in data-scarce conditions.

Keywords – Virtual Flow Monitoring, Machine Learning, Comingled Well.



Session 1 b

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Low-Altitude Sensing Standards: Institutional Support for Intelligence and Security

Lei Yan, Yajing Wu, Zeyi Yan, Ewe Hong Tat, Haiying Lu, Voon Chet Koo, Shougeng HU, **Chia Ming Toh**, Tian Shen, Kevin Tensy, Nengcheng Chen, Yoong Choon Chang, Lizhe Wang

Abstract – Low-altitude sensing is emerging as a foundation of the low-altitude economy and a frontier for the convergence of artificial intelligence, cybersecurity, and emerging technologies. Its standardization is essential for UAV application modeling, sensing accuracy, and cross-platform collaboration, as well as for ensuring safe and scalable intelligent operations. This paper reviews the IEEE pathway for low-altitude sensing standards. The 1936 series defines UAV application modeling and task frameworks, providing structured representations across scenarios. The 1937 series advances sensing technologies, including polarimetric remote sensing and polar coordinate photogrammetry. The 1939 series establishes cross-platform communication and collaboration, linking sensing and modeling to task execution. To avoid fragmentation, the IEEE Low-Altitude Sensing Subcommittee (LAP) was established, enabling institutional integration and coordinated governance. Building on this platform, the 1958 series emerged, using hydrogen-powered UAVs to incorporate energy systems into the standard framework—marking a shift from “information-driven” to “energy-driven” standardization. Together, these efforts provide standardized interfaces that empower AI-driven sensing, ensure trustworthy data exchange, and support network security. Looking forward, low-altitude sensing standardization will progress toward multi-modal sensing, multi-task adaptability, and energy integration, offering a solid foundation for intelligent UAV operations and the global deployment of emerging technologies.

Keywords – IEEE Standards, Low-Altitude Perception, UAV Remote Sensing, Emerging Technologies.

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Enhancing Dermatological Diagnostics: Lightweight Segmentation Models for Skin Lesions

Razan Alharith, **Ashraf Osman Ibrahim**, Mohammed Saleh, Rayner Alfred, Khalifa Chekima, Ayman Al-Ani, Salmah Fattah

Abstract – Skin lesions need to be segmented accurately to be used in dermatological diagnostics because it contributes to the identification and classification of skin disorders. This paper focuses on the acute problem that the high-precision models are frequently computationally infeasible when deployed on mobile or edge computing. We offer a systematic performance comparison of the implicit trade-off between accuracy and efficiency of segmentation. We have compared a range of different U-Net models with different backbone architectures on the ISIC 2018 dataset. We evaluate ten lightweight deep learning models, such as DPN68, ResNet34, MobileNetV2, and EfficientNet variants, which were selected to cover the entire range of the accuracy-resource trade-off. We have found that the U-Net using the DPN68 backbone has the best accuracy, and it provides high Dice coefficients and Intersection over Union (IoU) scores with a moderate level of computational cost. In the meantime, lightweight networks such as MobileNetV2 and EfficientNet can achieve competitive performance at much reduced resource requirements, which is why they are best used in real-time applications, but with a drawback of performance in capturing fine lesion boundaries. We also discuss the attention mechanisms, as a way of improving the feature representation without necessarily increasing the complexity. These observations help set a critical ground on medical image analysis and develop effective segmentation models to be used in the clinical field.

Keywords – Lightweight models, Skin Lesion Segmentation, Deep Learning Models, Dermatological Imaging.

Session 1 c

DS-1

A Classification Model for Predicting Stroke Rehabilitation Success

Nur Shada Nadherah Binti Abdul Ghani, Nooralisa Mohd Tuah

Abstract – Stroke in Malaysia, is a cerebrovascular disease that occurs when the blood supply to the brain is interrupted, leading to brain cell damage or death. Globally, stroke remains one of the leading causes of mortality and long-term disability, ranking third after cancer and heart disease according to the American Heart/Stroke Association. The growing burden of stroke-related disability highlights the urgent need for effective rehabilitation and predictive tools that can support clinicians in making early, data-driven decisions to enhance recovery outcomes. Despite advancements in medical treatment, many stroke patients experience varied rehabilitation outcomes due to differences in demographic, medical, and lifestyle factors. There is currently a lack of predictive frameworks capable of accurately forecasting rehabilitation success based on these parameters. This paper presents a study focused on developing a classification model to predict stroke rehabilitation outcomes (“successful” or “unsuccessful”) using initial patient data. The model was trained and validated using a dataset comprising patients’ demographic details, medical history, behavioural patterns, and stroke-specific variables. Machine learning techniques were employed to classify rehabilitation success and to identify significant predictors influencing recovery. Preliminary findings indicate that the proposed model achieved promising predictive accuracy, with key features such as age, blood pressure, diabetes history, and physical activity levels emerging as major determinants of rehabilitation success. The study contributes to stroke rehabilitation research by providing a data-driven framework capable of assisting clinicians in early prognosis and personalised recovery planning. This predictive approach can optimise healthcare resource allocation, improve patient management, and support evidence-based clinical decision-making in post-stroke rehabilitation programs. The study’s main limitation lies in the size and diversity of the dataset, which may restrict generalisability across populations. Future work will involve expanding the dataset, exploring deep learning methods, and validating the model in clinical settings. Overall, this study demonstrates the feasibility of using predictive modelling to support stroke rehabilitation prognosis. The integration of clinical, demographic, and behavioural data into intelligent systems holds great potential to improve recovery outcomes and enhance the quality of post-stroke care.

Keywords – Classification Model, Random Forest, Stroke Rehabilitation.

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Conceptual Framework for Understanding the Impact of Internet of Things for Filing System in Public Sectors

Joses Kodoh, Jackel Chew Vui Lung

Abstract – Filing systems are crucial for the efficiency, transparency, and accountability of public sector operations. However, many government agencies continue to rely on traditional filing methods that are vulnerable to inefficiencies, data loss, and limited accessibility. The Internet of Things (IoT) offers transformative opportunities to modernize filing systems through automation, real-time access, and enhanced document traceability. Despite growing interest in digital transformation, there is a lack of conceptual frameworks specifically designed to guide the integration of IoT technologies into public sector filing systems. This paper addresses this gap by proposing a structured conceptual framework that illustrates how IoT components, such as sensors, radio frequency identification, cloud computing, and gateways, can be integrated into filing systems to enhance system capabilities, ensure data security, and improve operational outcomes. The framework comprises four interrelated components namely IoT Technology, System Capabilities, Governance and Security, and Operational Outcomes. Grounded in socio-technical systems theory, the framework positions IoT not merely as a technological tool but as a catalyst for institutional reform, service innovation, and improved information management. The discussion explores the potential benefits of the framework, including increased efficiency, enhanced transparency, and improved decision-making, while also addressing implementation challenges related to infrastructure, policy, and institutional readiness. This paper makes a significant contribution to the literature on digital transformation and public sector innovation in Malaysia. It also lays the groundwork for future empirical studies implementing IoT-enabled filing systems in real-world government contexts.

Keywords – Internet of Things, Filing System, Public Sector, Digital Transformation, Conceptual Framework.

Session 1 c

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Optimization of Multi-Layer LEACH in Wireless Sensor Networks using Genetic Algorithm

Sam Lie Lie, Florence Sia, Salmah Fattah

Abstract – Wireless Sensor Networks (WSNs) face critical energy constraints that limit network lifetime and data reliability. The Low-Energy Adaptive Clustering Hierarchy (LEACH) protocol and its multi-layer variant (ML-LEACH) improve scalability through clustering and hierarchical routing, but both suffer from probabilistic Cluster Head (CH) selection that neglects residual energy and node distribution. This paper addresses the problem by integrating a Genetic Algorithm (GA) into ML-LEACH to optimize CH selection using a fitness function based on residual energy, intra-layer density, and inter-layer communication cost. Simulations conducted in MATLAB with 100 nodes over a 100 m × 100 m area show that GA-ML-LEACH reduces energy consumption, extends network lifetime, and achieves higher cumulative throughput by sustaining data delivery for longer rounds. These results demonstrate that layer-aware GA optimization enhances ML-LEACH performance and provide a foundation for future hybrid evolutionary approaches in WSN optimization.

Keywords – Cluster Head Selection, Genetic Algorithm, ML-LEACH, Wireless Sensor Networks, Optimization.

DS-2

Evaluating Custom CNN vs. VGG16 on FER-2013 for Facial Emotion Classification

Nur Fatin Nabilah binti Azhar, Nooralisa Mohd Tuah

Abstract – Facial emotion recognition has become an essential component in various human-computer interaction applications. This study presents a comparative evaluation of a custom Convolutional Neural Network (CNN) and the pre-trained VGG16 model on the FER-2013 dataset for facial emotion classification. Both models were assessed under two conditions: with and without data augmentation. Experimental results demonstrate that data augmentation significantly improves the performance of both models. The custom CNN achieved higher overall accuracy and better generalization when augmented, reaching 58% accuracy compared to 55% without augmentation. Similarly, the VGG16 model showed moderate improvement from 42% to 43% with augmentation. However, the VGG16 model underperformed compared to the custom CNN, particularly in recognizing complex emotions and in macro-average metrics. These findings suggest that a well-designed custom CNN, tailored to the task and enhanced with data augmentation techniques, can outperform deeper pre-trained models like VGG16 on emotion classification tasks involving limited or imbalanced datasets.

Keywords – Facial Emotion Recognition, Convolutional Neural Network (CNN), Transfer Learning, Data Augmentation, VGG16.



Session 1 c

79

A Systematic Literature Review on Technology Acceptance Determinants for Personalized Scheduling System among University Student

Mohd Azam Mad Suliman, Hadzariah Ismail, Jackel Chew Vui Lung

Abstract – Technology and digital tools have significantly improved people’s lifestyle by making tasks more time-efficient and focusing on human needs. Numerous studies have performed analytical insight through the well-established framework famously known as Technology Acceptance Model (TAM). However, lacking the focus on student personalized academic scheduling system leaving this area remains an underexplored domain. Validating the emerging predictors is necessary for clarity in using TAM model as the research framework to investigate the present study. This review paper systematically examines existing literature works on technology acceptance in academic settings related to educational technology. The extracted data were analyzed to provide insights and identifies emerging predictors associated with multiple academic and educational research contexts. The findings aim to provide a foundation for future research investigating the level of acceptance toward personalized academic scheduling systems among university students.

Keywords – Technology Acceptance, Personalized Scheduling, Educational Technology.

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Exploring Older Adults’ Perceptions of Augmented Reality Applications for Cultural Tourism: A Focus Group Study

Nur Amira Suhada Suhaimi, Zaidatul Haslinda Abdullah Sani

Abstract – The global population of older adults is rapidly increasing, with projections exceeding 2 billion by 2050. This demographic shift underscores the need to develop inclusive technologies that cater to age-related cognitive, sensory, and physical changes. Augmented Reality (AR) has emerged as a promising tool in cultural tourism, offering immersive experiences through digital overlays on physical environments. However, current AR systems often overlook the usability needs of older adults, resulting in barriers such as small text sizes, low visual contrast, complex navigation, and cognitive overload. This study investigates the older adults’ attitudes, concerns, and suggestions for AR applications in cultural tourism. Ten participants aged 56 to 76 years (mean 65.2; s.d. 6.5) engaged in focus group discussions at a community center in Malaysia. The findings indicate that participants in this study expressed interest in AR and acknowledged its usefulness, despite having very limited experience with it. They also highlighted some key concerns, including visual clarity, intuitive navigation, and the need for audio support. The participants also suggested improvements such as customizable text sizes, simplified interfaces, and cultural music integration. These insights contribute to bridging the digital divide and fostering greater engagement of older adults in cultural tourism.

Keywords – Augmented Reality, Older Adults, Focus Groups, Cultural Tourism.

Session 1 c

33

Teachers' Perception, Knowledge, And Attitude On Augmented Reality: A Survey Study

Puteri Dian Irdina Binti Mohd Yusni, Zaidatul Haslinda binti Abdullah Sani

Abstract – Augmented Reality (AR) is a technology that overlays digital content onto the real world. While much attention has been given to students' perspectives on AR in education, teachers' insights remain underexplored. This study aims to investigate the perceptions of primary school teachers in Malaysia towards AR as a pedagogical approach. A survey consisting of 50 responses was analyzed. Findings show that teachers recognize AR's potential to enhance engagement and learning, though concerns about training, infrastructure, and classroom integration persist. Most teachers were familiar with AR and its tools, but had limited experience using it in teaching or attending AR related training. Despite this, they viewed AR positively, especially for STEM subjects, and showed interest in interactive features while highlighting the need for professional development and better infrastructure. These insights are valuable for guiding effective AR implementation in Malaysian education.

Keywords – Augmented Reality, Education, Teachers' Attitude, Teachers' Perception, Survey.

DS-3

A Lightweight Privacy Preservation in Named Data Networking Through Name Rotation Mechanisms

Mohammad Shahrul Mohd Shah, Leau Yu Beng

Abstract – Named Data Networking (NDN) architecture transforms communication by prioritising content names instead of host addresses compared to TCP/IP. This architecture main features are to utilize hierarchical human-readable content names that poses a challenge where it reveals important metadata that may jeopardize user privacy. Consistent and semantically dense names allow attackers to identify user interests, track content access behaviors, and execute watchlist-based correlation attacks. The present work introduces a lightweight privacy preservation strategy via name rotation, facilitating ephemeral and unlinkable name usage during communication epochs. The suggested approach utilizes epoch-based seed generation through HMAC-DRBG and a non-invertible hash function (BLAKE3) to produce distinct, locally verifiable name tokens. Each edge router retains an epoch-specific Bloom filter that identifies rotated tokens with their original names, allowing efficient search and a low false positive probability. This design enables name rotation and resolution to function exclusively at the network edge, circumventing modifications to the core NDN architecture while preserving compatibility with current forwarding pipelines. Security examination reveals resilience against watchlist monitoring, replay attacks and key compromises, ensuring forward privacy over epochs. Simulation results validate that the approach attains substantial privacy enhancements with negligible processing expense, rendering it a feasible advancement toward implementable name privacy in NDN. This work presents a novel, independent framework for ephemeral name management that enhances NDN for privacy-preserving, user-centric communication.

Keywords – Named Data Networking, Name Rotation Mechanisms, privacy- preserving.

Session 2 a

**UPC-
20**

A Cutting Edge Approach to Phishing Email Detection using Machine Learning

Adeel Ahmed, **Gohar Rahman**, Mehmood Ahmed, Salmah binti Fattah, Sayyed Luqman Shah

Abstract – Phishing attacks represent a persistent and growing threat in the cybersecurity domain, particularly in the context of email security. This study proposes a novel hybrid model for phishing email detection tailored to the Arabic language, combining traditional Natural Language Processing (NLP) techniques with advanced deep learning approaches. The model is designed to enhance detection accuracy and reduce false positives by leveraging linguistic and semantic features specific to Arabic phishing emails. Key features of the model include its ability to address complex issues in Arabic, such as morphological variations and right-to-left text orientation. Additionally, the model incorporates contextual and word embedding techniques to capture subtle phishing tactics and deceptive language structures. The proposed approach emphasizes user privacy and interpretability while offering real-time detection capabilities. Experimental results demonstrate that this hybrid model outperforms traditional detection methods with 94% accuracy, providing a robust solution for phishing email detection in Arabic.

Keywords – Email Security, Arabic Language, Hybrid Model, Natural Language Processing (NLP), Deep Learning.

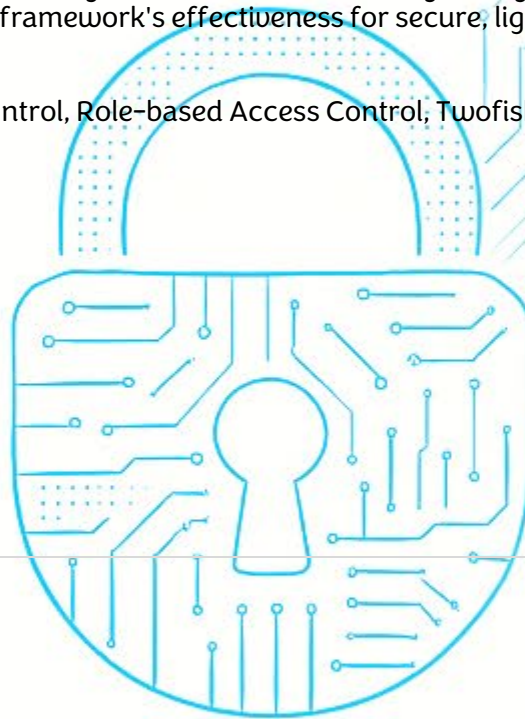
**UPC-
19**

Effective Two Factor Role-based Access Control for Cloud Computing using Twofish encrypted JAR file

Maha Saddal, **Gohar Rahman**, Mehmood Ahmed, Adeel Ahmed, Salmah binti Fattah

Abstract – Despite the rapid advancements in the security of web services on cloud computing, there are still some challenges of data integrity, confidentiality, and access control while sharing data on cloud servers. Typically, existing solutions employ cryptographic techniques by revealing data decryption keys to authorized users only. However, these arrangements produce heavy computational demands, sensitive to user data, for key dispersion and data management. In this paper, a new, effective two-factor role-based access control for web-based cloud computing using Twofish-encrypted JAR files is proposed. The suggested framework highlights the implementation of secret keys using JAR file applications rather than a security device. Simulation results show that encryption times for plaintexts of varying lengths ranged between 5.36 and 5.42 seconds, while decryption remained consistent at approximately 5.00 seconds. JAR file creation time scaled proportionally with file size, confirming the system's efficiency and scalability. These findings demonstrate the framework's effectiveness for secure, lightweight, and privacy-preserving cloud access control.

Keywords – JAR file, Access Control, Role-based Access Control, Twofish algorithm, Cloud Computing



Session 2 a

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Sentiment Insights and Usability Evaluation for KADUMALIN Translation System

Suraya Alias, Mohd Shamrie Sainin, Retno Kusumaningrum

Abstract – Machine Translation (MT) has evolved and become necessary with the rise of generative AI. However, the effort to preserve a low-resource language such as Kadazandusun in Sabah becomes a challenge due to the informal Malay Sabahan slang, improper spellings, and sentiment used by younger generations, hence affecting the translation's accuracy. This paper presents a user-centered evaluation of Kadumalin, an NLP-based machine translation system with spell checker features. We conducted a post-use survey analysis using the System Usability Scale (SUS) with 250 participants where Kadumalin achieved an average SUS score of 66.2, which indicates towards acceptable benchmark level of usability standard. Next, user feedback responses were analyzed to understand sentiment insights by comparing the lexical, machine learning, and hybrid deep learning sentiment analysis models. Our proposed hybrid BERT+XGBoost model with improved weight optimization achieved an FI (macro) score of 0.941608, encouraging results even on a small, imbalanced dataset. Positive feedback supported our effort to preserve the Kadazandusun language and its easy access. Negative feedback pointed out occasional mistranslations caused by limited corpus data, while neutral comments suggested improvements to the user interface design. These findings provide actionable insights for improving MT usability by combining SUS with sentiment analysis task in evaluating NLP-based solutions.

Keywords – Machine Translation, SUS, Sentiment Analysis, Kadumalin.

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Decentralized Proximal Policy Optimization for Traffic Signal Control

Matthew Laurentius Bansing, Siti Nor Atiqah Moharam, Min Keng Tan, Kit Guan Lim, Helen Sin Ee Chuo, Kenneth Tze Kin Teo

Abstract – The traffic signal control solution proposed in this paper is based on the Proximal Policy Optimization (PPO) algorithm. A map-based traffic model is created and tested using the Simulation of Urban Mobility (SUMO) software. This algorithm works as an optimizer for controlling traffic lights. Although the fixed-time method is still widely used in many traffic systems, it is becoming less effective as traffic congestion increases due to growing population sizes. This makes traffic conditions more unpredictable and changeable. Therefore, the proposed algorithm aims to improve overall traffic flow and increase the average speed of vehicles by adjusting traffic signals in real time based on current conditions. The PPO algorithm uses a special function that limits how much the algorithm can change during each update, keeping new decisions like previous ones. One of PPO's main strengths is that it learns faster than many other methods while still maintaining good performance and efficiency. In this project, the algorithm resulted in a 40% boost in average vehicle speed and a 60% improvement in lane-level traffic flow compared to the fixed-time method. These results show that the proposed system is reliable and effective in a simulated traffic environment.

Keywords – Proximal Policy Optimization, Traffic Signal Timing Optimization, Simulation of Urban Mobility

Session 2 a

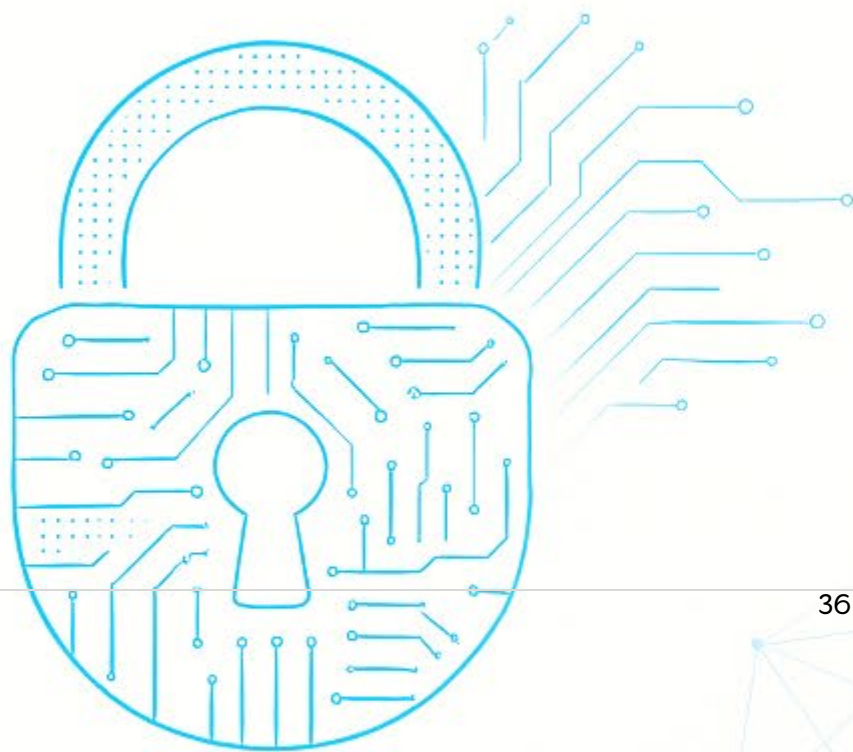
**UPC-
40**

A Survey on Metaheuristic Approaches for Muskingum Flood Routing Model Parameter Estimation

Jackel Vui Lung Chew, Mohammad Fadhli Asli

Abstract – Flood routing models, particularly the Muskingum model, are vital tools for predicting flood wave movement. Accurate parameter estimation is critical but challenging due to the nonlinear dynamics of hydrological systems and the scarcity of real-world flood data. This paper presents a structured survey of recent applications of metaheuristic approaches for Muskingum model parameter estimation. Eight peer-reviewed articles were analyzed, covering linear and nonlinear Muskingum models as well as hybrid variants such as Muskingum-Cunge. This survey categorizes the types of parameters, objective functions, benchmark datasets, algorithms, and evaluation metrics used across these studies. Particle swarm optimization, grey wolf optimizer, and their hybrid variants emerged as the most frequently applied methods, consistently demonstrating superior performance in reducing error metrics. Nevertheless, challenges remain in terms of real-time deployment, cross-basin generalizability, and computational efficiency. Future directions include integrating real-time data, conducting uncertainty analyses, and advancing hybrid metaheuristic techniques to enhance the robustness of flood routing systems. By focusing on metaheuristic optimization, this survey complements existing surveys and offers valuable insights for improving Muskingum model parameter estimation.

Keywords – Flood Routing, Muskingum, Model Parameter, Metaheuristics, Algorithm.



Session 2 b

UPC-
10

Integrating Carbon Footprint Awareness into an E-Barter Application for Sustainable Consumption in Malaysia

Choo Yen Lee, Gigi Coh Rui Min, Pong Hon Keat, Arsouski Sasa

Abstract – Human activities are increasingly disrupting natural ecosystems, with climate change driven primarily by greenhouse gas (GHG) emissions posing a critical global challenge. Promoting awareness of individual carbon footprints is essential for fostering sustainable behaviour and informed decision-making. This study investigates the integration of carbon footprint tracking into an E-Barter System to enhance environmental awareness and encourage eco-conscious consumption. A survey of 40 Malaysian respondents was conducted to assess user awareness, usage patterns, expectations, and satisfaction with two existing e-barter platforms. Results indicate limited understanding of carbon footprints, underscoring the need for accessible, user-friendly digital tools that promote sustainable trading practices. The proposed system incorporates carbon tracking, gamification, and educational features to guide users toward reducing emissions and adopting responsible consumption habits. Findings demonstrate the potential of e-barter platforms to combine digital exchange with environmental education, fostering a culture of sustainability within communities.

Keywords – e-Barter System, Carbon Footprint Tracking, Sustainable Consumption, Digital Platform, Environmental Awareness.

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User-centered Mobile Application Design for Smart Waste Collection

Norazlina Khamis, Noor Faozi Basowaidan, Rafidah Md Noor, Aris Puji Widodo, Norhayati Daut

Abstract – The waste collection process in Kota Kinabalu, Sabah faces significant communication challenges due to reliance on traditional methods and lack of a dedicated digital platform. Residents often miss pickups because schedules are inconsistently communicated via word-of-mouth or messaging apps, leading to overflowing bins and frustration. To address these issues, we designed KK Garbage Tracker, a user-centered mobile application suite for smart waste collection. The system provides real-time garbage truck tracking, personalized pickup reminders, schedule announcements, and feedback channels, bridging the information gap between residents, garbage truck drivers, and municipal authorities. Emphasis was placed on usability and accessibility in the design, guided by established UX principles and standards. The development followed a hybrid waterfall and iterative prototyping approach, resulting in mobile apps for residents and drivers and a web dashboard for authorities. We evaluated the system's usability through the System Usability Scale (SUS) and heuristic assessments. The KK Garbage Tracker achieved a high SUS score, indicating above-average usability, and positive user feedback on its learnability and usefulness. This solution enhances communication and transparency in waste management operations, aligning with Malaysia's digitalization vision and Sustainable Development Goal 11 for sustainable cities. The paper discusses the design process, system features, usability evaluation results, and how the application supports broader smart city and digital government initiatives.

Keywords – Smart Waste Management, User-Centered Design, Mobile UI/UX, Real-Time Vehicle tracking.

Session 2 b

**UPC-
36**

Design and Development of 'Kimaragang Words': A Game-Based Learning Mobile Application for Local Language Engagement

Victor B. Pangayan, Lilian Lee Shiau Gee, Emily Yapp Hon Tshin

Abstract – As an intervention to improve the increasingly spoken Kimaragang language in Sabah, Malaysia, this study focuses on the development of "Kimaragang Words," a game application aimed to help children learn the local language. Based on game-based learning concepts, specialized gamification and an intuitive user interface (UI) are integrated to improve language acquisition and cultural engagement among Kimaragang children. Badges, leaderboards, missions, and points are used to encourage long-term participation, and culturally relevant content improves the Kimaragang language learning experiences. "Kimaragang Words" was designed using a systematic approach model that involved game design, low-fidelity prototype, and testing. An iterative process was used to conduct a comprehensive review of "Kimaragang Words" at various levels. This study emphasizes the advantages of gamification in education, including its capacity to boost student engagement and retention through interactive components and visualizations. "Kimaragang Words" is an entertaining language learning tool that indicates the need for a gamified learning environment and user-centered design. The extensive adoption and positive user feedback illustrates its potential to make the Kimaragang language engaging and accessible to students.

Keywords – Kimaragang Language, Cultural Preservation, Gamification, Educational Technology, User Experiences.

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Leveraging Immersive Technologies to Transform Food Security: Applications, Challenges and Future Directions

Khairul Shafee Kalid, Gehad Mohammed Ahmed Najil, Kalaifarasi Sonai Muthu Anbananthen, Saravanan Muthaiyah, Yunus Bin Yousif, and Suraya Mohammad

Abstract – A complex web of interrelated variables, such as resource scarcity due to climate change, supply chain inefficiencies, and restricted access to information for both farmers and consumers, are posing a growing danger to global food security. Despite increasing technical advancements, there is still a big gap in how immersive technologies like augmented reality (AR) and virtual reality (VR) may be used to address these issues holistically throughout the food value chain. The purpose of this article is to close this gap by examining how VR and AR might improve food systems' sustainability, efficiency, and resilience. We define these technologies and highlight their capabilities, including enhanced visualization, interactive learning, and real-time data integration. The study explores their applications precision agriculture farmer training supply chain optimization, quality control, and how immersive technologies can reduce food waste, promote sustainable practices and encourage healthier dietary choices. This research contributes to the discourse on innovative solutions for global food security by positioning VR and AR as pivotal for systemic improvement.

Keywords – Food security, Immersive Technology, Technology Adoption.

Session 2 b

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Trustworthiness in Image Pre-Processing Techniques for Stroke Classification Using DenseNet and LIME

Christopher Ijok, Daphne Teck Ching Lai, Rosyzie Anna binti Hj Mohd Apong

Abstract – Image classification has seen significant advances in accuracy, enabling its application across diverse fields. This study focuses on the healthcare industry. It evaluates the impact of various preprocessing technique combinations on the classification of Acute Ischemic Stroke (AIS) from CT scans using convolutional neural networks (CNNs). CNN's performance is assessed using metrics such as the F1 score. Additionally, model interpretability is addressed through Local Interpretable Model-Agnostic Explanations (LIME), which provides insight into the reliability of classification outcomes. The findings highlight that the most effective preprocessing combinations were: (1) erosion without Gaussian blur, (2) dilation with Gaussian blur, and (3) erosion with Gaussian blur. However, LIME analysis reveals that models may rely on nonbrain regions for decision-making, indicating that accuracy metrics alone may not reflect true model validity. These results emphasize the importance of interpretability in medical imaging models. Future work will involve expanding the dataset, testing alternative CNN architectures, and exploring more advanced preprocessing pipelines.

Keywords – Convolutional Neural Network, Acute Ischemic Stroke, Local Interpretable Model-Agnostic Explanation.



Session 3 a

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Envisioning Multiple Contexts of a Historical Landmark using Augmented Reality: The Chimney Tower

Dinna N. Mohd Nizam, Zhi J. Wong, Zaidatol H. Abdullah Sani, Muhammad A. Adnan, Dinar M. Kusumo

Abstract – Augmented reality (AR) is a technology that can be used to help close the gap of misinformation and information dissemination to visitors in historical centers. It also attracts visitors and helps them envision old historical artefacts or buildings in almost complete detail. Recent historical research has uncovered additional possible purposes for the Chimney Tower landmark, situated in the Federal Territory of Labuan, Malaysia. However, envisioning the possible atmosphere of the tower is limited for visitors, as the current booklets are static and limited. Therefore, this study aims to design and develop a bespoke augmented reality mobile application to help visitors visualize the possible purposes of the locally known landmark through three-dimensional representations. Experts from the museum and visitors collaborated on the design, and the AR application was developed using Unity. In addition, thirty other visitors participated in assessing the prototype application using the System Usability Score (SUS) tool and conducted brief interviews. The SUS scored 81.33, indicating a highly positive perception among the participants. The short interview evaluations provided positive feedback, and visitors valued the innovative approach of using AR to reimagine the landmark in multiple contexts. Future opportunities and refining the application for a diverse audience were also suggested.

Keywords – Augmented Reality, Information Dissemination, Historical Landmark, System Usability Scale, Museums..

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FloodApp: Real-Time Integrated Mobile Application for Flood Monitoring, Detection, and Alerts

Muhammad Faiz Azlin, Rosniza Roslan, Raseeda Hamzah, Zainal Fikri Zamzuri, Muhammad Aqil Mohd Sabri

Abstract – This paper presents FloodApp, a real-time mobile application developed that deliver live information to enhance flood monitoring, detection, and alerts. This platform incorporates five primary features. The homepage provides the central hub, user easy access to all functions, and important updates. The camera module allows users to capture or video streaming for instant flood validation. The graph page visualizes water level data and trends, helping users monitor changes over time. The awareness enhancement is further achieved through the map page, which displays geospatial information of affected locations, and flood-prone areas. The weather page delivers current atmospheric conditions, including rainfall data and forecasts, enabling proactive decision-making. The design of all features to present relevant, and informative data through intuitive, user-friendly interface. FloodApp has been applied using Flutter, and Dart as frontend, and Firebase as backend database, to ensure scalability, real-time updates, and cross-platform accessibility. The results showed that FloodApp passed all feature interface, and functionality evaluations. Therefore, FloodApp provides a comprehensive mobile platform for flood monitoring that integrates multiple features into single application.

Keywords – Real-Time, Mobile Application, Flood Monitoring, Geospatial, Weather Forecast.

Session 3 a

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Food-as-Medicine Recommender Systems: A Vision for Generative AI-Powered Grocery Guidance

Kapil Poreddy, Ajit Kumar Sahu

Abstract – We propose a recommender system framework that uses Generative AI and family health profiling to transform grocery shopping into a precision health intervention. The framework enables real-time nudges, personalized scoring, and dynamically generated ingredient transparency using large language models (LLMs). We implement a practical ingredient classifier with a ChatGPT-family model accessed via the OpenAI API and expose its decisions through a web front end. This vision lays the groundwork for proactive nutrition coaching embedded within everyday consumer behavior, offering scalable, ethical, and equity-aware deployment across retail ecosystems. Beyond technical feasibility, we discuss implications for healthcare, retail, and society, and outline a prototype with illustrative telemetry. To set scope, we present a prototype with mock telemetry and illustrative evaluation rather than large-scale deployment, and we discuss limitations such as partial JSON-constrained outputs and reliance on external nutrition databases.

Keywords – Terms—Generative AI, Recommender Systems, Nutrition, Food-as-Medicine, Digital Nudging, Retail Technology, Precision Health.

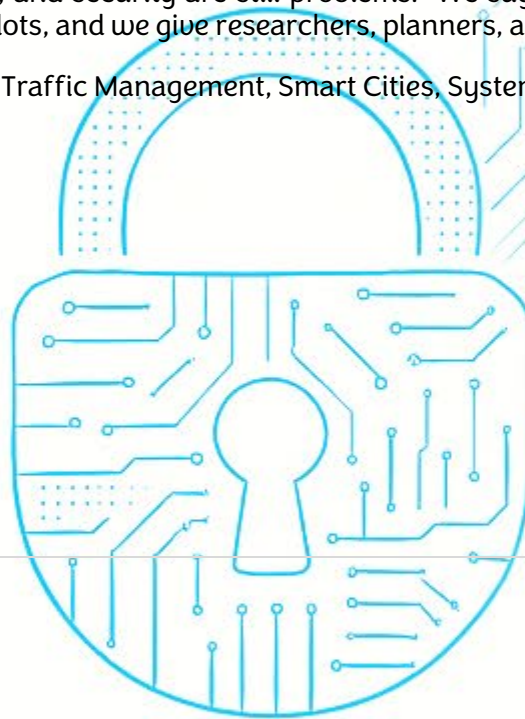
UPC-
25

A Taxonomy of AI-Driven and IoT-based Solutions for Smart Traffic Management

Khalid yahya Ahmed, Che Soh bin Said Said, Noor Alhuda Binti Madzlan

Abstract – Traffic jams are still a big problem in cities that are growing quickly. This study emphasizes the significance of the Internet of Things (IoT) in facilitating real-time monitoring, control, and decision-making for urban traffic management. We systematically examined 150 studies (2014–2024) and, following the application of established inclusion and exclusion criteria, selected 105 for comprehensive analysis. We created a detailed taxonomy of IoT-based traffic management solutions, sorting them by application area, processing method, communication protocol, and data collection method. Five areas of solutions were found: Smart Traffic Signals, Vehicle-to-Vehicle (V2V) Communication, IoT Security, Smart Traffic Monitoring, and Intelligent Forecasting. We used a cross-validation method with an 80/20 split to check the reliability of the analysis among reviewers (Cohen's $\kappa > 0.80$), and we found that the taxonomy was stable. The results show that flow optimization, safety, and predictive ability all have measurable benefits, but scalability, integration, cost, and security are still problems. We suggest standardization, AI-enabled architectures, and real-world pilots, and we give researchers, planners, and policymakers useful advice.

Keywords – Internet of Things, Traffic Management, Smart Cities, Systems Analysis, Traffic Forecasting.



Session 3 a

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Deep Learning Models for Low-Dose CT Denoising: A Forward Survey (2022-2025)

Wang Zhang, Chin Kim On, Rayner Alfred, Soo See Chai, Chew Chiou Sheng,

Abstract – Low-dose Computed Tomography (LDCT) can reduce radiation exposure, but it also increases image noise, significantly elevating diagnostic risks. While traditional deep learning-based denoising methods effectively suppress noise, their over-reliance on metrics such as Peak Signal-to-Noise Ratio (PSNR) and Structural Similarity Index (SSIM) often results in overly smooth images, leading to the loss of critical pathological features such as microcalcifications and ground-glass nodules. Therefore, there is an urgent need to establish a comprehensive evaluation framework that balances perceptual quality with diagnostic efficacy, and to develop adaptive denoising strategies driven by diagnostic tasks. This paper summarizes research findings from recent years (2022-2025) focused on perceptual quality. Currently, methods based on convolutional neural networks, generative adversarial networks, Transformer architectures, and their variants (such as Mamba), as well as diffusion models, have achieved notable breakthroughs in detail preservation. These advancements are accompanied by continuous innovation in optimizer design, loss functions, and evaluation systems. This work systematically reviews the latest progress in the field, highlights the strengths and limitations of existing methods in optimizing perceptual quality, and provides a reference for future research on diagnosis-oriented LDCT denoising.

Keywords – Low-dose CT (LDCT), Medical Image Denoising, Deep Learning, Optimizer Design, Image Processing.

UPC-
34

Federated Learning Strategies for Image Analysis in the Healthcare Sector

H. Mora, **Aitana Pastor Osuna**, A. Maciá-Lillo, A. Martínez-García, Julian Szymański

Abstract – This work explores the use of federated learning (FL) in healthcare, aiming to train artificial intelligence models capable of detecting chest abnormalities from X-rays without the need to centralize clinical data. Deep learning has proven effective in medical tasks, but its generalization capabilities are limited when models are trained on data from a single institution due to specific biases and lack of diversity. Federated learning is presented as a promising solution, as it enables collaboration between multiple entities while keeping the data in its original location. In this decentralized approach, each health center trains its model locally and only shares parameter updates with a central server, thus protecting patient privacy and complying with regulations such as GDPR and HIPAA. This work proposes a horizontal federated learning (HFL) model, using the pre-trained DenseNet121 architecture, adapted to classify chest images into four classes. The experimental results show high accuracy for the local models (99.94% and 99.80%) and an overall accuracy of 90.81%, confirming the federated model's ability to generalize across diverse data. Future work plans include expanding the number of participating institutions, applying techniques to better manage data heterogeneity, incorporating differential privacy methods, and exploring more complex architectures. Overall, this study demonstrates that federated learning is a technically viable, ethical, and effective alternative for the medicine of the future.

Keywords – Federated Learning (FL), Deep Learning, Distributed Machine Learning, Medical Imaging, Image Classification, Healthcare, Data Privacy.

Session 3 a

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Sentiment Analysis in Public Health: Leveraging Expert-Annotated Social Media Data

Daimler Benz Alebaba, Suaini Sura, Muzaffar Hamzah, Nooralisa Mohd Tuah, Hadzariah Ismail, Seungwon Lee

Abstract – Understanding user sentiments, particularly on social media, has become increasingly important for organizations and researchers alike. One of the primary challenges sentiment analysis faces is the noisy and dynamic nature of language, particularly within public health, where users share highly personal and medical narratives. Sentiment analysis challenges need to be methodically resolved to uphold the sentiment analysis findings' credibility and dependability. This study employs a sentiment analysis approach to examine user comments on a public health social media page. It consists of methodology outlining the collection and expert annotation of the dataset and subsequent text preprocessing with Natural Language Processing, construction of feature vectors with Term Frequency-Inverse Document Frequency, and classification utilizing the Support Vector Machine algorithm. The proposed model demonstrated noteworthy predictive performance, achieving an accuracy of 94%, a classification performance regarded as excellent by classification literature. This demonstrates that the model passes the public health confusion matrix evaluation test, achieving a fairly accurate and reliable predictive performance with a solid balance of precision and recall.

Keywords – Expert Annotator, Public Health, Sentiment Analysis, Social Media, Natural Language Processing.



Session 3 b

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A Remote Sensing Image Object Detection Method Based on Multi-scale Transformer

Jinghe Zhou, Yu-Beng Leau, Jinmei Shi, Xiangling Yang, Aobo Shi

Abstract – Remote Sensing image object detection is one of the core research areas of Remote Sensing technology. The inherent scale variability and complex background features of Remote Sensing images pose significant challenges to traditional object detection techniques based on Convolutional Neural Networks (CNN), traditional CNN-based object detection techniques exhibit obvious locality in parsing such image information, making them less effective for remote sensing images. In recent years, Transformer models have made significant progress in the field of computer vision due to their powerful global feature capture ability and self-attention mechanism, providing new ideas for solving multi-scale problems in Remote Sensing image object detection. This design uses Swin Transformer as the core architecture and utilizes its hierarchical window self-attention mechanism to extract the multi-level characteristics of the image step by step, capturing both shallow local details and deep global information. The multi-scale feature maps generated at each stage carry rich information of corresponding levels. The strategy of introducing the multi-level features generated by Swin Transformer into the Feature Pyramid Network (FPN) cleverly integrates feature maps from different resolutions by setting a top-down path and horizontal connection mechanism, thereby generating enhanced multi-scale feature representations. On this basis, we ultimately deploy detection components on the aggregated feature maps to achieve efficient target localization and recognition tasks.

Keywords – Multi-Scale Transformer, Swin Transformer, Remote Sensing Image, Object Detection, Feature Pyramid Network.

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Feeling the Frame: Deep Multimodal Learning for Emotion-Aware Image Captioning

Sarin Kumar Thayyilsbramanian, Lakshmi Ethirajan

Abstract – Accurately identifying the emotions conveyed in scenes featuring multiple individuals is a complex yet vital task in the field of computer vision. This study introduces a novel approach to effectively recognize emotions and sentiments in multi-person environments by leveraging generative image captioning techniques alongside explainable AI models. In contrast to traditional methods that extract image features directly, this framework is based on image captions for an interpretive emotional context in a more human-centered manner. The proposed approach extracts key regions of interest (ROI) from images and generates a descriptive caption for each individual in the image by analyzing the facial expression, the body posture and the image. The detailed captions are aggregated and crisply summarized without losing any key information. A classification technique is employed to assess the emotions and sentiments of this summarized text. Model interpretability is enhanced with the help of explainable AI techniques that make classification decisions interpretable. Benchmarking on the datasets proves that the methodology is accurate and robust. In this sense, this work contributes to improving the reliability and transparency of emotion recognition in AI-driven decisions, while emphasizing the benefits of text-based contextual analysis over standard feature-based approaches.

Keywords – Emotion Detection, Image Captioning, Generative AI, Deep Learning, Computer Vision.

Session 3 b

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Machine Learning for Circular Economy: Predicting Product Lifecycle and Optimizing Waste Management

Mohammad Anisur Rahman, Afia Masuda Supti, Rahima Binta Bellal, Maniruzzaman Bhuiyan, Efat Ara Haque, Sayer Bin Shafi, Syeda Tabassum, Amena Hoque, Md. Shihab Hossain

Abstract – Moving toward a Circular Economy (CE) is not straightforward. One of the persistent hurdles lies in keeping track of how products progress through their lifecycles and, more critically, knowing exactly when they reach the End-of-Life (EoL) stage. This stage plays a central role in deciding how materials can be recovered and reused. While machine learning is increasingly explored in the Circular Economy, a significant gap persists in establishing a validated benchmark for the critical End-of-Life (EoL) prediction, complicated by class imbalance and reliance on unstructured diagnostic data. To address this, our work provides a first-of-its-kind, head-to-head comparative analysis of the three leading gradient boosting frameworks—XGBoost, LightGBM, and CatBoost—specifically focusing on maximizing recall for the minority EoL class and leveraging Natural Language Processing (NLP) to incorporate repair descriptions, thereby setting a new technical standard for lifecycle prediction. Publicly available lifecycle datasets formed the basis of the analysis, which moved from data preprocessing to hyperparameter tuning with GridSearchCV. Model performance was then measured using Stratified K-Fold Cross-Validation, and the results were compared across accuracy, precision, recall, and F1-score. Our analysis indicates that XGBoost was the strongest predictor. By implementing SMOTE to address the class imbalance, XGBoost achieved a robust EoL Recall of 85% (F1-score of 87%), demonstrating its strong capability to identify the crucial minority EoL class. These findings confirm that a high-recall, machine-learning approach is viable for optimizing material recovery logistics. From these findings, we draw practical guidance for choosing algorithms suited to lifecycle prediction, and we see clear evidence that machine learning can support better decisions in waste reduction and resource recovery. Even so, the imbalance between classes remains a key challenge, and addressing it will be important for improving the accuracy of future EoL detection efforts.

Keywords – Circular economy, Gradient boosting, Machine learning, Product lifecycle prediction, Waste management.

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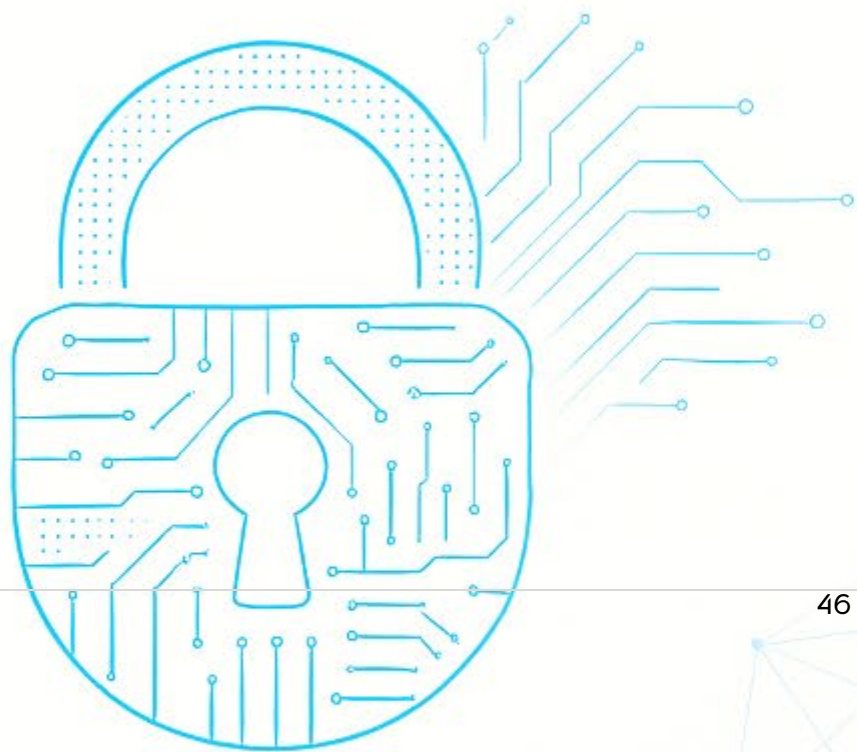
AI-Powered Personalized Therapy for Children with Autism: A Reinforcement Learning Approach

Mahdia Amina, Rahima Binta Bellal, Shirajum Munira Mow, Mohammad Delowar Hossain Gazi, Maisha Hossain Ahona, Md Shawon Islam, Tasmim Jamal Joti, Nowshin Suraiah

Abstract – Autism Spectrum Disorder (ASD) presents significant challenges in both early detection and individualized therapy due to the heterogeneity of symptoms and developmental trajectories. Recent advances in artificial intelligence offer promising avenues to enhance personalized autism care. This research aims to develop robust machine learning models for accurate ASD detection and investigate reinforcement learning (RL)-inspired architectures to facilitate adaptive, personalized therapy recommendations. Utilizing the Autistic Spectrum Disorder Screening Data for Adults dataset comprising 704 records with behavioral AQ-10 questionnaire scores and demographic variables, two deep learning models were developed: a regularized Deep Q-Network (DQN)-inspired feed-forward neural network and a transformer-based neural network adapted for tabular data. Both models employed rigorous regularization techniques including layer normalization, dropout, input noise, and L1/L2 penalties, and were trained with Adam optimizer and early stopping to prevent overfitting. The models were evaluated using accuracy, precision, recall, F1-score, and AUC-ROC metrics. The regularized transformer achieved superior accuracy of 99.81%, while the DQN-inspired model attained 99.53%, with both models demonstrating exceptional AUC-ROC values above 0.99, underscoring their strong discriminative power. Confusion matrix analyses confirmed minimal misclassification, critical for clinical reliability. The transformer's

architecture offers scalability toward session-based therapy personalization, while the DQN model provides a robust decision-making framework compatible with RL environments. These findings position AI-powered models as effective tools for enhancing ASD screening and pave the way for future adaptive, personalized therapeutic interventions incorporating sequential feedback.

Keywords – Autism Spectrum Disorder, Reinforcement Learning, Personalized Therapy, Deep Learning, Transformer Networks.



Session 3 b

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Optimizing Diabetes Prediction using Ensemble Learning Techniques for Enhanced Accuracy

Arifa Ahmed, Barna Biswas, Mohammad Shahidullah, Durga Shahi, Fariha Akhter, Mst Shurovi Akter, Muslima Begom Riipa, Md Shayakh Alam

Abstract – Diabetes is a growing global health concern that often progresses silently in early stages, making timely prediction crucial for prevention and treatment. Despite the availability of clinical data, traditional machine learning models often struggle with imbalanced datasets and complex feature relationships, leading to suboptimal sensitivity and poor generalization. In our study, these limitations were partially addressed using SMOTE for oversampling and ensemble learning to improve model robustness, although full elimination of data noise and clinical variability remains a challenge. To solve these issues, we explored advanced ensemble approaches by combining multiple models that capture different aspects of the data. We worked with a structured dataset consisting of numeric and binary health indicators and applied models such as Naïve Bayes, Decision Tree, SVM, Random Forest, and a stacked ensemble using XGBoost, CatBoost, and LightGBM with Logistic Regression as a meta-learner. The proposed stacked model demonstrated superior performance, achieving 0.9936 accuracy and a 0.95 F1-score, outperforming all baseline models. These results indicate that our approach provides a reliable, high-performing solution for diabetes prediction and holds strong potential for real-world deployment in clinical decision-support systems where early and accurate identification of diabetic patients is essential.

Keywords – Diabetes Prediction, Ensemble Learning, SMOTE, Stacked Model, Machine Learning..

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AI-Powered Precision Intervention: Ending America's Opioid and Substance Abuse Crisis Through Predictive Analytics

Md Kazi Shahab Uddin, **Md Habibur Rahman**, Kazi Md Riaz Hossan, Md Delower Hossain, Md Barkat Ullah, Abdullah Al Zaiem

Abstract – The opioid and substance use epidemic in the United States is a compounding public health issue, and it is aggravated by regional variations, socio-economic forces, and drug trends. This paper focuses on the field of artificial intelligence (AI) and machine learning (ML) that can be used to determine and overcome opioid-related risks on a precision level. With the help of the CDC Injury Center database, we performed a multifaceted geographic and time-based analysis to track overdose death-related high-risk areas and demographic trends. The Kernel Density Estimation, spatial autocorrelation, and cluster analytical analyses showed that some areas were found to have high geographic cluster, which includes New England, Appalachia, and the Southwest, and these areas needed interventions. We also tested various models in predictive analysis: XGBoost, Random Forest, SVM, and Multi-layer Perceptron, used in classification and regression. XGBoost was ranked the best model and performed notably in terms of high classification accuracy (0.92), high precision (0.89), high recall (0.91), strong F1-score (0.90), as well as a high AUC = 0.95, yet with a very low regression error (MAE = 3.45, R2 = 0.92). Such results highlight the possibility of predictive analytics in AI to empower data-driven and targeted interventions in the opioid and substance abuse epidemic in public health settings. Ethical implementation and the quality of the data, as well as interdisciplinary collaboration, are also stressed in the study to enable equal measures that focus on vulnerable communities.

Keywords – Opioid crisis, AI-driven predictive analytics, machine learning, spatial autocorrelation, precision intervention, public health..

Session 3 c

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Sabah Smart Science and Technology Park: A Strategic Framework for Regional Innovation and Economic Transformation

Uda Hashim, Muhammad Nur Afnan Uda, Ervin Gubin Mounq

Abstract – This paper presents a comprehensive framework for establishing the Sabah Smart Science and Technology Park (SSSTP) as a catalyst for transforming Sabah into a knowledge-based economy and regional innovation leader. The proposal addresses Sabah's economic reliance on traditional industries by creating an ecosystem that integrates research, industry collaboration, and commercialization. Leveraging Sabah's strategic location, abundant natural resources, and the research capabilities of Universiti Malaysia Sabah (UMS), the SSSTP framework incorporates Centers of Excellence (COEs), industry-sponsored laboratories, and a phased implementation strategy leading to a High-Tech Industrial Valley. The paper outlines the critical role of UMS in supporting this initiative through academic-industry linkages, talent development, and research leadership. The expected outcomes include technological advancement, high-tech job creation, foreign investment attraction, and sustainable economic diversification, which collectively suggest improved progress in regional development. Moreover, this strategic approach positions Sabah as a competitive player in Southeast Asia's innovation landscape and addresses workforce development challenges in STEM fields in Malaysia. Thus, these outcomes demonstrate better performance in building Sabah's capacity for further advancement in the technology sector, particularly through the organizational practices of regional innovation hubs.

Keywords – Data-Driven, Tech Commercialization, Knowledge Management, Digital Transformation.

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Enhancing Phishing Detection Through Machine Learning

Bahman A. Sassani (Sarrafpour), Zhen Xue

Abstract – Phishing attacks are among the most serious cyber threats, especially in social engineering. They affect individuals and businesses daily, leading to significant financial and data losses. Traditional blacklist-based defenses are ineffective, as blacklist updates often lag behind the emergence of new phishing sites. Machine learning has become a powerful tool across many fields. In cybersecurity, it enables the development of models to detect threats more accurately and reliably than traditional methods. This research applies three popular machine learning models—Random Forest (RF), Decision Tree (DT), and Extreme Gradient Boosting (XG-Boost)—to build phishing detection classifiers. Five feature selection methods are compared and integrated with these models to enhance detection performance and identify the most effective feature subset. The goal is to develop an effective machine learning model with feature selection to better combat phishing and protect users online. The models will be evaluated using a confusion matrix, accuracy, precision, recall, ROC AUC, and Gini score to identify the best feature selection method. A larger dataset will be used to retrain the chosen model to improve its generalization. This thesis contributes to phishing detection research and cybersecurity defense.

Keywords – Cybersecurity, Social engineering, Advanced Persistent Threat, APT, Phishing, Machine learning, Random forest, Decision tree, XG-Boost.

Session 3 c

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Security in Software-Defined Networking Migration: Challenges, Proposal and Future Perspective

Kai Yuan Tan, Saw Chin Tan, Muhammad Faiz M. Zaki

Abstract – Software-Defined Networking (SDN) offers major benefits but poses several security challenges during migration from legacy networks, especially in hybrid environments. This paper reviews existing security-oriented SDN migration works, critically analyzing their handling of security and robustness. We identify key challenges, including maintaining policy consistency, managing hardware constraints, and balancing security with performance. To address these, we delineate essential requirements for secure migration strategies such as semantically-aware policy management, prospective hardware and resource utilization assessment, and adaptive security-performance optimization. Building on these, we propose an adaptive framework, Secure Adaptive Migration (SAM) that integrates a policy management subsystem (PMS) with a deep reinforcement learning (DRL)-based migration planner to develop migration strategies. It conducts policy translation to ensure consistency of policy, optimizes migration actions to manage hardware constraints, and balances security with performance through a carefully crafted reward function based on network conditions and security metrics. This enables secure and effective migration while addressing the multifaceted challenges that conventional approaches handle in isolation.

Keywords – SDN migration, Security challenges, Machine learning framework.

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Binary Flaw Detection: A Security Analysis Paper

Fahad Amin

Abstract – We propose a novel, scalable framework for overlapping community detection designed for vulnerability localization in binary code graphs. The framework is an algorithmic pipeline (“Candidate + Refine”) that (i) generates compact overlapping community seeds, (ii) refines membership using an objective that balances intra-community density and overlap sparsity, and (iii) reconciles boundary communities in a distributed setting. We evaluate the approach on standard benchmarks (DBLP, LiveJournal, YouTube) and LFR synthetic graphs, and report consistent improvements in extended NMI (+6–12%) and end-to-end runtime (6 hours on YouTube vs. 10–48 hours for baseline methods). We also provide ROC / precision, recall analyses, runtime scalability plots, and visual examples of detected communities to aid interpretability. Code and artifact details are provided in the supplementary material.

Keywords – No info.



Session 3 c

**UPC-
35**

A Hybrid Data Collection Framework for Anomaly Detection in Modbus-Based IIoT Networks

Kimsreng Lim, Sophea Prum

Abstract – The lack of realistic and protocol-agnostic datasets remains a challenge for anomaly detection under Industrial Internet of Things (IIoT) settings, especially for traditional protocols like Modbus/TCP. This paper presents a modular framework that merges simulated industry operations, controlled internal attacks, and spontaneous real-world adversarial interactions captured through a publicly exposed honeypot. The architecture uses a multi-node structure to aggregate benign and malicious Modbus traffic with automated labeling and detailed protocol feature extraction. Our dataset contains over 47 million flows with a benign-to-malicious ratio of about 1:19, resulting from the combination of honeypot captures and internal simulations. Using this dataset, multiple conventional machine learning algorithms (RandomForest, XGBoost, KNN) achieved around 0.99 F1-scores and 0.97 AUC, while deep learning models (MLP, LSTM) reached up to 0.9864 AUC. Unlike research focused around detection algorithms or isolated honeypots, our research combines architectural construction, scalable dataset acquisition, and extensive empirical analysis, demonstrating its effectiveness for IIoT anomaly detection. Additional benchmarking using TON IoT and CICIDS2018 datasets confirmed superior F1-scores and AUC, thereby confirming the dataset's robustness and generalization capability.

Keywords – Industrial IoT (IIoT), Modbus/TCP, Honeypot, Anomaly Detection, Data Collection Framework, SCADA Security, Industrial Protocol Security, Cybersecurity Testbed

**UPC-
29**

Deep Learning Approach for IoT Vulnerability Severity Prediction

Samira A. Baho, Jemal Abawajy

Abstract – The proliferation of Internet of Things (IoT) devices has introduced a vast and complex attack surface, making the efficient management and prioritisation of vulnerabilities a critical cybersecurity challenge. Fast and accurate assessment of IoT vulnerability severity level is essential for effective prioritisation and management of security risks. However, manual evaluation remains time-consuming, error-prone, and increasingly unsustainable given the rapid growth of IoT-specific vulnerabilities. This paper presents a novel approach that leverages a transfer learning model to automatically predict the severity of IoT vulnerabilities based on their textual descriptions, by leveraging the rich semantic information in vulnerability reports. This solution allows us to address the common issue of data scarcity in specialised domains like IoT security. Experimental results demonstrate that the proposed model significantly outperforms traditional machine learning techniques, achieving high accuracy of 91.5 and F1-scores of 0.90 in severity classification. This enables security teams to rapidly assess and prioritise vulnerabilities, thereby enhancing proactive defence measures and optimising resource allocation in complex IoT environments.

Keywords – IoT, vulnerability, transfer learning, severity level, CVSS.

Session 3 c

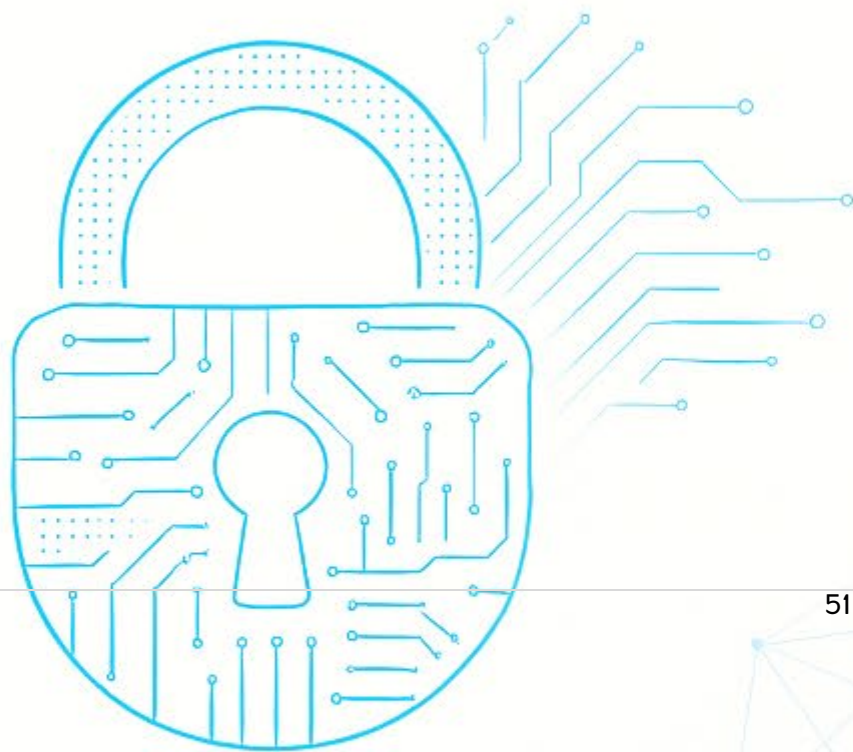
UPC-
11

AI-Driven Forecasting of Wave Energy Potential in Terengganu, Malaysia

Rafi Jusar Wishnuwardana

Abstract – Wave energy is a promising renewable energy source and remains underutilized in Malaysia despite its extensive coastline and significant potential. This study addresses this gap by developing and evaluating machine learning models Linear Regression (LR), Support Vector Regression (SVR), Artificial Neural Networks (ANN), Random Forest Regressor (RFR), and Extreme Gradient Boosting (XGBoost) to predict wave energy using environmental variables such as wind speed, wave height, and sea surface temperature. XGBoost emerged as the best-performing model, achieving the highest accuracy (R^2 : 0.9411) and lowest error metrics (MAE: 0.3627, RMSE: 0.6942), demonstrating its robustness in capturing complex relationships. The findings highlight the potential of AI-driven models to improve wave energy prediction accuracy, supporting the identification of optimal locations for Wave Energy Converters (WECs) in Malaysia. Biomimetic WECs, inspired by natural marine organisms, offer enhanced adaptability and reduced environmental impact compared to traditional mechanical based WECs. This research contributes to Malaysia's renewable energy strategy by providing a data-driven approach to wave energy forecasting in making informed decisions. Future work should focus on expanding datasets, optimizing hyperparameters, and exploring hybrid models to further enhance prediction accuracy and support the sustainable development of wave energy in Malaysia, aligning with Sustainable Development Goal 7 (Affordable and Clean Energy).

Keywords – Wave Energy, Artificial Intelligence, Xgboost, Biomimetic, Renewable Energy.



Session 3 d

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High-Accuracy Potato Leaf Disease Classification Using Transfer Learning with ResNet50

Ayush Kumar, Pragati Baghel, **Abhishek Bajpai**, Naveen Tiwari, Shaline Sahu, Shriyanshi

Abstract – This study introduces a deep learning-based method for detecting and classifying potatoes disease in an automatic manner using a hybrid model that combines neural networks (CNN) with the ResNet50 architecture. The main objective is to optimize the early diagnosis of crop diseases in potato crops for early and late blight, so as not to reduce the yield from the potential loss of yield. The data set consists of publicly available images as well as local samples taken in Kannauj to offer some degree of diversity and real-world applicability. To improve generalization, the images were pre-processed using respective techniques including normalization, resizing, and data augmentation. The ResNet50 model was pre-trained on the ImageNet dataset and fine-tuned using transfer learning for the particular classification task. The model was assessed using key metrics for the proposed model that included precision, precision, recall, F1-score, and confusion matrix. The proposed model achieved high classification accuracy, thus establishing the potential of the model for implementation in real-time environments through established mobile or IoT-based presented platforms to help farmers monitor and manage disease effectively.

Keywords – Potato leaf diseases, ResNet50, Convolutional Neural Network, Deep learning, Transfer learning.

UPC-
30

The Challenge of Generalization: Preserving Sarcasm Detection in a Multitask Model Across Different Linguistic Contexts

Mohd Suhairi Md Suhaimin, Mohd Hanafi Ahmad Hijazi, Wan Siti Rodziah Mohd Nasir, Adi Wibowo, Ervin Gubin Mounq

Abstract – Multitask deep learning models have shown significant promise in handling complex NLP tasks like sentiment analysis and sarcasm detection, especially for bilingual, code-mixed social media text. However, the true robustness of such a specialized model is determined by its ability to generalize to different linguistic contexts and data domains. This paper evaluates the generalization capabilities of a multitask deep learning model, which combines a hybrid feature engineering technique with a Bi-LSTM and GRU architecture, originally designed for English-Malay code-mixed text in the public security domain. We test the model on two benchmark datasets: a monolingual English dataset and a bilingual English-Malay dataset. Our findings reveal a critical trade-off: while the model successfully generalizes for sentiment analysis, achieving competitive or superior performance, its sarcasm detection capability varies dramatically. On the monolingual dataset, it surpasses state-of-the-art methods in sarcasm detection. However, on the second bilingual dataset, its performance drops significantly, suggesting that preprocessing and normalization techniques, while beneficial for general sentiment, can inadvertently strip away the subtle, domain-specific markers essential for sarcasm detection. This work highlights the critical challenges in generalizing models for nuanced pragmatic phenomena and underscores that a "one-size-fits-all" approach may compromise performance on specialized tasks.

Keywords – Model Generalization, Multitask Learning, Sarcasm Detection, Sentiment Analysis, Bilingual Code-Mixed.

Session 3 d

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Blockchain for Transparent and Efficient Carbon Credit Trading

*Arafat Islam, Arif Hosen, Fahad Ahmed, Adib Hossain, Md Fakhrul Hasan Bhuiyan, Nur Vanu, Md Bayzid Kamal, Mashuk Rahman Utsho, **Rakibul Hasan***

Abstract – This research addresses the critical need for accurate and transparent carbon credit allocation within blockchain-based trading systems aimed at mitigating climate change. The study develops predictive models for per capita CO₂ emissions leveraging the Global Carbon Budget 2022 dataset, encompassing historical and cross-national emission data. Two machine learning algorithms—Random Forest Regressor and Support Vector Regression (SVR)—are implemented and evaluated for their efficacy in forecasting emissions relevant to automated credit allocation frameworks. The Random Forest model outperforms SVR substantially, achieving an R² score of 0.9798 compared to 0.7571 for SVR, alongside significantly lower error metrics (MAE, MSE, RMSE), demonstrating superior precision and robustness. Feature importance analysis highlights key drivers such as gas flaring and fossil fuel composition ratios, which are essential for equitable credit distribution aligned with actual emission sources. The integration of these high-accuracy predictive models with blockchain smart contracts enables automated, immutable, and transparent carbon credit transactions, minimizing fraud and administrative overhead. This research contributes a novel framework combining machine learning and blockchain technologies to facilitate scalable and fair carbon trading mechanisms. The findings have practical implications for policymakers and market operators seeking to enhance accountability and efficiency in carbon markets, supporting global sustainability targets through data-driven, decentralized solutions.

Keywords – Carbon Credit Trading, Blockchain, Machine Learning, Random Forest, Support Vector Regression, CO₂ Emissions, Predictive Modeling, Smart Contracts.

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AI-Driven ESG Scoring for Sustainable Investment Decisions

*Mahafuj Hassan, AFM Rafid Hassan Akand, Md Azharul Islam, Ali Hassan, Hammed Esa, Md Abdur Rob, Anupom Debnath, Arif Ahmed Sizan, **Rakibul Hasan***

Abstract – Environmental, Social, and Governance (ESG) investing is increasingly recognized as a cornerstone of sustainable finance, yet traditional ESG scoring frameworks face persistent challenges including inconsistent methodologies, limited transparency, and data quality issues. This study aims to develop and evaluate an AI-driven ESG scoring framework capable of delivering more transparent, reproducible, and accurate assessments for sustainable investment decision-making. Using a synthetic dataset of 1,000 global companies across nine industries and seven regions spanning 2015–2025 (11,000 observations), we integrated 16 original ESG and financial variables with 29 engineered features capturing environmental efficiency, resource usage, and financial performance ratios. Two supervised machine learning models—Random Forest (200 trees, max depth 15, Gini impurity) and Gaussian Naive Bayes—were trained and validated using stratified 80–20 splits with cross-validation. The Random Forest model achieved superior performance (Accuracy 86.50%, Precision 83.49%, Recall 91.00%, F1-score 0.8708) compared to Naive Bayes (Accuracy 51.00%, Recall 8.00%), with ESG Efficiency and Carbon Intensity emerging as dominant predictors. These results demonstrate Random Forest's ability to capture complex ESG-financial interactions, providing a reliable and interpretable tool for high-ESG firm identification. The findings support the integration of AI-enhanced ESG scoring into portfolio management workflows, offering scalable, data-driven, and transparent alternatives to traditional ratings. Future research should explore explainable AI techniques and multimodal data integration to further enhance transparency, robustness, and global applicability.

Keywords – ESG scoring, sustainable investment, Random Forest, machine learning, environmental efficiency.

Session 3 d

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Leveraging Machine Learning for Predictive Sustainability Analytics: Optimizing Resource Management in Manufacturing

Arif Ahmed Sizan, **Arifa Ahmed**, Mahafuj Hassan, Mohammad Shahidullah, Mashuk Rahman Utsho, Md Bayzid Kamal, Mst Shurovi Akter, Farhana Akter

Abstract – The improvement of energy consumption in factory conditions is also now a topical issue in the era of sustainability and smart infrastructure. This paper is aimed at developing and introducing a machine learning-based predictive sustainability analytics framework that is focused on the modeling and prediction approach of the energy consumption and, at the same time, is positioned in a smart manufacturing environment. Exploiting a publicly available dataset provided by Kaggle, which contains both operational and environmental features, we compared some regression models, such as Linear Regression, Elastic Net, Random Forest, and a Stacked Ensemble. A data preprocessing package was used that includes all the preprocessing required to conduct data exploration, data analysis, and feature correlation analysis in order to identify the most important variables. Standard performance measures were used to evaluate the models, including Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and the coefficient of determination (R²). The findings indicate that ensemble methods acted as good generalizers, but regularized linear programs such as Elastic Net were highly accurate compared to others. The models were also reliable, as demonstrated by visual and residual analysis. The results justify the incorporation of machine learning in predictive energy analytics and provide meaningful solutions that can be used in manufacturing to make sustainable decisions.

Keywords – Sustainability Analytics, Energy Forecasting, Machine Learning, Smart Manufacturing, Ensemble Learning, Predictive Modeling, Resource Optimization.

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AI-Powered Medical Imaging: Enhancing Diagnostic Accuracy in Radiology

Hasan Mahmud Sozib, **Mahdia Amina**, Tanvir Mahmud, Mohammad Delowar Hossain Gazi, Fahim Shahrear, Tasmim Jamal Joti, Anjuman Awal

Abstract – Medical imaging plays a pivotal role in disease diagnosis, particularly in identifying thoracic conditions such as COVID-19 and pneumonia using chest X-rays. However, the complexity and variability in medical images often limit the effectiveness of traditional convolutional approaches, which struggle with capturing long-range spatial dependencies. To address these limitations, we propose a hybrid deep learning architecture that integrates the strengths of Vision Transformers (ViT) for global spatial feature extraction with recurrent neural network variants—RNN, GRU, and LSTM for temporal sequence modeling. In our framework, the ViT-Base-Patch16-224 model, pretrained on ImageNet-21k, is employed to extract high-dimensional embeddings from 16×16 image patches. These embeddings are then passed through RNN-based architectures to model sequential dependencies among the patches, enabling a richer and more context-aware representation. The proposed models were evaluated on a balanced dataset of 6939 posteroanterior chest X-ray images, comprising three classes: COVID-19, Pneumonia, and Normal. Extensive experiments revealed that the ViT-LSTM model achieved the highest classification accuracy of 96.33%, outperforming both ViT-GRU (95.51%) and ViT-RNN (93%). These results highlight the effectiveness of combining global attention mechanisms with sequential learning for robust and interpretable medical image classification. Our findings suggest that ViT-LSTM is a promising approach for enhancing diagnostic precision in radiology and could support clinical decision-making in real-world healthcare settings.

Keywords – Vision Transformers (ViT), RNN, LSTM, GRU, Spatial Dependencies.

Session 3 d

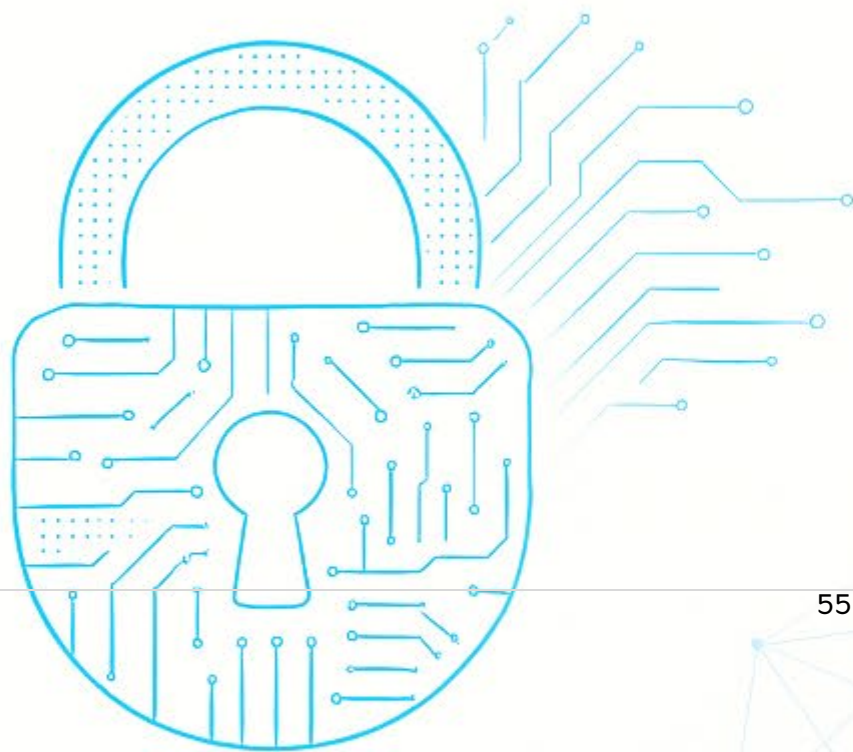
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Performance Analysis of MTCNN for Face Detection

Jeswin Joison, Dr. Sridevi R, Dr. Nisha Varghese

Abstract – Face detection is a fundamental task in computer vision that has many uses, including human-computer interaction and security systems. This study thoroughly examines the Multi-task Cascaded Convolutional Network (MTCNN) for facial recognition. we used a focused dataset of more than 750 images as a pilot study to validate the proposed methodology. Data collection, model training with the Adam optimizer, and evaluation of the results using common performance criteria were all steps in the process. The findings show that the MTCNN model obtains a high accuracy of 94.59% and a 92.24% F1-score. A baseline Convolutional Neural Network (CNN) and many traditional classifiers, including Dlib and Haar Cascade, were compared with other models. The baseline CNN was the most effective in terms of performance.

Keywords – Face Detection, MTCNN, Deep Learning, Computer Vision, Convolutional Neural Network, Haar Cascade.



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