TABLE OF CONTENTS

WELCOME MESSAGE

On behalf of the organizing committee, it is our profound honor to welcome all of you to the 14th International Conference on Software and Computer Applications (ICSCA 2025) and its workshop – the 4th International Conference on Computer Technologies (ICCTech 2025), held in the vibrant city of Kuala Lumpur, Malaysia, from February 20th to 23rd, 2025.

This year, we are privileged to host this esteemed event, co-sponsored by Institut Teknologi Bandung, Indonesia; Universiti Malaysia Pahang, Malaysia; and FH JOANNEUM University of Applied Sciences, Austria, reflecting a strong international collaboration that underpins our conference.

ICSCA and ICCTech have always been a platform where the brightest minds in software, computer applications, and computer technologies converge to share insights, breakthroughs, and innovations that shape the future of our field. This year, we continue this tradition with an impressive lineup of three Keynote Speakers and three Invited Speakers, each being a distinguished leader in their respective areas, ready to share their expertise and inspire us all.

With eight offline sessions and six online sessions, ICSCA 2025 and ICCTech 2025 offer a diverse and comprehensive program, designed to cater to a wide array of interests and specialties within the realms of software and computer applications. Our sessions are meticulously planned to foster learning, discussion, and an exchange of ideas, providing both in-person and virtual attendees with an enriching experience.

As we embark on this four-day journey of learning and discovery, I encourage each of you to engage fully with the sessions, speakers, and your fellow attendees. The connections made here, the knowledge shared, and the collaborations formed are the lifeblood of our conference and the driving force behind the advancement of our field.

Once again, welcome to ICSCA 2025 and ICCTech 2025. Your presence here, whether physically or virtually, signifies your commitment to excellence and innovation in software and computer applications. Let us make the most of this opportunity to learn, share, and inspire.

ICSCA 2025 & ICCTech 2025

Conference Committees

Conference Chairs

Kamal Zuhairi Zamli, Vitaliy Mezhuyev

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CONFERENCE VENUE

Alila Bangsar Kuala Lumpur

Address: 58 Jalan Ang Seng, 50470 Kuala Lumpur, Malaysia
Tel: +60 322 683 888
Website: https://www.alilahotels.com/bangsar/

TRAFFIC INFORMATION

➤ **From Kuala Lumpur International Airport**

By Taxi: Around 40 minutes.

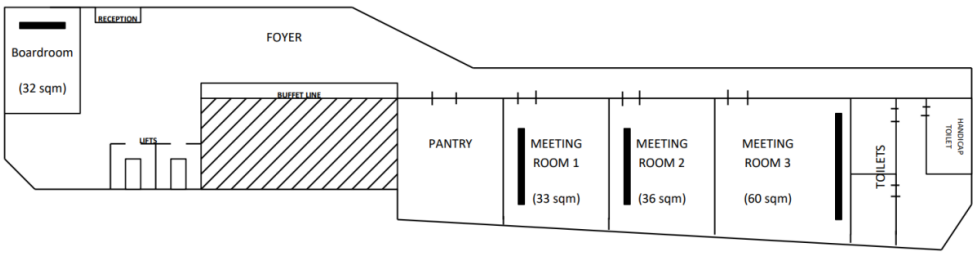
By Airport Rail Link - KLIA Ekspres & KLIA Transit: Around 50 minutes

By Airport Bus: About 1 hour and 15 minutes to KL Sentral. Then you need to take a taxi or other transportation to the hotel, so the total time is about 1.5 to 2 hours.

By Shuttle Bus: Around 40 minutes（Depending on the departure time）

ALILA BANGSAR KUALA LUMPUR

LEVEL 9 FUNCTION ROOM FLOOR PLAN



GUIDELINES

- **Oral Presentation**

1. Please prepare your PowerPoint in advance and bring it with you. The conference committee will provide a standardized background template, but its use is not mandatory.
2. The duration of the presentation slot is 15 minutes. Please target your lecture for a duration of about 10-12 minutes for the presentation plus about 3-5 minutes for questions from the audience.
3. Your punctual arrival and active involvement in each session will be highly appreciated.

   - Get your presentation PPT or PDF files prepared and backed up.

3. Laptops, projector & screen, laser sticks will be provided by the conference organizer.
5. The Best Presentation will be announced at the end of the session.

- **Online Presentation**

1. ZOOM Download Link

https://zoom.us/download (Oversea)

https://zoom.com.cn/download (Author in China)

2. Meeting Rooms

ZOOM Meeting

894 3270 7266 (Zoom A)

863 8588 5223 (Zoom B)

Password: 022023

3. Test Your Presentation

Date: **Feb. 20, 2025**

Prior to the formal meeting, online presenters shall join the test room to ensure everything is on the right track. Please check your test Zoom Meeting ID on this program.

4. Oral Presentation

Timing: a maximum of 15 minutes in total, including 2-3 minutes for Q&A. Please make sure your presentation is well timed.

Please join the meeting room 10 minutes in advance.

Stay online during Keynote & Invited speeches and your own sessions.

English Only during the conference.

Rename your screen name before entering the room

Example:

Authors: Paper ID-NameTC0001-San Zhang

Listener: Listener Number-Name Listener- San Zhang

Keynote Speaker: Keynote-Name Keynote- San Zhang

Committee Member: Position-Name Committee- San Zhang

5. Follow us on We-chat

Follow us on we-chat, Remark

"ICSCA 2025-Paper ID"

Please ensure that you take your belongings with you at all times when leaving a room.

Do not leave bags or laptops unattended.

AGENDA OVERVIEW

All times in this schedule are listed in Malaysia Standard Time (MYT).

Feb. 20, 2025 | Thursday		
Time	**Activity**	**Venue**
10:00-17:00	**Onsite Sign-in & Conference Materials Collection**	**9F Lobby of Meeting Room Floor**
10:00-12:00	**Online Sign-in & Equipment Testing** CT1068, CT1085, CT1109. CT1076, CT1106, CT1022, CT0444 CT1058	**Zoom A 894 3270 7266 Password: 022023**
14:00–17:00	**Online Sign-in & Equipment Testing** CT1075, CT1042, CT1026, CT1062, CT1091. CT1101, CT1067, CT0108, CT0328, CT0437, CT1071, CT1077	
10:00-12:00	**Online Sign-in & Equipment Testing** CT1009, CT1065, CT1084, CT1102, CT1107. CT1103, CT0109 CT1025, CT1093	**Zoom B 863 8588 5223 Password: 022023**
14:00–17:00	**Online Sign-in & Equipment Testing** CT1104, CT0319, CT0324, CT1069, CT1020, CT1070, CT1015, CT1072, CT0329, CT1081, CT0331, CT0441, CT0445, CT1110, CT1064	

Feb. 21, 2025 | Friday		
Time	**Activity**	**Venue**
08:30-09:30	**Sign-in & Conference Materials Collection**	**9F Lobby of Meeting Room Floor**
Opening Ceremony **Host: Vitaliy Mezhuyev, FH JOANNEUM University of Applied Sciences, Austria** **Zoom: 894 3270 7266** **Passward: 022023**		
09:00-09:10	**Opening Ceremony**	
09:00-09:10	**Welcome Message** **Kamal Zuhairi Zamli,** Universiti Malaysia Pahang, Malaysia	**9F Meeting Room II & III**

09:10-09:20	**Group Photo**	
Keynote Speech		
09:20-10:05	**Keynote Speech 1** **Kamal Zuhairi Zamli,** Universiti Malaysia Pahang, Malaysia **Title:** Optimizing Multi Task Test Redundancy Reduction based on Multi Factorial Approach	**9F Meeting Room II & III**
10:05-10:25	**Coffee Break**	
10:25-11:10	**Keynote Speech 2** **Nor Ashidi Mat Isa,** Universiti Sains Malaysia, Malaysia **Title:** Transforming Industry with Deep Learning: Potential of Convolutional Neural Networks for Printed Circuit Board Defect Detection	**9F Meeting Room II & III**
11:10-11:55	**Keynote Speech 3 - Online Speech** **Nikola Kassabov**, The University of Auckland, New Zealand **Title:** Brain-inspired technologies for AI Applications	**9F Meeting Room II & III**
12:00-14:00	**Lunch**	**Botanica+Co**
14:00-16:05	**Technical Session 1 - Software Design and Program Development** **Invited Speech - Dayang Norhayati Abang Jawawi** **CT1040, CT1074, CT1043, CT1088, CT0107, CT1111**	**9F Meeting Room II**
14:00-15:35	**Technical Session 2 - Artificial intelligence theory and application** **Invited Speech - Mohamed Bahaj** **CT1086, CT1122-A, CT1035 CT1092, CT1116**	**9F Meeting Room III**
14:00-15:35	**Technical Session 3 - Image Recognition and Classification** **Invited Speech - Bambang Leo Handoko** **CT1023, CT1073, CT1078, CT1036, CT1079**	**9F Boardroom**
14:00-15:30	**Technical Session 4 - Modern Integrated Information Systems and Control** **CT1039, CT1024, CT1028, CT1041, CT0104, CT0327-A**	**9F Meeting Room I**
16:05-16:30	**Coffee Break**	
16:30-18:00	**Technical Session 5 - Intelligent Image Analysis and Methods** **CT0105, CT1055, CT1034, CT1119. CT0315, CT0326**	**9F Meeting Room II**

16:30-18:15	Technical Session 6 - Modern Communications and Information Systems CT1004, CT1012, CT1033, CT1094-A, CT1054, CT1087, CT0323	9F Meeting Room III
16:30-18:00	Technical Session 7 - Data-Oriented Information System Optimization and Security Certification CT1044, CT1027, CT1017, CT1050, CT0438, CT0440	9F Boardroom
16:30-18:15	Technical Session 8 - Data-Based Intelligent Computing and Information Management CT1053, CT1011, CT1001, CT1095, CT1108, CT1031, CT1013	9F Meeting Room I
18:20	Banquet	Botanica+Co

Feb. 22, 2025 | Saturday		
Time	**Activity**	**Venue**
10:00-11:45	Online Session 1 - Machine Learning Models and Calculations CT1068, CT1085, CT1109. CT1076, CT1106, CT1022, CT0444	Zoom A 894 3270 7266 Password: 022023
	Online Session 2 - Software Design, Testing and Verification CT1058, CT1075, CT1042, CT1026, CT1062, CT1091. CT1101	Zoom B 863 8588 5223 Password: 022023
12:00-13:00	Break	
13:00-14:45	Online Session 3 - Machine Learning in Image Processing CT1067, CT0108, CT0328, CT0437, CT1071, CT1077	Zoom A 894 3270 7266 Password: 022023
	Online Session 4 - Advanced Information Networks and Computer Models CT1009, CT1065, CT1084, CT1102, CT1107. CT0109, CT1103	Zoom B 863 8588 5223 Password: 022023
15:00-16:00	Break	
16:00-18:15	Online Session 5 - Ai-Based Digital Image Analysis and Processing Technology CT1025, CT1093, CT1104, CT0319, CT0324, CT1069, CT1020, CT1070, CT1105	Zoom A 894 3270 7266 Password: 022023
	Online Session 6 - Ai-Based Model Design, Algorithm Optimization and Data Analysis CT1015, CT1072, CT0329, CT1081, CT0331, CT0441, CT0445, CT1110, CT1064, CT1007	Zoom B 863 8588 5223 Password: 022023

KEYNOTE SPEAKER

09:20-10:05 | Meeting Room II & III

Kamal Zuhairi Zamli

Professor at Universiti Malaysia Pahang, Malaysia

Biography: Kamal Z. Zamli received the degree in electrical engineering from the Worcester Polytechnic Institute, USA, in 1992, the M.Sc. degree in real-time software engineering from Universiti Teknologi Malaysia, in 2000, and the Ph.D. degree in software engineering from the University of Newcastle upon Tyne, U.K., in 2003. He has written nearly 350 articles in journals and conferences worldwide mainly in the area of (combinatorial t-way) software testing and search-based software engineering. He is the runner up for the Q-Merit Award conferred by the Malaysian Software Testing Board, in 2011, based on his contribution to the field of software testing in Malaysia.

Speech Title: Optimizing Multi Task Test Redundancy Reduction based on Multi Factorial Approach

Abstract: Test redundancy occurs when one requirement is requirements (i.e., large-test-to-requirement configurations covered by more than one test. Potentially affecting the testing costs while at the same time delaying the software release, test redundancy is often undesirable. Considered as an optimization explosion problem, a plethora of existing work exists typically utilizing meta-heuristic algorithms as the backbone algorithm. Although useful, much existing meta-heuristic based algorithms have focused on solving the test redundancy reduction problem as a single task problem (i.e., one-test redundancy task-at-at-time). To cater for simultaneous test redundancy reduction from multiple software development projects, our work explores the design and implementation of a multi-factorial Sine Cosine Algorithm (MF-SCA). The novelty of our work is that we integrate the multi-factorial paradigm and transfer learning algorithm to the Sine Cosine Algorithm (SCA) to achieve implicit multi-task capabilities

KEYNOTE SPEAKER

10:25-11:10 | Meeting Room II & III

Nor Ashidi Mat Isa

Professor at Universiti Sains Malaysia, Malaysia

Biography: Prof. Ir. Dr. Nor Ashidi received the B. Eng. Degree in Electrical and Electronic Engineering with First Class Honors in 1999 and the PhD degree in Electronic Engineering (majoring in Image Processing and Artificial Neural Network) in 2003 from Universiti Sains Malaysia (USM). He is currently a Professor at the School of Electrical and Electronic Engineering, USM. His research interests include intelligent systems, image processing, machine learning, deep learning and medical image processing. As of September 2024, he has published more than 195, 238 and 317 articles indexed in WoS-ISI (H-index 35), SCOPUS (H-index 42) and Google Scholar (H-Index 51) respectively. Due to his outstanding achievement in research, he gained recognition, both national and internationally. He was recognized as top 2% researcher in category – Citation Impact in Single Calendar Years 2020, 2021, 2022, 2023 and 2024 by Stanford University USA - Elsevier and Top Research Scientist Malaysia (TRSM) by Akademi Sains Malaysia (ASM) in 2020.

Speech Title: Transforming Industry with Deep Learning: Potential of Convolutional Neural Networks for Printed Circuit Board Defect Detection

Abstract: Printed circuit boards (PCBs) are becoming more intricate, smaller, and fragile due to the continuous advancements in integrated circuit technology. As a result, accurately detecting PCB defects and components is both essential and increasingly difficult for the industry. Traditional PCB inspection techniques struggle to achieve both speed and precision simultaneously, which creates a pressing need for more advanced solutions. While automated systems have made progress, they still face challenges in handling the complexity and variability of modern PCBs. Convolutional Neural Networks (CNNs), particularly models like You Only Look Once (YOLO), are renowned for their effectiveness in real-time object detection and have shown significant promise in PCB inspections.

This presentation will explore the application of CNNs in identifying a variety of PCB issues, such as dense component placement, soldering defects, small cosmetic flaws, solder mask peel-offs (SMPO), and label printing errors. The ability of CNNs to process large amounts of visual data with high accuracy makes them an ideal tool for automating the detection of such defects. Furthermore, CNNs have the potential to reduce human error and increase the efficiency of inspections, which is critical in the fast-paced manufacturing environment.

Drawing on research conducted by the Imaging and Intelligent System Research Team (ISRT) at USM, several newly developed CNN variants have demonstrated not only outstanding performance in detecting PCB components but also remarkable ability to generalize across various PCB defect types. These advanced models have shown that, beyond simply identifying defects, they can also improve overall quality control by detecting subtle issues that might go unnoticed by traditional methods. The integration of CNNs into PCB inspection workflows could pave the way for more reliable and cost-effective production processes. This could lead to fewer faulty products reaching the market and reduced downtime in manufacturing, ultimately benefiting the entire electronics industry.

Additionally, ongoing improvements in machine learning algorithms are likely to enhance the adaptability and accuracy of these systems, ensuring that CNNs remain at the forefront of PCB inspection technology.

KEYNOTE SPEAKER

11:10-11:55 | Meeting Room II & III

Nikola Kassabov

Professor at The University of Auckland, New Zealand

Biography: Professor Nikola K Kasabov is a Life Fellow of IEEE, Fellow of the Royal Society of New Zealand, Fellow of the INNS College of Fellows, DVF of the Royal Academy of Engineering UK. He has Doctor Honoris Causa from Obuda University, Budapest. He is the Founding Director of KEDRI and Professor Emeritus at the School of Engineering, Computing and Mathematical Sciences at Auckland University of Technology, New Zealand. He is also a Visiting Professor at IICT Bulgarian Academy of Sciences and Dalian University, China and Honorary professor at the University of Auckland. Kasabov is Past President of the Asia Pacific Neural Network Society (APNNS) and the International Neural Network Society (INNS). He has been a chair and a member of several technical committees of IEEE Computational Intelligence Society and Distinguished Lecturer of IEEE (2012-2014). He is Editor of Springer Handbook of Bio-Neuroinformatics, EiC of Springer Series of Bio- and Neuro-systems and co-EiC of the Springer journal Evolving Systems. He is Associate Editor of several other journals. Kasabov holds MSc in computer engineering and PhD in mathematics from TU Sofia, Bulgaria. His main research interests are in the areas of neural networks, intelligent information systems, soft computing, bioinformatics, neuroinformatics. He has published more than 700 publications, highly cited internationally. He has extensive academic experience at various academic and research organisations in Europe and Asia, including: TU Sofia Bulgaria; University of Essex UK; University of Otago, NZ; Shanghai Jiao Tong University and CASIA Beijing; ETH/University of Zurich. Kasabov has received a number of awards, among them: INNS Ada Lovelace Meritorious Service Award; NN journal Best Paper Award for 2016; APNNA'Outstanding Achievements Award'; INNS Gabor Award for'Outstanding contributions to engineering applications of neural networks'; EU Marie Curie Fellowship; Bayer Science Innovation Award; APNNA Excellent Service Award; RSNZ Science and Technology Medal; 2015 AUT NZ Medal; Medal 'Bacho Kiro' and Honorary Citizen of Pavlikeni, Bulgaria; Fellow and Honorary Member of the New Zealand-, the Bulgarian-, the Greek- and the Scottish Societies for Computer Science and Information Technologies. More information of Prof. Kasabov can be found in: https://academics.aut.ac.nz/nkasabov.

Speech Title: Brain-inspired technologies for AI Applications

Abstract: The talk presents a brain-inspired AI approach for predictive and explainable modelling of multimodal data with a wider scope of applications, including: brain-machine interfaces; predicting individual health and welfare outcomes, such as dementia, stroke, mental health; predicting environmental disasters, such as floods and earthquakes. The models are based on brain inspired spiking neural neuronal network architectures (BI-SNN) that include other machine learning methods [1,2,3,4]. The inspiration comes from the brain, which can deal with multimodal sensory, emotional and other information at different and connected time scales. The talk discusses how multiple modalities of data can be integrated for a better outcome prediction and a better explainability of the models, showing the 'hidden' dynamic interaction between the used modalities of data related to an individual. This approach could potentially lead to the creation of principally new 'conscious' and safe decision support AI systems [5], where systems take into account holistically many aspects of an individual features across different time scales and also their consequences and relation to the environment and other individuals.

INVITED SPEAKER

14:00-14:20 | Meeting Room II

Dayang Norhayati Abang Jawawi

Professor at Universiti Teknologi Malaysia, Malaysia

Biography: She is a professor at the Faculty of Computing, Universiti Technologi Malaysia (UTM). She received her B.Sc. in Software Engineering from Sheffield Hallam University, UK, and her M.Sc. and Ph.D. in the field of Software Engineering from UTM. She has served as an academic administrator at UTM, since 2009 and currently she is Deputy Dean (Academic and Student Affairs) at Faculty of Computing, UTM. Her research areas are software engineering and computing education. Most of her research projects are focused to the domain of educational robotics, computational thinking, healthcare system and real-time embedded system application.

Speech Title: Women in Software Engineering Education: Competency and Diversity

Abstract: In 1990, Mary Shaw emphasized the importance of systematic methods, empirical evidence, and engineering principles in software engineering to enhance quality and reliability. These principles influence modern trends like Agile methodologies, microservices, cloud computing, and AI-driven development, advancing the field towards disciplined practice. This presentation links Shaw's ideas with these trends to underscore the critical importance of software engineering education in developing core competencies and preparing future engineers. Additionally, nurturing female talent in software engineering brings the benefits of diversity, driving innovation and addressing industry challenges.

Focusing on Malaysian female students in engineering and technology programs, this talk will use a case study from Universiti Teknologi Malaysia's software engineering program to analyze trends in female participation. It will highlight the competencies of female students, providing insights into women's representation in software engineering education. By showcasing their contributions and potential, this presentation aims to inspire and advocate for an inclusive and supportive environment for women in software engineering, ultimately contributing to a more diverse and innovative industry.

INVITED SPEAKER

14:00-14:20 | Meeting Room III

Mohamed Bahaj

Professor at University Hassan 1st Faculty of Sciences & Technologies Settat Morocco, Morocco

Biography: Prof. MOHAMED BAHAJ is a Full Professor in the Department of Mathematics and Computer Sciences from the University Hassan 1st Faculty of Sciences & Technologies Settat Morocco. He has published over 130 peer-reviewed papers. His research interests focus on Artificial Intelligence, Human-Computer Interaction, Information Systems, Deep Learning, Business Intelligence, Internet of Things, Big Data Analysis, Intelligent Systems, Ontologies Engineering, Scientific Computing.

He served as a reviewer at many reputed journals of Elsevier (Expert Systems with Applications Journal, SoftwareX Journal, Big Data Research Journal, Applied Soft Computing Journal, Knowledge-Based Systems Journal, Information Systems Journal, Information Sciences Journal, Computer & Security Journal, Journal of King Saud University - Computer and Information Sciences, Journal of Computer Science Review, Journal of Informatics in Medicine Unlocked).

He has supervised several PhD theses in Computer Sciences & in Applied Mathematics. He chaired many international conferences (Indexed Scopus, Web of Sciences, Springer). He also attended a series of workshops, seminars and discussion forums for Academic Development on Software and Research.

Speech Title: Artificial Intelligence: Deep Learning and Next-Gen Approaches for Conversational Agents

Abstract: Today's AI systems can interact with users, discern their requirements, understand their needs, map their preferences, learn patterns in human conversation, and recommend an appropriate line of action with minimal or no human intervention and coherent responses.

We aim in this presentation to foster open advanced existing conversational AI platforms and share the latest advancements in Chabot communication and deep Learning. Specifically to assess near-human capabilities in conversational agents.

Chatbots are based on the NLP tasks, which contain, Optical Character Recognition, Speech Recognition, Speech Segmentation, Text-To-Speech and also NLP applications Text Summarization, Machine Translation, Natural Language Understanding (NLU), Natural Language Generation (NLG), Question Answering, Text-To-Image generation.

We will cover topics ranging from concepts of variants of autoencoder architectures to basic innovations of GANs/ Attention Mechanisms and Transformers in the context of AI-Powered Chatbot Architecture and show their limitations and newer varieties.

We outline how the approaches from RNNs LSTMs, Encoder-Decoder Convolutional LSTM, GANs, DCGANs, SAGAN, Transformer (The Self-Attention Mechanism) can leverage and build Deep learning-based Conversational AI.

A federated or a hybrid approach leverages the strengths and mitigates the weaknesses of both the latest technologies in conversational agents and deep Learning tools

The presentation intends also to explore, create strategic value and improve performances (Environment sensing and Data acquisition, Data analysis for detection and prediction, Real-time analysis for decision support

system, Use Case Development).

The architecture of these models are scalable and layered in such a way to provide necessary refined chatbots: Enhancing Agility and Adaptability.

This Presentation also focuses on assessing the latest programming technologies extensively used in Deep Learning models/AI-Powered Chatbot Architecture, which serve as substantial and pivotal criteria for evaluating diverse performance compliance needs.

INVITED SPEAKER

14:00-14:20 | Boardroom

Bambang Leo Handoko

Professor at Bina Nusantara University, Indonesia

Biography: Bambang Leo Handoko is an associate professor and practitioner in the field of accounting with a specialization in Auditing and advanced expertise in Computer-Assisted Audit Techniques (CAATs) and Computer Forensics. With extensive experience as an auditor in public accounting firms, internal auditor for corporations, and an auditor for securing vital national assets under the National Police Headquarters, he brings a blend of practical and technological insights to the field. As an expert in financial audits, cryptocurrencies, financial technology, the stock market, e-business, and the integration of technology in auditing, he leverages tools like CAATs to enhance audit efficiency and accuracy. His proficiency in computer forensics enables him to investigate complex digital financial systems and detect fraud effectively.

He has published extensively in highly indexed international journals and proceedings, gaining numerous citations and acknowledgments from global researchers. His work has been recognized with multiple research grants from institutions and government bodies. Currently, he serves as the Subject Content Coordinator for Auditing in the Accounting Department at the School of Accounting, Bina Nusantara University, Indonesia. In addition to his academic and research contributions, he is actively involved as a technical committee member for many reputable journals and conferences, promoting advancements in accounting and auditing technologies. His innovative approaches bridge traditional auditing practices with cutting-edge digital solutions.

Speech Title: Model of Task-Technology Fit to Enhance Auditor Performance with Computer Assisted Audit Techniques

Abstract: This study examines the determinants of auditor performance, focusing on the role of task-technology fit (TTF) and the utilization of Computer-Assisted Audit Techniques (CAATTs). The research aims to explore how the alignment between audit tasks and technology, as well as the degree to which auditors utilize these technologies, influences their performance. Using a quantitative approach, data was collected from auditors in Indonesia, using purposive sample resulting in 127 valid responses. The data analysis was conducted using Structural Equation Modeling Partial Least Square (SEM PLS). The findings indicate that both task-technology fit, and utilization significantly impact auditor performance, with task-technology fit also influencing utilization. Furthermore, technology characteristics were found to have a significant effect on task-technology fit, while task characteristics did not show a significant direct impact. These results provide valuable insights for the adoption and effective use of CAATTs in auditing, contributing to improved performance and efficiency in audit processes. The study also highlights practical implications for audit firms in developing strategies for better integration of technology into audit tasks.

TECHNICAL SESSION

T01: Software Design and Program Development

Chair: Abdallah Qusef, Princess Sumaya University for Technology, Jordan

14:00-15:50 | Feb. 21, 2025 | Meeting Room II

Invited Speaker

Dayang Norhayati Abang Jawawi | 14:00-14:20
Universiti Teknologi Malaysia, Malaysia

Speech Title: Women in Software Engineering Education: Competency and Diversity

Abstract: In 1990, Mary Shaw emphasized the importance of systematic methods, empirical evidence, and engineering principles in software engineering to enhance quality and reliability. These principles influence modern trends like Agile methodologies, microservices, cloud computing, and AI-driven development, advancing the field towards disciplined practice. This presentation links Shaw's ideas with these trends to underscore the critical importance of software engineering education in developing core competencies and preparing future engineers. Additionally, nurturing female talent in software engineering brings the benefits of diversity, driving innovation and addressing industry challenges.

Focusing on Malaysian female students in engineering and technology programs, this talk will use a case study from Universiti Teknologi Malaysia's software engineering program to analyze trends in female participation. It will highlight the competencies of female students, providing insights into women's representation in software engineering education. By showcasing their contributions and potential, this presentation aims to inspire and advocate for an inclusive and supportive environment for women in software engineering, ultimately contributing to a more diverse and innovative industry.

TAIK DETAILS

Time	Presentation
14:20-14:35 **CT1040**	Title: Case Studies Toward Introducing Liveness on Interactive System Development with p5.js Author: Masaki Saito, Akira Sasaki, Hiroshi Hosobe Presenter: Masaki Saito, Hosei University, Japan Abstract: Processing is a programming language and an integrated development environment (IDE) specialized for electronic arts and visual designs. Because of the ease of its programming, Processing can be used regardless of programming maturity. Processing can also be used to develop not only visual designs but also

interactive systems that require the user's input such as key typing, mouse movement, mouse click, etc. Owing to its unique characteristics in developing interactive systems, there are some development labors (e.g. editing the behavior after executing a certain time or checking the behavior on specific inputs). Furthermore, in practical programming, programmers must face a gap between execution and coding in their programming cycle, which consists of repetition of coding, compiling, and executing. Live programming is a programming style that allows programmers to check the system's behavior immediately and lessen the gap. In this study, we developed an interactive system development environment that can reduce these labors by utilizing live programming, snapshots of program states, and event macros that automate the user's input. This system provides simple mechanisms that re-execute p5.js code in response to the user's editing process. We present case studies on developing interactive systems using this system, which focus on the view changing and types of user inputs. Through these case studies, we showed methods that introduce liveness in the development of interactive systems, which leads to coding efficiency, especially by combining live programming with snapshots of program states and event macros.

14:35-14:50
CT1074

Title: Extending JML with Refinement Types for Enhanced Java Program Verification
Author: Tomohiro SUZUKI, Shin-ya NISHIZAKI
Presenter: Shinya NISHIZAKI, Institute of Science Tokyo

Abstract: Java Modeling Language (JML) is a behavioral interface specification language for Java programs. It uses preconditions and postconditions, following Hoare's contract-based approach. JML can describe rich specifications but often demands many annotations, making defect detection within methods time-consuming.
Our study tackles these challenges by extending JML with refinement types. A refinement type pairs a type with a predicate restricting permissible values. In our extension, predicates can only constrain variables explicitly declared with refinement types, disallowing references to arrays, methods, and non-final variables. We also enforce JML's standard visibility rules for variables in predicates.
Additionally, we present a verification tool for S-JML, a lightweight Java and JML framework enhanced with refinement-type annotations. This tool relies on an SMT solver to check for counterexamples and blocks the usage of refinement-type fields until constructors confirm their predicates. Examples demonstrate reduced specification overhead and simpler defect localization, proving our approach's effectiveness. Improves Java verification.

14:50-15:05
CT1043

Title: OpenMIP: Towards an Open Toolkit for Medical Image Processing
Author: Oualid Miloudi, Elmoukhtar Zemmouri
Presenter: Elmoukhtar Zemmouri, Moulay Ismail University, ENSAM Meknes, Morocco

Abstract: In this paper, we introduce OpenMIP an open and extensible toolkit for medical image processing. It encompasses a comprehensive set of pre-processing operations and methodology for radiology images, especially magnetic resonance imaging (MRI) and computed

tomography (CT) scans. The objective is to enhance scan's visualization and optimize datasets for deep learning algorithms. The MRI preprocessing pipeline encompasses denoising, bias field correction, standardization, segmentation, slice selection, and cropping, while the CT preprocessing involves HU transformation, denoising, windowing, segmentation, slice selection, and cropping. These preprocessing steps collectively improve image quality, aid in focused visualization of specific regions, and efficiently enhance data quality and reduce data size for deep learning applications.

15:05-15:20
CT1088

Title: Leveraging Similarity Hashing for Effective Detection of Android Malware and Its Variants
Author: Alina Khalid, Hassan Jalil Hadi, Dr Naveed Ahmad
Presenter: Naveed Ahmad, Prince Sultan University, Pakistan

Abstract: With the progression of technology, there is an increasing occurrence and intricacy of cyberattacks. The Android OS, due to its substantial market presence, has emerged as a primary target for advanced malware threats. The fundamental categories of malware persist, yet slight alterations frequently enable these variants to bypass detection, presenting considerable obstacles for security systems. To tackle this issue, a range of techniques and algorithms have been utilized to enhance the detection and classification of malware. In this paper, we proposed leveraging fuzzy hashes to enhance Android malware detection, this research introduces a static feature-based hashing method for improved accuracy and reliability. By calculating file similarity indices, the technique identifies malicious APK files and classifies malware into six categories: trojan, adware, spyware, virus, downloader, and hacktool. Testing on 2500 APK samples demonstrated a precision-driven accuracy of 98.77%, surpassing traditional methods without complex machine learning models.

15:20-15:35
CT0107

Title: Aspect-oriented Programming with Julia
Author: Osamu Ishimura, Yoshihide Yoshimoto
Presenter: Osamu Ishimura, The University of Tokyo, Japan

Abstract: This paper proposes integrating Aspect-oriented Programming (AOP) into Julia, a language widely used in scientific and High-Performance Computing (HPC). AOP enhances software modularity by encapsulating cross-cutting concerns, such as logging, caching, and parallelizing, into separate, reusable aspects. Leveraging Julia's powerful metaprogramming and abstract syntax tree (AST) manipulation capabilities, we introduce AspectJulia, an AOP framework designed to operate within Julia's runtime environment as a package. AspectJulia enables developers to define and apply aspects seamlessly, leading to more modular, maintainable, and adaptable code. We detail the implementation of AspectJulia and present diverse use cases, ranging from HPC and scientific computing to business applications, demonstrating its effectiveness in managing cross-cutting concerns. This integration simplifies application development and improves the adaptability of existing Julia modules and packages, paving the way for more efficient and maintainable software systems.

15:35-15:50
CT1111

Title: Multi-Task Test Redundancy Reduction Optimization Problem based on the Brown Bear Algorithm

Author: Multi-Task Test Redundancy Reduction Optimization Problem based on the Brown Bear Algorithm
Presenter: Roslina Mohd Sidek, Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia

Abstract: A condition test redundancy occurs when many tests address one or more requirements. In addition to cost factors, test redundancy can be undesirable during software testing activities. The test redundancy reduction problem is regarded as an optimization problem, and numerous previous studies have addressed it by utilizing a variety of metaheuristic algorithms as the foundational solution implementation (e.g., Brown Bear Algorithm, Sine Cosine algorithm, Particle Swarm Optimization, etc.). Implementations based on metaheuristics have proven to be effective in addressing test redundancy and minimizing testing costs thus far. Despite their usefulness, the majority of current metaheuristic solutions concentrate primarily on test redundancy reduction as a single optimization effort. In this study, brown bear based used to study about multitask optimization. In implementation of brown bear algorithm, we measure based on two research question: the correctness of multitasks brown bear on TRR; and the comparison with sequential multitask. This study proven the brown bear based manage to fulfill all requirements needed and the performance of multitask brown bear improve the time taken in software testing. As conclusion, multitask brown bear minimized the number of testcases to be tested and reduce testing costs.

TECHNICAL SESSION

T02: Artificial Intelligence Theory and Application

Chair: Shigeki Hagihara, Institute of Science Tokyo, Japan

14:00-15:35 | Feb. 21, 2025 | Meeting Room III

Invited Speaker

Mohamed Bahaj | 14:00-14:20
University Hassan 1st Faculty of Sciences & Technologies Settat Morocco, Morocco

Speech Title: Artificial Intelligence: Deep Learning and Next-Gen Approaches for Conversational Agents

Today's AI systems can interact with users, discern their requirements, understand their needs, map their preferences, learn patterns in human conversation, and recommend an appropriate line of action with minimal or no human intervention and coherent responses.

We aim in this presentation to foster open advanced existing conversational AI platforms and share the latest advancements in Chabot communication and deep Learning. Specifically to assess near-human capabilities in conversational agents.

Chatbots are based on the NLP tasks, which contain, Optical Character Recognition, Speech Recognition, Speech Segmentation, Text-To-Speech and also NLP applications Text Summarization, Machine Translation, Natural Language Understanding (NLU), Natural Language Generation (NLG), Question Answering, Text-To-Image generation.

We will cover topics ranging from concepts of variants of autoencoder architectures to basic innovations of GANs/ Attention Mechanisms and Transformers in the context of AI-Powered Chatbot Architecture and show their limitations and newer varieties.

We outline how the approaches from RNNs LSTMs, Encoder-Decoder Convolutional LSTM, GANs, DCGANs, SAGAN, Transformer (The Self-Attention Mechanism) can leverage and build Deep learning-based Conversational AI.

A federated or a hybrid approach leverages the strengths and mitigates the weaknesses of both the latest technologies in conversational agents and deep Learning tools

The presentation intends also to explore, create strategic value and improve performances (Environment sensing and Data acquisition, Data analysis for detection and prediction, Real-time analysis for decision support system, Use Case Development).

The architecture of these models are scalable and layered in such a way to provide necessary refined chatbots: Enhancing Agility and Adaptability.

This Presentation also focuses on assessing the latest programming technologies

extensively used in Deep Learning models/AI-Powered Chatbot Architecture, which serve as substantial and pivotal criteria for evaluating diverse performance compliance needs.

TAIK DETAILS	
Time	**Presentation**
14:20-14:35 CT1086	Title: Application of Artificial Intelligence for Assessing Models Consistency in Model-Driven Engineering Author: Saliha Ejaz, Farooque Azam, Muhammad Waseem Anwar, Marwareed Rehman Presenter: Farooque Azam, National University of Sciences & Technology, H-12, Islambad, Pakistan Abstract: Finding out the consistency between two entities is important for grouping or learning similar behavior for classification and recommendations. Consistency means that an entity follows a certain similar pattern when related to other entities in the same group. Models are often classified according to categories, uses, complexity level, similar sets of classes, and other attributes. Heterogeneous models tend to have similar patterns and categories thus giving rise to an inconsistency. Identifying the similarity and consistency becomes crucial in Model-driven engineering where we often have to group UML/ECORE models for various purposes such as classification, Machine learning, and recommendation systems. In this paper, We have introduced the Siamese neural network to determine the similarity between the two models. This network carefully extracts the relevant features from the given models and generates the similarity index based on features and contextual information. The proposed approach has been validated using the Modelset dataset with an accuracy of 96.67% percent. The proposed approach sets a solid platform to evaluate model consistencies for different purposes.
14:35-14:50 CT1122-A	Title: Optimizing Time Windows for COVID-19 Case Forecasting Using Machine Learning Models Author: Sallonie Bikash Gupta, Anaiy Somalwar Presenter: Sallonie Bikash Gupta, Singapore Abstract: The unprecedented scale and rapid transmission of COVID-19 highlighted the critical need for accurate case forecasting to guide public health and policy decisions. While current research predominantly focuses on improving predictive accuracy, there is limited emphasis on identifying the optimal time window for autoregressive forecasting, which plays a pivotal role in both machine learning (ML) and traditional epidemiological models. In this study, we explore the relationship between predictive performance and the time window used for forecasting, employing state-of-the-art ML techniques, including Linear Regression, Ridge Regression, Gradient Boosting Trees, XGBoost, Multilayer Perceptrons (MLPs), and Deep Neural Networks (DNNs). Leveraging the New York Times dataset on COVID-19 cases in the United States, our analysis demonstrates that predictive accuracy is highly sensitive to the selected time window. Notably, we found that a 7-day window of previous data

offers the optimal balance between accuracy and computational efficiency. Our best-performing models, particularly Ridge Regression and XGBoost, achieved an average error of 800 deaths. Furthermore, this framework offers significant utility for enhancing traditional epidemiological models, which rely heavily on autoregressive inputs for disease progression simulations. The methodologies and findings are extensible to other infectious diseases, such as influenza, tuberculosis, and measles, thereby providing a scalable solution for data-driven public health forecasting.

14:50-15:05
CT1035

Title: Development of Natural Fiber Classification System using Deep Convolutional Neural Network
Author: Keysed Ian V. Mahor, Meo Vincent C. Caya, Jocelyn F. Villaverde
Presenter: Keysed Ian V. Mahor, Mapua University, Philippines

Abstract: This study developed a prototype for classification
of natural fibers in the Philippines using Convolutional Neural Network. The study utilized AlexNet CNN architecture for its model development, OpenCV and Flask framework for userinterface development, and Raspberry Pi as a major component for hardware development. The natural fibers included in the study were Abaca, Coconut, Pineapple, Raffia, and Salago fiber. Each class has a 200 training images wherein it applied the 80:20 ratio, in which the 20% was used for validation. Using the developed prototype, the researchers also conducted a system testing. During the testing, 30 samples were used for each class. Upon testing, the model achieved an accuracy rate of 94% wherein out of 30 samples, the system correctly predicted all the samples for both Coconut and Salago fibers, 28 for Abaca and Pineapple fibers, and 25 for Raffia fiber. Overall, the developed system can be utilized as an alternative device for classification of natural fibers.

15:05-15:20
CT1092

Title: Interaction Design in AI Applications: A Systematic Review
Author: Puvana Venkidasalam, Amna Alshawa Ragheb Alshawa, Tek Yong Lim, Zhiqiang Luo
Presenter: Puvana Venkidasalam, Multimedia University, Malaysia

Abstract: Despite the availability of Artificial Intelligence applications across different domains, persistent usability challenges have hindered their effectiveness and user adoption. This systematic review investigates the role of interaction design in enhancing the usability and user experience of Artificial Intelligence applications. This analysis yielded three key findings. First, integration & interaction, learning, and communication are the primary Artificial Intelligence domains that leverage interaction design research to ensure user-centric and efficient applications. Second, Artificial Intelligence techniques such as hybridization, searching, and optimization are widely adopted to address multifaceted challenges. Finally, mixed methods have emerged as the most versatile user experience evaluation approach, integrating quantitative and qualitative techniques to provide comprehensive insights into Artificial Intelligence applications. These results offer a holistic framework for Artificial Intelligence practitioners and designers to develop intuitive and robust applications while addressing gaps in the field.

Title: Automated Test Scenario Generation for Autonomous Robots using Large Language Models
Author: Kyoji Tanaka, Kenji Hisazumi
Presenter: Kyoji Tanaka, Shibaura Institute of Technology, Japan

15:20-15:35
CT1116

Abstract: The development of autonomous robots has increasingly emphasized the importance of identifying potential issues early through efficient validation and simulation-based testing. Despite this progress, significant challenges remain in automating test scenario generation and addressing the diversity and complexity of testing environments. This study introduces a method for scenario-based testing using the Hakoniwa platform, which supports IoT and robot software development in a virtual environment, in combination with Large Language Models (LLM) to achieve a more precise drone simulation tailored to user requirements.

TECHNICAL SESSION

T03: Image Recognition and Classification

Chair: Bambang Leo Handoko, Bina Nusantara University, Indonesia

14:00-15:35 | Feb. 21, 2025 | Boardroom

Invited Speaker

Bambang Leo Handoko | 14:00-14:20
Bina Nusantara University, Indonesia

Abstract: This study examines the determinants of auditor performance, focusing on the role of tasktechnology fit (TTF) and the utilization of Computer-Assisted Audit Techniques (CAATTs). The research aims to explore how the alignment between audit tasks and technology, as well as the degree to which auditors utilize these technologies, influences their performance. Using a quantitative approach, data was collected from auditors in Indonesia, using purposive sample resulting in 127 valid responses. The data analysis was conducted using Structural Equation Modeling Partial Least Square (SEM PLS). The findings indicate that both task-technology fit, and utilization significantly impact auditor performance, with tasktechnology fit also influencing utilization. Furthermore, technology characteristics were found to have a significant effect on task-technology fit, while task characteristics did not show a significant direct impact. These results provide valuable insights for the adoption and effective use of CAATTs in auditing, contributing to improved performance and efficiency in audit processes. The study also highlights practical implications for audit firms in developing strategies for better integration of technology into audit tasks.

TAIK DETAILS

Time	Presentation
14:20-14:35 **CT1023**	Title: Enhancing Masked Face Recognition with Real-Time Eye Blink Detection for Secure Access Control Author: Siew-Chin Chong, Lee-Ying Chong, Kuok-Kwee Wee Presenter: Siew-Chin Chong, Multimedia University, Malaysia Abstract: This paper presents a novel approach for enhancing masked face recognition in access control systems through the implementation of eye blink detection, utilizing 68 facial landmarks and the eye aspect ratio (EAR). It examines the role of these markers and the use of eye landmarks to accurately calculate EAR. Access systems, especially those used in banking applications, often rely on passwords or multi-factor authentication methods such as passwords combined with facial recognition. However, these traditional methods have certain vulnerabilities, including susceptibility to shoulder surfing and facial spoofing. To address these challenges, an improved masked face recognition method that integrates eye blink

detection is proposed, providing a robust solution for access control and liveness detection. The masked face recognition component employs a deep learning model, achieving a 99.77% recognition accuracy on a benchmark dataset, with real-time eye blink detection built onto this model to prevent spoofing attacks via static images. To showcase the viability of this approach, a web application called "MaskBlink" has been developed, with functional tests conducted to validate its key features.

14:35-14:50
CT1073

Title: Application of a Hybrid CNN-SE-GCN Model with Multi-Loss Optimization and Adversarial Samples in Real-Time Emotion Recognition
Author: Yan Zhang, Jiacheng Li, Masato Noto
Presenter: Yan Zhang + Field of Electrical, Electronics and Information Engineering, Graduate School of Engineering, Kanagawa University, Yokohama, Japan

Abstract: In recent years, with the rapid development of artificial intelligence and internet technologies, facial expression recognition has gained widespread application and attention in fields such as human-computer interaction and intelligent healthcare. However, existing methods still face significant limitations when dealing with small samples, imbalanced datasets, and adversarial attacks. Therefore, we propose a hybrid Convolutional Neural Network (CNN)- Squeeze-and-Excitation (SE) Graph Convolutional Network (GCN) model that integrates multi-loss optimization and adversarial samples for real-time facial expression recognition. The model draws inspiration from the generator-discriminator architecture of Generative Adversarial Networks (GANs). The generator is based on an improved ResNet18, incorporating an SE module to extract local features from images, while leveraging GCNs to process high-dimensional geometric information, thereby effectively fusing global and local features. To enhance the generator's adaptability to adversarial samples, we employ the Fast Gradient Sign Method (FGSM) to generate adversarial samples and combine them with the original data for joint training, further optimizing the generator's feature representation and robustness. Additionally, we designed a geometric information discriminator to distinguish generated features from real geometric information, strengthening the discriminator's capability through adversarial training. Furthermore, we propose a multi-loss optimization strategy that integrates classification loss, geometric constraint loss, and adversarial training loss to optimize the model from multiple dimensions. Experimental results on the CK+ dataset demonstrate that the proposed method achieves high accuracy and robustness in small-sample facial expression recognition tasks, effectively addressing data imbalance and adversarial sample interference. Finally, we developed a web system that applies the proposed method to practical scenarios, providing an efficient solution for real-time facial expression recognition tasks.

14:50-15:05
CT1078

Title: Optimized Land Cover Classification: A Lightweight Approach to High-Resolution Remote Sensing
Author: Vikas Kumar Jain, Tej Bahadur Chandra, Janhavi Agrawal, Deepika Pandey, Divyanshu Pandey
Presenter: Vikas Kumar Jain, Bennett University, Greater Noida, India

Abstract: Land cover classification is a critical challenge in remote sensing, essential for monitoring physical and anthropogenic phenomena on a large scale. While

extensive research has focused on multi-class classification, where each pixel is assigned to a single class, these traditional approaches need help with the complexities of high-resolution remote sensing images in multilabel classification tasks. Convolutional neural networks (CNNs) based on deep learning have shown promising results, but their many trainable parameters often lead to overfitting. To address this issue, we propose a lightweight convolutional neural network specifically designed to reduce model complexity. Our experiments, conducted on the widely recognized UC Merced Land Use dataset, demonstrate that the proposed model achieves higher precision, recall, and overall accuracy while reducing the number of trainable parameters by more than 39% compared to existing models. This reduction mitigates overfitting and significantly decreases training and testing time, highlighting the efficiency and effectiveness of our approach for land cover classification in remote sensing.

15:05-15:20
CT1036

Title: Classification of Black Garlic Grade Using Convolutional Neural Network
Author: Raymart O. Villena, Jocelyn F. Villaverde
Presenter: Raymart O. Villena, Mapua University, Philippines

Abstract: Health has become one of the top priorities in terms of research and impact metrics, with the target of finding relevant foods and strategies to improve public health problems. The utilization of plant agents such as vegetables, fruits, herbs, and nuts have been taken into attention for their various health benefits, including the inhibition of illnesses. Black garlic (Allium sativum L.) belongs to the group which has good medicinal properties and better taste than raw garlic. Black garlic gained popularity Ilocos Norte, Philippines and they have estimated annual production demand of eighty-five thousand hundred-gram packs. However, the manual classification of black garlic is hard and tedious to do out of the processing oven. This is due to lack of equipment in determining the aging quality. Hence, we created a device with Raspberry Pi 4 and camera module. The system acquires the images using artificial setup and applies trained ResNet50v2, VGGNet16, and EfficientNetB0 model that perform image classification. We trained the models using total of 1305 images of black garlic which was divided into 85/15 ratio training and validation subsets. The models were fine-tuned using less aggressive hyperparameters to adjust the already learned features of the model and introduce the new features of black garlic. The result achieved 98.33% accuracy for all the models upon testing the 60 samples of different class with errors in different samples. The EfficientNetB0 model is recommended for the use since it has the least model memory footprint at considerable same performance in terms of accuracy.

15:20-15:35
CT1079

Title: CXR-ViT: A Transformer-Based Framework for Enhanced Chest X-Ray Classification
Author: Kajal Kansal, Tej Bahadur Chandra, Akansha Singh
Presenter: Tej Bahadur Chandra, Bennett University, Greater Noida, India

Abstract: Increasing need for accurate medical image analysis, chest X-ray classification has become a powerful tool for diagnosing pulmonary diseases. However, the inherent complexity of thoracic abnormalities and the limited annotated medical data pose significant challenges to accurate classification. In this study, we

utilized fine-tuned deep learning-based CNN and large vision transformer frameworks to classify lung diseases from CXR images. Moreover, to address the issues of model interpretability and decision-making, we use Gradient-weighted Class Activation Map (Grad-CAM) to visualize the results and improve the model predictions' interpretability and accuracy by identifying relevant regions in the lung areas. The results of our experiments on the publicly available COVID-QU-Ex dataset show that the proposed CXR-ViT outperforms the conventional CNN approaches with an accuracy of 99.01 %. This work highlights the use of transformers in medical image analysis, emphasizing better lung disease classification and interpretability.

TECHNICAL SESSION

T04: Modern Integrated Information Systems and Control

Chair: Vitaliy Mezhuyev, FH JOANNEUM University of Applied Sciences, Austria

14:00-15:30 | Feb. 21, 2025 | Meeting Room I

TAIK DETAILS	
Time	**Presentation**
14:00-14:15 CT1039	Title: ML Model for Predicting Tensile Strength of 3D-Printed Components Using Bayesian Optimization Author: Vitaliy Mezhuyev, Hanusch Sabine, Paul Hofmann, and Manfred Mücke Presenter: Vitaliy Mezhuyev, FH JOANNEUM University of Applied Sciences, Austria Abstract: The increasing popularity of 3D printing as a manufacturing process has highlighted the need for predictive models, which can estimate the mechanical properties of printed components before production. This study focuses on developing a machine learning (ML) model for predicting the tensile strength of 3D-printed components, manufactured using Fused Deposition Modeling (FDM). The model uses key printing parameters (layer height, infill pattern, infill density, print speed, wall thickness) and provides respective predictions of resulting tensile strength thereby reducing the number of test prints to identify suitable printing parameters. Gaussian Process Regression (GPR) and Bayesian optimization were employed to train the model, utilizing tensile test data from only 57 3D-printed samples. The model performance, evaluated using the coefficient of determination (R^2), showed promising results (0.948). This research underscores the potential of ML models to streamline the 3D printing process by optimizing parameter selection and minimizing material waste, thus contributing to the broader adoption of additive manufacturing.
14:15-14:30 CT1024	Title: Design and Implementation of a Compact Educational Blockchain System to Aid Understanding of System Integrity and Behavior Author: Kengo Matsui, Shigeki Hagihara Presenter: Kengo Matsui, Chitose Institute of Science and Technology, Japan Abstract: This study involved designing and implementing a compact educational blockchain system that facilitates understanding by eliminating much of the complexity of blockchain technology. The system, implemented in Python, ensures that the concept of blockchain integrity is easy to comprehend. Essential features include operation of consensus algorithms and use of block generation/addition to facilitate learning. The effectiveness of the system was evaluated via a survey of university students. The results revealed significant improvements in blockchain comprehension. These findings contribute to the development of foundational systems for blockchain education in academic settings.

Title: Prediction of Standard Minute Value Using Machine Learning in the Garment Industry
Author: MD TASADUL ISLAM HEMAL, SIN YEW KEONG, AHMAD FARIMIN AHMAD OSMAN, TAN YI FEI
Presenter: MD TASADUL ISLAM HEMAL, MULTIMEDIA UNIVERSITY, MALAYSIA

14:30-14:45
CT1028

Abstract: The garment industry is a critical component of the global economy, and it has been a major driver of economic growth. The industry faces various challenges, including labour practices, one of which involves the estimation of the standard minute value (SMV). The SMV, representing the time required for a qualified operator to complete a task under standard conditions with appropriate allowances, is often estimated primarily based on engineers' experience. Different individuals may predict the SMV differently. Advancements in technology are expected to standardize SMV prediction and make the production processes more efficient. By knowing SMV accurately in advance, the garment production processes can be improved, thereby reducing cost of producing clothes. In this research, data are collected from a ready-made garment (RMG) industry, with the aim to apply machine learning (ML) based regression models to predict SMV outcomes without depending on industrial engineers. Among the regression models, linear regression (LR), decision tree regression (DTR), and random forest regression (RFR) are chosen for predicting SMV. For the model performance evaluation, mean square error (MSE) and squared correlation coefficient (R2) are calculated. The testing results showed that MSE values fall within 0.004 to 0.006 and R2 range from 0.77 to 0.86, indicating that ML-based regression models are quite accurate in predicting SMV. In addition to providing an efficient method for predicting SMV, this research helps in reducing manpower requirements, enhancing productivity, and minimizing losses.

Title: Sentiment Analysis on Out-Of-Vocabulary (OOV) Malaysia Rojak Language
Author: CHENG KEI KEI, CHAN YONG JIE, CHEE ZHAO DE, LIM KHAI YIN, TAN CHI WEE
Presenter: CHENG KEI KEI, CHAN YONG JIE, CHEE ZHAO DE, LIM KHAI YIN, TAN CHI WEE, Tunku Abdul Rahman University of Management and Technology,Malaysia

14:45-15:00
CT1041

Abstract: Code-mixing, commonly practised in multilingual societies, refers to the use of multiple languages in a single phrase or conversation. It is one of the biggest hurdles in natural language processing (NLP), particularly for tasks like sentiment analysis. This study focuses on a commonly used dialect in Malaysia, Bahasa Rojak that contains elements of English, Malay, and Chinese. Aiming to establish a model to address the code-mixing phenomena of Bahasa Rojak, this study leverages transfer learning with three pretrained models to perform sentiment analysis on the SentiBahasaRojak dataset consisting of out-of-vocab (OOV) words. Upon the completion of the three models training, an ensemble learning approach using Fully Connected Neural Networks (FCNN) is proposed to enhance sentiment classification accuracy. The model, fine-tuned with SentiBahasaRojak data, achieves a notable accuracy of 0.84 using the XLM-T. Furthermore, the performance is improved by the FCNN ensemble learning approach, reaching an accuracy of 0.87, achieved an improvement of 0.02 as compared to an existing similar approach. This study has

demonstrated the effectiveness of combining transfer learning with ensemble methods using the proposed preprocessing method, providing a robust solution for sentiment analysis in code-mixed languages.

15:00-15:15
CT0104

Title: Embedding information into printed matter using invisible luminance-modulated illumination
Author: Kazutake Uehira and Hiroshi Unno
Presenter: Kazutake Uehira, Kanagawa Institute of Technology, Japan

Abstract: This paper presents a novel technique for embedding information in printed images of real objects captured by a camera, aiming to verify the authenticity of these images. The key feature of this method is that information is invisibly embedded in the illumination light that shines on the object when capturing image of the real object. As a result, the captured image of the object, as well as the printed version of that image, retains this invisible information. In this study, we focus on face photographs, commonly used for ID photos. A projector, serving as the light source, projects an image with uniform brightness across the illumination area. To embed 1 bit of information in each 16x16 pixel block, a small value is assigned to a specific frequency component based on binary data. The printed image is scanned, re-digitized, and subjected to DCT transformation, allowing information to be extracted from the values of specific frequency components. Experimental results demonstrated that 100 % accurate information embedding and retrieval are achievable with appropriate parameter settings. This technique represents a cost-effective and practical solution for ensuring the authenticity of printed ID images, offering significant advantages over existing methods by utilizing standard consumer-grade devices. The findings could be instrumental in preventing identity fraud and expanding applications in security and authentication.

15:15-15:30
CT0327-A

Title: A Case Study on Equipment Failure Classification and Response Strategy Prediction Using Unstructured Text Data in Manufacturing Companies
Author: Minjae Ko, Youngju Cho
Presenter: Minjae Ko, Korea Institute of Industrial Technology(KITECH), South Korea

Abstract: In the field of manufacturing, effective equipment management involves identifying equipment malfunctions or product defects by their causes or phenomena, monitoring trends across failure types, and resolving identified issues. Accurate categorization is pivotal as it provides essential data for efficient management processes. Manufacturing Execution Systems (MES), widely used in the industry, gather historical data on equipment failures and responses, incorporating both structured machine-generated logs and unstructured operator-generated text. This research leveraged actual equipment failure data from manufacturing facilities to develop classification models using BERT and Random Forest, enabling the identification of 10 distinct failure types. Furthermore, T5 models were constructed and optimized to propose effective response strategies, followed by a detailed performance evaluation. This study introduces a methodology for applying advanced deep learning techniques to categorize equipment failures and design response strategies, aiming for practical deployment in manufacturing environments. The proposed approach offers significant potential for reducing downtime through

proactive integration into future operations. Natural Language Processing (NLP), a pivotal component of artificial intelligence, facilitates interaction between computers and human languages, enabling the extraction of insights from unstructured textual data. While early NLP advancements relied on statistical methods, recent deep learning techniques have revolutionized the field, driving innovation across industries, including manufacturing, where unstructured data is abundant. Equipment downtime, a key concern in manufacturing, is categorized as planned or unplanned, with the latter being particularly challenging due to its unpredictability and impact on productivity. Effective management requires precise classification of equipment failures, integrating structured and unstructured data to identify root causes and prioritize resolutions. This study focuses on developing a deep learning-based methodology that leverages unstructured text data, such as documented failure logs from an automotive parts manufacturing company, to classify equipment failure types and predict response strategies. The proposed approach aims to provide a standardized framework for improving equipment management across diverse industrial contexts.

TECHNICAL SESSION

T05: Intelligent Image Analysis and Methods

Chair: Shruthi M.L.J. PES University, India

16:30-18:00 | Feb. 21, 2025 | Meeting Room II

TAIK DETAILS	
Time	**Presentation**
16:30-16:45 CT0105	Title: Japanese Writer Identification Method Introducing Attention Mechanism into ResNet to Capture Local Writing Habits Author: Ami Ishimori, Shuich Arai Presenter: Ami Ishimori, Tokyo City University, Japan, Ami Ishimori, Tokyo City University, Japan Abstract: Writer identification is a task to estimate the person who wrote a character in the input character image by estimating whose writing habits are similar to those of writers in the database. In recent years, the number of writer identifiers based on neural networks has been increasing. However, they have not been able to capture local features. Therefore, we proposed to introduce an attention mechanism into ResNet. Experimental results with different locations of the attention mechanism improved the identification rate from 75.3% to 80.0%.
16:45-17:00 CT1055	Title: Learner Face Detection and Analysis in Smart Learning Environments Author: Masashi Katsumata Presenter: Masashi Katsumata, Nippon Institute of Technology, Japan Abstract: The widespread adoption of wearable smart devices has increased expectations for the development of personalized learning environments. These environments offer real-time analysis of learners' study states by utilizing sensor data from wearable devices and tablets, as well as facial image data captured during learning sessions. In this study, we propose a smart learning environment that integrates multiple smart devices, with a particular focus on detecting and analyzing learners' facial images recorded by the front camera of a tablet used as a learning terminal. Facial image analysis was performed using the InsightFace library, which accurately extracts facial landmarks from angled facial images. The results highlight the feasibility of capturing learners' facial orientations using this monitoring function and explore how these data can contribute to enhancing smart learning environments.
17:00-17:15 CT1034	Title: Detection and Identification of Abaca Plant Pests and Diseases using Computer Vision and Deep Neural Network Author: Pearl Joy B. Rima, Jocelyn F. Villaverde Presenter: Pearl Joy B. Rima, Mapua University, Philippines

Abstract: This study developed a prototype for detection and identification of abaca plant pests and diseases. The creation of the prototype comprised both hardware and software development. In software development, the process was divided into two, namely model development and user interface (UI) development. During the model development, the pre-trained model of InceptionV3 CNN architecture was utilized to train the two classes of abaca diseases such as the abaca mosaic and abaca bunchy top virus (ABTV) and three classes of pests particularly the Brown Aphids, Slug Caterpillar, and Corm Weevil. The final model was integrated in the developed UI. The UI was developed using three different frameworks such as OpenCV, TensorFlow Lite and Flask. Moreover, for hardware component, the Raspberry Pi 4 was utilized as major component and as a microprocessor of the whole system. Upon testing the prototype, the performance achieved an accuracy rate of 94.6\%. Its commendable performance shows its possibility to be deployed in a real-world detection and identification of abaca plants pest and diseases.

17:15-17:30
CT1119

Title: Performance Analysis of ML Models: An Overlook through the Perspective of VOCs to Detect Lung and Liver Cancer
Author: Nishita N Joshi, Keertiraj Krishna Vernekar, Shriya Barad, Shruthi Venkatraman and Shruthi M L J
Presenter: Shruthi M.L.J. Department of Electronics and communication Engineering, PES University, Bengaluru, Karnataka, India

Abstract: This study highlights the role of exhaled breath analysis as one promising, non-invasive technique used in the detection of cancer biomarkers, specifically focusing on Volatile Organic Compounds (VOCs) linked to lung and liver cancers.Three machine learning models were incorporated for model testing - Random Forest, Decision Tree, and SVM to identify the best classification models among these that distinguish the cancer profiles. The study achieved the highest accuracy of 95% for liver cancer and accuracy of rate 85% for lung cancer. Multivariate heatmaps and robust correlation matrices were plotted to highlight the unique VOC patterns which distinguish between benign, cancerous and healthy profiles. Advanced data imputation techniques were carefully evaluated, with zero imputation emerging as an effective method for optimizing data dimensionality. The VOCs associated with lung and liver carcinomas were condensed from 27 to 20 and 16 to 10, respectively, with compounds being shown as the most diagnostically significant. These findings support VOC profiling as a novel, innovative and patient-friendly approach for early cancer detection that could transform clinical oncology practices.

17:30-17:45
CT0315

Title: Monocular 3D Human Pose Estimation-Based Joystick Control System for Teleoperation of a Cobot Arm
Author: Benn Henderson, Sonya Coleman, Dermot Kerr, Justin Quinn
Presenter: Benn Henderson, Ulster University, UK

Abstract: Teleoperation is the process of remotely controlling a robotic system. This paper compares two real-time 3D human pose estimation (HPE) models for teleoperating the tool centre point (TCP) of a UR5 robot arm on non-GPU hardware: BlazePose and a lightweight version of OpenPose. These models were selected for

their real-time capabilities. Building on previous work, the 3D joint position of the right hand, derived from monocular RGB input, is used to generate remote control instructions for the UR5, while the left hand controls the attached RG2 gripper. A new joystick-based control system is introduced, where right-hand movement in any direction translates to continuous robot TCP movement in that direction at a fixed speed. This addresses issues with the prior mapping-based system, which relied on accurate depth estimation and often caused unintended arm movements. The two HPE models were evaluated on hold-position and pick-and-place tasks, comparing both the joystick and mapping control systems. Results indicate the lightweight OpenPose model reduces unintended movement but remains insufficient for pick-and-place tasks under the mapping system. In contrast, the joystick system enabled successful task completion with accuracy comparable to previous 2D control methods, while freeing the left hand for additional controls. Future work may enhance the system by using the left hand for rotational control.

17:45-18:00
CT0326

Title: Robust Image Watermarking Scheme Based on Prediction Error Algorithm
Author: Muhammad Afnan Hafidz, Ferda Ernawan, Mohammed Fakhreldin, Yagoub Abbker Adam, Haitham Elhadi
Presenter: Ferda Ernawan, Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia

Abstract: Digital images have been widely distributed through the internet, making ownership and illegal distribution an important issue. Image watermarking technique is a vital component in protecting ownership of digital image in the multimedia technology nowadays. In this study, an image watermarking system based on a three-level integer wavelet transform (IWT) is proposed, along with a set of embedding rules and prediction error algorithm. The prediction error algorithm can be used to determine the embedding location and strengthen copyright protection. The image is divided into 16×16 non-overlapping pieces, and the computation is done using a three-level IWT decomposition. A prediction error algorithm is used to embed the watermark bits in the 2×2 LL sub-band utilizing a set of embedding algorithms. Compared to the current existing methods, the results improved robustness performance against various attacks. The proposed embedding scheme obtains an average PSNR score of 45.1760 db and an SSIM score of 0.9944.

TECHNICAL SESSION

T06: Modern Communications and Information Systems

Chair: Elmoukhtar Zemmouri, Moulay Ismail University, ENSAM Meknes, Morocco

16:30-18:15 | Feb. 21, 2025 | Meeting Room III

TAIK DETAILS	
Time	**Presentation**
16:30-16:45 CT1004	Title: Forest Fire Inventory Dataset for Peninsular Malaysia (2001-2023) Generated Using a Framework with Google Earth Engine and Multi-Source Remote Sensing Data Author: Yee Jian Chew, Shih Yin Ooi, Ying Han Pang Presenter: Chew Yee Jian, Multimedia University, Malaysia Abstract: This paper presents a novel forest fire inventory dataset for Peninsular Malaysia, created using public remote sensing data spanning from 2001 to 2023. The dataset leverages the Google Earth Engine (GEE) framework established in our previous study, designed to address the lack of comprehensive, publicly accessible fire dataset for this region. It includes a total of 7349 columns (attributes) and 11,279 rows, consisting of 5650 fire points and 5629 non-fire points. The attributes encompass annual, seasonal, and monthly dynamic variables, as well as static, administrative, temporal variables, and class labels. As a result of this research, we have published and made the dataset publicly accessible at https://doi.org/10.5281/zenodo.11542164. This dataset is aspired to serve as a valuable resource for researchers and domain experts, facilitating further analysis and deeper understanding into forest fire behavior in Peninsular Malaysia.
16:45-17:00 CT1012	Title: Unified Interoffice Communication System (UICS) Integration Using Nextcloud at Romblon State University Author: Carlwin V. Dayagdag, Cyril F. Faeldan, Joan F. Ferranco and Robert Jeffrey Fermanejo Presenter: Carlwin V. Dayagdag, Romblon State University, Philippines Abstract: Effective office communication is essential for organizational productivity and efficiency. At Romblon State University (RSU), traditional paper-based methods, such as printed memos and face-to-face interactions, are still commonly used to disseminate announcements and compliance requirements. However, these methods often fail to meet the growing demands for rapid and secure communication. Although commercial electronic platforms like email and instant messaging applications have been introduced, inefficiencies persist. This study addressed these challenges by integrating and configuring Nextcloud, an open-source platform, as the Unified Interoffice Communication System (UICS) for RSU. The project aimed to enhance communication efficiency and security by customizing Nextcloud to meet the

university's specific needs. The development process included analyzing current practices, configuring essential features, and evaluating the system's quality using ISO 9126 metrics. Results demonstrated significant improvements in functionality, reliability, usability, efficiency, maintainability, and portability, contributing to a more productive university environment. The findings provide a practical framework for educational institutions, especially state universities and colleges, to adopt secure and efficient communication systems. It is strongly recommended that UICS be fully deployed across all RSU departments and campuses to maximize its benefits and streamline communication workflows. Expanding future evaluations to include campus directors, faculty, and students from other campuses will ensure a more comprehensive assessment. By fully implementing UICS, RSU can enhance collaboration and operational efficiency, setting a benchmark for modernizing communication in academic settings.

17:00-17:15
CT1033

Title: Adaptive Context-Aware Hierarchical Resource Management Algorithm for Internet of Things

Author: Kamran Awan, Abdullah Alqahtani
Presenter: Abdullah Alqahtani, Department of Electrical and Electronic Engineering, Collage of Engineering and Computer Science, Jazan University, Kingdom of Saudi Arabia.

Abstract: The expeditious expansion of the Internet of Things (IoT) demands efficient resource management strategies. Ex-isting algorithms often struggle with scalability and efficiency in dynamic IoT environments. This study aims to develop a novel resource management algorithm that enhances scalability, energy efficiency, and latency performance in IoT networks. We propose the Context-Aware Hierarchical Resource Manage-ment (CAHRM) algorithm, which integrates context-awareness with hierarchical clustering to optimize resource allocation.The architecture comprises a hierarchical clustering mechanism organizing devices into clusters managed by local coordinators; a context-awareness module collecting real-time data on device status and network conditions; an adaptive learning module employing lightweight online learning to adjust resource allo- cation strategies; and an optimization process balancing energy consumption with latency requirements. Simulations over 1000 seconds compared CAHRM with existing state-of-the-art (SPDR, MORA, RATS, DRAH, RMRL, and EERA). Results showed that CAHRM outperformed existing methods, achieving up to 52% residual energy under high-load conditions, reducing average task completion time to 2.5 seconds under high traffic, and maintaining network throughput of 88% in large-scale networks of 500 devices.

17:15-17:30
CT1094-A

Title: Enhancing Personal Data Protection Through Selective Anonymization of Group Photos and Adaptive Verification

Author: Chalee Vorakulpipat, Satheanpong Jeungudomporn, Chanchai Techawatcharapaikul
Presenter: Chalee Vorakulpipat, National Electronics and Computer Technology Center (NECTEC), Thailand

Abstract: Ensuring personal data protection, as mandated by regulations like GDPR and PDPA, requires ethical and proactive management of sensitive information. A

recurring challenge lies in the inadvertent disclosure of facial images in group photos, particularly at events or on social media. This research introduces an online system designed to enhance privacy by automatically detecting and selectively anonymizing faces of unrecognized individuals. The system delivers four core services:

1. Selective Anonymization: Automatically blurring faces of non-consenting individuals in event photos, identified by markers like special lanyards.
2. Personalized Social Media Privacy: Blurring all faces except the user's in personal social media posts.
3. Flexible Blurring Options: Offering semi-automatic and manual blurring tools for general use cases.
4. Enhanced Verification: Incorporating additional verification layers, such as matching ID card photos with individuals wearing lanyards at events.

A key innovation lies in leveraging AI to detect and process human faces, lanyards, and objects with varying degrees of accuracy based on the processing sequence. The presentation will highlight the development and training of these AI models, showcasing the impact of workflow order on accuracy. This system aims to simplify privacy compliance while balancing robust security measures with user convenience, ensuring responsible handling of facial data in alignment with legal standards.

17:30-17:45
CT1054

Title: Leveraging Machine Learning Techniques to Obtain Data for Virtual Sensors
Author: GE-ZHI ZHAO, YI-FEI TAN, HEZERUL BIN ABDUL KARIM, TZE-HANG CHEENG, CHING-KING CHIA
Presenter: GE-ZHI ZHAO, Multimedia University, Malaysia

Abstract: The Internet-of-Things (IoT) has revolutionized smart devices by enabling real-time monitoring through remote sensors. It is the most essential element particularly in smart sensing industrial applications such as environmental monitoring and industrial automation. These sensors provide crucial raw data to be analysed and accurate prediction of events of equipment breakdowns or preventive maintenance is required. However, if a physical sensor fails to function normally, virtual sensors can facilitate the missing data during downtime. Virtual sensors utilise predictive models to forecast the missing data, leveraging historical data and patterns from previously trained events to forecast sensor readings under the same conditions. In this research, the authors build a predictive model to generate data for a malfunctioned sensor by using actual data from other functional sensors. The hybrid setup between physical and virtual sensors will complement each other during operations to ensure fail-safe operation. In the research methodology, data from five sensors were analysed with predictive models of random forest. Data were trained on four of the sensors to predict the next day's readings of the fifth sensor. The experiment examined the impact of training various data durations (5, 10, and 15 days). The results revealed promising outcomes across all three training data sizes. Notably, the random forest regression model achieved better performance with larger training datasets, highlighting the impact of dataset size on model effectiveness.

17:45-18:00
CT1087

Title: Risk-Based MITRE TTP Scoring for Proactive Cyber Threat Prioritization and Response
Author: S M Zia Ur Rashid, Mohammad Makchudul Alam, Irfanul Montasir, Ashfaqul Haq
Presenter: Mohammad Makchudul Alam, BGD e-GOV CIRT, Bangladesh

Abstract: MITRE ATT&CK is a globally accessible knowledge base of adversary tactics and techniques based on real-world observations. Tactics, Techniques, and Procedures (TTPs) are behaviors, methods, or patterns of activity used by threat actors or groups of threat actors. This paper introduces a novel scoring system using Adversarial Impact Metrics (AIM) to prioritize MITRE ATT&CK techniques and tactics to improve threat detection, prioritization, and cybersecurity defense in general. The approach incorporates several scoring parameters, including prevalence, exploitability, attack vector, and complexity, to provide a clear and orderly framework for analyzing and ranking cyber threats. This research addresses a major problem that is inherent in most threat intelligence platforms: the absence of a base scoring system, which makes it impossible to prioritize TTPs after an alert has been generated. The methodology is scalable and relevant to any organization, as it integrates a standardized and adaptable scoring system, enabling organizations to respond dynamically to risks based on their potential impact and the ease of exploitation. By facilitating a deeper understanding of resource allocation for cybersecurity teams, organizations enhance their capacity to respond to emerging threats, thereby strengthening their cybersecurity resilience amidst escalating risks.

18:00-18:15
CT0323

Title: GPU Implementation of Iterative Algorithms with Convergence Checks Using C++ Sender/Receiver
Author: Ryuto Tamichi, Noriyuki Fujimoto
Presenter: Ryuto Tamichi, Osaka Metropolitan University, Japan

Abstract: This paper proposes a method to implement iterative algorithms with convergence checks using the asynchronous parallel programming model Sender/Receiver, which is scheduled for standardization in C++26. The performance of the proposed method is evaluated using the Himeno Benchmark (himenoBMT). The iterative algorithms considered in this study are those that can be parallelized among the class of algorithms that repeatedly perform computations to obtain a solution until certain predefined conditions are met, including stationary iterative methods such as the Jacobi method. While the original himenoBMT does not include convergence checks and evaluates benchmark performance based on the execution time of a fixed number of Jacobi iterations, this study introduces a GPU implementation of himenoBMT with convergence checks using Sender/Receiver. The benchmark performance of the proposed method is compared with a multicore CPU implementation using OpenMP and a GPU implementation using Standard Parallelism (Stdpar). When using an NVIDIA GeForce RTX 4090 GPU, the proposed method achieved a maximum performance of 969.98 GFLOPS, representing approximately a 62% improvement over the maximum performance of 600.95 GFLOPS achieved by the Stdpar implementation. Furthermore, compared to the execution time of a multicore CPU implementation using OpenMP on a CPU with 16

physical cores and 32 logical cores, the proposed method demonstrated up to a 23.21-fold speedup. Although the asynchronous nature of the proposed method introduces variability in the number of iterations required for convergence, the impact on execution time was found to be small.

TECHNICAL SESSION

T07: Data-Oriented Information System Optimization and Security Certification

Chair: Siew-Chin Chong, Multimedia University, Malaysia

16:30-18:00 | Feb. 21, 2025 | Boardroom

TAIK DETAILS	
Time	**Presentation**
16:30-16:45 CT1044	Title: Predictive Modelling for Early Sepsis Dection Using Electronic Health Author: A Feasibility Case Study for Aotearoa New Zealand Presenter: Abtin Ijadi Maghsoodi, New Zealand Abstract: Sepsis is a critical health condition associated with high morbidity and mortality rates, posing substantial challenges to healthcare systems worldwide, including within Aotearoa New Zealand. This study investigates the application of predictive modelling to assess sepsis risk, adopting a streamlined approach that facilitates effective integration of predictive insights into clinical practice. By analyzing electronic health record (EHR) data, our model identifies key factors contributing to the onset of sepsis, aiming to provide early alerts that support timely interventions. Alongside presenting this predictive framework, the study discusses the broader implications of machine learning (ML) and artificial intelligence (AI) for enhancing sepsis care with a focus on Aotearoa New Zealand population. Emphasizing how predictive models can serve as essential tools for healthcare providers, we underscore the value of data-driven decisions and targeted preventive measures. Our findings highlight the potential for accessible AI solutions to improve patient outcomes, optimize resource allocation, and address disparities in sepsis care across diverse healthcare environments.
16:45-17:00 CT1027	Title: Evaluation Criteria for Explainable AI in Intrusion Detection to Ensure the Creation of High-Quality Threat Intelligence Author: Noriyoshi Ozawa, Satoru Sunahara, Shigeki Hagihara Presenter: Noriyoshi Ozawa, Chitose Institute of Science and Technology, Japan Abstract: Threat intelligence is important for forming rapid, appropriate responses to increasing numbers of sophisticated cyberattacks. High-quality threat intelligence requires excellent threat information. Although intrusion detection systems that use deep learning are highly accurate, it is impossible to understand how they come to their decisions. Therefore, such systems cannot be used to created threat intelligence. Explainable artificial intelligence (XAI) is being intensively studied to clarify how deep learning decisions are made. However, standard XAI evaluation criteria are lacking, and comparative evaluations are impossible. This study aimed to establish XAI methods and evaluation criteria to determine whether it is possible to

obtain high-quality threat intelligence. First, we carefully defined the role that a deep learning-based XAI intrusion detection system should play when creating high-quality threat intelligence. Then, we established XAI methods and evaluation criteria to examine the extent to which XAI fulfills this required role. The evaluation method was compared to current international standards. The results revealed that our criteria are generally applicable for assessing whether an XAI yields the information required to create high-quality threat intelligence.

17:00-17:15
CT1017

Title: An Empirical Study of Risk Management Approaches in Information Systems Development Projects from the Vendor's Perspective: Evidence from Japan
Author: Tingting Huang, Akinori Yokota, Ken-ichi Suzuki
Presenter: Akinori Yokota, College of Business Administration of Ritsumeikan University, Japan

Abstract: Even though the IT outsourcing market continues to grow annually, most risk management research has primarily viewed vendors as a singular type of risk factor, without delving into risk management from the vendors' viewpoint. This study aims to fill this gap and enhance the current, limited empirical research concerning risk management in information systems development (ISD) projects. Our contributions are twofold: First, by unveiling a risk assessment framework from a Japanese vendor company and juxtaposing it against existing literature, we underscore that understanding risk management from the vendor's perspective is paramount; Second, we establish a composite model, integrating both effort and time dimensions, based on regression analyses of 269 ISD projects. From a list of fifty-nine potential risk factors, seven were identified as critical. Notably, the elements of Data Migration Responsibility and Delay Impact on the Customer emerged as significant, demonstrating that the risk intensity of certain factors doesn't always correlate directly with a project's failure rate. Furthermore, our proposed model offers insights into overcoming obstacles that hinder the practical application of risk management research findings.

17:15-17:30
CT1050

Title: LLM-Net: Democratizing LLMs-as-a-Service through Blockchain-based Expert Networks
Author: Zan Kai Chong, Hiroyuki Ohsaki, Bryan Ng
Presenter: Zan-Kai Chong, Kwansei Gakuin University, Japan

Abstract: The centralization of Large Language Models (LLMs) development has created significant barriers to AI advancement, limiting the democratization of these powerful technologies. This centralization, coupled with the scarcity of high-quality training data and mounting complexity of maintaining comprehensive expertise across rapidly expanding knowledge domains, poses critical challenges to the continued growth of LLMs. While solutions like Retrieval-Augmented Generation (RAG) offer potential remedies, maintaining up-to-date expert knowledge across diverse domains remains a significant challenge, particularly given the exponential growth of specialized information. This paper introduces LLMs Networks (LLM-Net), a blockchain-based framework that democratizes LLMs-as-a-Service through a decentralized network of specialized LLM providers. By leveraging collective

computational resources and distributed domain expertise, LLM-Net incorporates fine-tuned expert models for various specific domains, ensuring sustained knowledge growth while maintaining service quality through collaborative prompting mechanisms. The framework's robust design includes blockchain technology for transparent transaction and performance validation, establishing an immutable record of service delivery. Our simulation, built on top of state-of-the-art LLMs such as Claude 3.5 Sonnet, Llama 3.1, Grok-2, and GPT-4o, validates the effectiveness of the reputation-based mechanism in maintaining service quality by selecting high-performing respondents (LLM providers). Thereby it demonstrates the potential of LLM-Net to sustain AI advancement through the integration of decentralized expertise and blockchain-based accountability.

17:30-17:45
CT0438

Title: Review of Cryptanalysis Techniques in Elliptic Curve Scalar Multiplication: Binary and Elliptic Net Methods

Author: Norliana Muslim, Muhammad Husaini Nadri, Lyana Izzati Mohd Asri, Nur Lyana Shahfiqa Albashah

Presenter: Muhammad Husaini Nadri, Universiti Tunku Abdul Rahman, Malaysia

Abstract: Elliptic Curve Cryptography (ECC) is widely recognized for its strong security and efficiency, with scalar multiplication serving as its core operation. This study critically examines two prominent methods for scalar multiplication, namely known as the binary and the elliptic net methods. The binary method offers simplicity and computational efficiency but remains vulnerable to side-channel attacks due to its predictable operation sequence. In contrast, the elliptic net method enhances security by utilizing recursive relations derived from elliptic divisibility sequences but introduces complexity and new attack surfaces. This review consolidates insights from foundational research to explore the cryptanalytic vulnerabilities of these methods, highlighting side-channel and fault attacks as key threats. It also evaluates countermeasures to mitigate these vulnerabilities, such as constant-time implementations and error-handling mechanisms. By addressing these challenges, this study contributes to the development of more secure and efficient elliptic curve cryptographic systems capable of withstanding evolving threats.

17:45-18:00
CT0440

Title: Adaptive Intrusion Detection System Leveraging Dynamic Neural Models with Adversarial Learning for 5G/6G Networks

Author: Neha, Tarunpreet Bhatia

Presenter: Tarunpreet Bhatia, Thapar Institute of Engineering and Technology, India

Abstract: Intrusion Detection Systems (IDS) are critical components in safeguarding 5G/6G networks from both internal and external cyber threats. While traditional IDS approaches rely heavily on signature-based methods, they struggle to detect novel and evolving attacks. This paper presents an advanced IDS framework that leverages adversarial training and dynamic neural networks in 5G/6G networks to enhance network security by providing robust, real-time threat detection and response capabilities. Unlike conventional models, which require costly retraining to update knowledge, the proposed framework integrates incremental learning algorithms, reducing the need for frequent retraining. Adversarial training is used to fortify the IDS

against poisoned data. By using fewer features and incorporating statistical properties, the system can efficiently detect potential threats. Extensive evaluations using the NSL-KDD dataset demonstrate that the proposed approach provides better accuracy of 82.33% for multiclass classification of various network attacks while resisting dataset poisoning. This research highlights the potential of adversarial-trained, dynamic neural networks for building resilient IDS solutions

TECHNICAL SESSION

T08: Data-Based Intelligent Computing and Information Management

Chair: Shinya NISHIZAKI, Institute of Science Tokyo, Japan

16:30-18:15 | Feb. 21, 2025 | Meeting Room I

TAIK DETAILS	
Time	**Presentation**
16:30-16:45 CT1053	Title: Improving Fake News Detection in Arabic Using ML and DL Algorithms Author: Abdallah Qusef, Hatem Mosa, Ammar El-Hassan Presenter: Abdallah Qusef, Princess Sumaya University for Technology, Jordan Abstract: The significant rise in social media usage has brought attention to the critical issue of fake news, which has become a prominent subject of academic and professional research in recent years. The detection of fake news written in Arabic presents distinct challenges due to the language's structural complexity and instances of homography. These factors contribute to additional difficulties in analyzing the text and interpreting its meanings effectively. This research paper aims to improve the detection of fake news in Arabic. The authors employed various datasets sourced from multiple platforms. They implemented different machine learning and deep learning algorithms, such as Support Vector Machine (SVM) and Naive Bayes (NB), in addition to Long Short-Term Memory (LSTM) Networks and AraBERT. The resultswere analyzed, and the findings indicated promising outcomes, demonstrating enhanced accuracy in identifying fake news in Arabic.
16:45-17:00 CT1011	Title: Harnessing Patterns to Support the Development of Hybrid Quantum Applications Author: Daniel Vietz, Johanna Barzen, Martin Beisel, Frank Leymann, Lavinia Stiliadou, Benjamin Weder Presenter: Benjamin Weder, University of Stuttgart, Germany Abstract: Quantum computing provides computational advantages in various domains. To benefit from these advantages complex hybrid quantum applications must be built, which comprise both quantum and classical programs. Engineering these applications requires immense expertise in physics, mathematics, and software engineering. To facilitate the development of quantum applications, a corresponding quantum computing pattern language providing proven solutions to recurring problems has been presented. However, identifying suitable patterns for tackling a specific application scenario and subsequently combining them in an application is a time-consuming manual task. To overcome this issue, we present an approach that enables (i) the automated

	detection of patterns solving a given problem, (ii) the selection of suitable implementations fulfilling non-functional requirements of the user, and (iii) the automated aggregation of these solutions into an executable quantum application.
17:00-17:15 **CT1001**	Title: Prioritizing Bugs using Stack Overflow Posts Author: Raed Shatnawi Presenter: Raed Shatnawi, Software Engineering Department, Irbid, Jordan Abstract: As software bug fixing incurs high costs and complexity. There is a need to rank a large number of bug types to help developers prioritize bug fixing. Program analysis tools such as Findbug provide an in-depth analysis of software code and reports on 423 potential bugs in code. However, these bugs are not prioritized, and the developers need to focus their effort on the most vital ones. Therefore, we propose to prioritize and rank Findbug bugs by mining Stack Overflow (SO). SO is a question-answer platform specialized for software developers and engineers. This platform gives solutions to recurring problems. Collaborators provide solutions to fix bugs. To prioritize programming bugs, we propose a ranking function, BM25, for this purpose. The results of the rankings show that not all programming errors are of interest to software developers. Only 23% of the programming bugs matched with bug triaging and repairing posts. Some bugs did not match any posts. Furthermore, 80% of posts asked about 100 programming bugs only. the data suggest that the posts are usually associated with a single language, while posts requiring two or more languages were rarely asked.
17:15-17:30 **CT1095**	Title: Time Series Classification with Composite Shapelets Author: Masayuki Okabe Presenter: Masayuki Okabe, Prefectural University of Hiroshima, Japan Abstract: One approach to time series data classification is the use of partial data series that show characteristic variations refered to as shapelets. This method classifies data based on information regarding the presence of multiple shapelets. However it does not account for the order of occurrence among the shapelets. In this study, we propose a method that incorporates the occurrence order and intervals between shapelets as features by introducing composite shapelets, which are constructed from base shapelets extracted from the time series data. To reduce the number of shapelet combinations required to identify useful composite shapelets, the proposed method employs two strategies. First, it limits the analysis to base shapelets extracted from the same time series data. Second, it ranks combinations based on the average quality of each component and terminates search when the predefined number of consecutive failures to update quality is reached. Using 108 datasets from the UCR Time Series Classification Archive, experiments demonstrate that the introduction of composite shapelets enhances classification accuracy.

17:30-17:45
CT1108

Title: Stock Portfolio Risk Analysis Using Multi-Modal Data
Author: Suyog k, Sushmitha T, Swathi, Uttam Ballal, Prema Ramasay
Presenter: SUYOG K, PES UNIVERSITY, Bangalore

Abstract: Managing portfolios effectively in the modern financial markets presents significant challenges for traders due to the rapidly chang-ing dynamics and inherent risks. While multimodal machine learn-ing models have gained traction across various disciplines, their application to portfolio risk analysis remains underexplored. This study introduces a novel methodology leveraging multimodal data sources to improve portfolio risk management and forecasting. We employ the Temporal Fusion Transformer (TFT) model, a state-of-the-art deep learning framework, to forecast stock prices by integrating diverse data modalities, including historical stock prices, news sentiment, Reddit discussions, and macroeconomic indicators. Risk metrics such as beta, volatility, Sharpe ratio, and Value at Risk (VaR) are computed and aggregated using a weighted aggregation approach. Different weight schemes are employed for short-term, medium-term, and long-term risk trends to capture varying market dynamics. The aggregated risk scores are used to classify stocks into high, medium, or low risk for each trend, with notifications triggered only when scores exceed predefined thresholds. This methodology transforms multimodal financial data into actionable insights, enabling traders to anticipate risks, optimize portfolios, and navigate volatile markets with greater confidence and efficienc.

17:45-18:00
CT1031

Title: Proposed Feature Dimensionality Reduction Method in a Predictive Model for Carbon Neutrality: A Hybrid Quantum-Classical Approach
Author: Ghifari Munawar, Nur Ulfa Maulidevi, Kridanto Surendro
Presenter: Ghifari Munawar, Institut Teknologi Bandung, Indonesia

Abstract: As global carbon emissions continue to rise, achieving carbon neutrality has become a primary objective worldwide. Predictive modeling for carbon emissions has emerged as a crucial strategy, with numerous methods developed to forecast and manage emissions effectively. Traditional models, which predominantly employ classical computing-based metaheuristic optimization techniques, often face limitations in reaching global optima, impacting prediction accuracy. This study introduces a hybrid quantum-classical approach to enhance prediction models, particularly through feature dimensionality reduction, which is essential for improving model performance. Quantum algorithms, especially quantum annealing (QA), have shown advantages in addressing complex optimization problems by utilizing principles such as superposition and tunneling, thus offering significant benefits over classical methods. The integration of QA with classical dimensionality reduction techniques, such as principal component analysis (PCA), represents a novel advancement in managing high-dimensional data within predictive models. By optimizing feature selection, our approach aims to increase both the accuracy and computational efficiency of carbon neutrality models. This paper proposes hybrid quantum-classical optimization opportunities that can serve as a foundation for future studies, ultimately leading to more robust and accurate predictive models.

Title: Heuristic Evaluation in Mobile Applications: A Case Study of Airline Mobile Applications in the Middle East
Author: Abdulrahman Khamaj
Presenter: Abdulrahman Khamaj, College of Engineering and Computer Science, Saudi Arabia

18:00-18:15
CT1013

Abstract: The rapid proliferation of mobile applications has transformed the travel industry, particularly in the airline sector. Despite extensive investment in design and functionality, many airline mobile applications encounter significant usability issues, leading to unsatisfactory user experiences. This paper presents a heuristic evaluation of five prominent airline mobile applications in the Middle East to identify these usability problems and generate actionable insights for improvement. By applying established usability heuristics, this work assesses the applications against user expectations and behavioral patterns, aiming to enhance user satisfaction, promote increased engagement, and improve overall performance in the competitive landscape of mobile airline services.

ONLINE SESSION

OS01: Machine Learning Models and Calculations

Chair: Yun Li Lee, Sunway University, Malaysia

10:00-11:45 | Feb. 22, 2025 | 894 3270 7266 | Password: 022023

TAIK DETAILS	
Time	**Presentation**
10:00-10:15 CT1068	Title: Enhancing Machine Learning Accuracy in Water Quality Assessment and Potability Prediction Using Imputation and Balancing Techniques Author: RIGEL RAFIQ SETIAWAN, ERNA HIKMAWATI Presenter: RIGEL RAFIQ SETIAWAN, Telkom University, Indonesia Abstract: Clean and safe water is essential for human health and recognized as a fundamental right. However, the degradation of water quality worldwide, due to pollution and inadequate water management, poses serious risks to public health, making it crucial to evaluate water potability effectively. This study aims to classify water potability more accurately by leveraging machine learning models. The research utilized the Water Potability Dataset, which contains 3,276 records and 10 parameters, such as pH, hardness, and solids, all of which were analyzed to ensure a comprehensive assessment of water quality. Missing values in the dataset were addressed through imputation techniques, while class imbalance was resolved with data balancing methods. The dataset was divided into 80% for training and 20% for testing, ensuring reliable model validation. Decision Tree and Random Forest models were applied due to their efficiency in managing complex datasets and providing interpretable outputs. The Random Forest model outperformed the Decision Tree, achieving higher accuracy and demonstrating superior reliability in classifying water as potable or non-potable. Evaluation results indicate that these models effectively classify water as potable or non-potable, showcasing the potential of machine learning to improve water quality analysis. The findings of this study provide a reliable, data-driven framework that can support policymakers, water management authorities, and public health organizations in addressing water quality challenges. By facilitating timely and accurate assessment, this research contributes to safeguarding public health and promoting sustainable water management practices.
10:15-10:30 CT1085	Title: Proposing New Criteria for Early Stopping in CNN Training: A Step Towards Optimal Training Author: LIM YONG SHENG, Musa Mohd Mokji Presenter: LIM YONG SHENG, SKE UTM, Malaysia Abstract: Deep neural network training, particularly with Convolutional Neural Networks (CNNs), can be resource-intensive and time-consuming. Traditional early stopping strategies, which are primarily based on validation loss, may not always

accurately capture the point at which a model has learnt the most relevant features, thereby resulting in overtraining or undertraining. This work presents Singular Vector Canonical Correlation Analysis (SVCCA) as a unique method for early stopping in CNN training. SVCCA provides a dynamic method for determining when a model has converged by examining the similarity of activations outcomes through SVCCA. The proposed method monitors the stability of the learnt representations and indicates when additional training no longer results in significant advances in model generalization. We show that SVCCA-based early stopping can result in more efficient training by reducing overfitting and preserving or even improving model performance. Experimental results on benchmark datasets show that the proposed strategy outperforms standard early stopping methods, providing a reliable option for optimizing training time in CNNs.

10:30-10:45
CT1109

Title: Enhancing Predictive Accuracy in Agricultural Land Suitability with Machine Learning Using Feature Selection and Data Balancing
Author: Luthfi Revansyah Pratama, Erna Hikmawati
Presenter: Luthfi Revansyah Pratama, School of Applied Science Telkom University, Indonesia

Abstract: Agricultural land assessment and soil quality evaluation are critical for sustainable agricultural practices. However, traditional methods are often inefficient and inaccurate in handling large and complex data sets. This study aims to prove that machine learning can enhance the accuracy of datasets by implementing advanced techniques like data preprocessing and feature selection. Three machine learning models which is Random Forest, Decision Tree, and K-Nearest Neighbors (KNN) were applied to a Kaggle Agricultural Land Suitability and Soil Quality dataset to predict land suitability more effectively. The evaluation results show a significant improvement in performance metrics after preprocessing. For instance, the Random Forest model's AUC increased from 0.491 to 0.838, and its MCC improved from -0.013 to 0.476. Similarly, the Decision Tree and KNN models achieved substantial performance improvement, showing the value of machine learning in enhancing prediction accuracy. This study provides a clear framework for using machine learning to make data-driven decision-making in agriculture, which promote efficient land use and sustainable farming practices.

10:45-11:00
CT1076

Title: Tempognize: Fostering Deep Learning and Knowledge Consolidation with a Large Language Model-Based Learning Assistant
Author: XIN XIE, RONGYU CUI
Presenter: XIN XIE, Chengdu Neusoft University, China

Abstract: The swift progression of artificial intelligence (AI), especially large language models (LLMs), offers both prospects and obstacles for education. Although LLMs provide opportunities for improved knowledge acquisition and individualized learning, they may not intrinsically foster higher-order cognitive abilities. This study presents Tempognize, a novel learning assistant application utilizing LLMs to promote Socratic learning and tackle the widespread problem of "information hoarding." Tempognize seeks to enhance learning and knowledge retention by combining AI-generated questions with innovative note lifecycle management and regular evaluations. An

extensive semester-long classroom intervention, evaluated via student course reviews, indicates Tempognize's efficacy in augmenting student engagement, fostering deeper learning, and strengthening critical thinking abilities. This study offers a significant example of the successful incorporation of AI in education.

11:00-11:15
CT1106

Title: Designing a Quantum Annealing-Based Method for Optimizing Backpropagation Neural Networks in Greenhouse Gas Emissions Prediction
Author: Wahyu Hidayat, Nur Ulfa Maulidevi, Kridanto Surendro
Presenter: Wahyu Hidayat, Institut Teknologi Bandung, Indonesia

Abstract: Greenhouse gas emissions prediction, whether at a macroscopic scale or through building energy demand, commonly employs Backpropagation Neural Network (BPNN) models. These models often encounter issues like extended training durations and difficulties in configuring the optimal number of hidden layers and neurons. Achieving a balance between the complexity of the model and its ability to generalize effectively is essential for creating models that are both efficient and effective. Current approaches to optimizing BPNN structures predominantly utilize classical optimization techniques, often focusing on either the number of hidden layers or the number of neurons. In this paper, we propose a conceptual framework that leverages quantum annealing to optimize BPNN models for GHG emissions prediction. The method is structured in three stages: (1) optimizing the number of hidden layers, (2) optimizing the number of neurons in each layer, and (3) performing neuron pruning optimization. This study focuses on the theoretical design and methodology of the proposed approach, emphasizing its potential to integrate classical and quantum computing paradigms to achieve superior optimization outcomes.

11:15-11:30
CT1022

Title: Applying Neural Networks on Traffic Forecasting
Author: YINGYI CHEN, ZHUOYING ZHANG*, JINGDONG ZHOU, SHANYEE TA
Presenter: YINGYI CHEN, University College London, UK

Abstract: Urban traffic congestion poses a substantial risk to economic productivity and efficiency. Traditional infrastructure solutions are no longer able to meet the demand for traffic flow management as metropolitan populations continue to grow. Three models-Long Short-Term Memory (LSTM), Convolutional Neural Network and Long Short-Term Memory Hybrid Model (CNN-LSTM), and Diffusion Convolutional Recurrent Neural Network (DCRNN)-are used in this study to investigate the use of neural networks in the traffic forecasting problem. Key elements of traffic data, particularly temporal and spatial dependencies, are captured by each model. Our tests show that the hybrid and DCRNN models successfully combine temporal and spatial dynamics, whereas the LSTM model has trouble capturing spatial linkages. The models showed better-predicting abilities as the neural network grew more sophisticated and skilled at the tasks. Notably, the integration of Convolutional Neural Networks (CNNs) has resulted in a 19% reduction in the Mean Absolute Error (MAE) loss of Long Short-Term Memory (LSTM) models. Moreover, Diffusion Convolutional Recurrent Neural Networks (DCRNNs) achieved impressive accuracy, with an MAE loss that is only 57% of that observed in LSTM models. The findings stress the significance of employing suitable neural networks for the traffic forecasting task.

Future researchers should consider incorporating contextual data as well as expanding datasets in order to enhance prediction accuracy with wider model capacity.

11:30-11:45
CT0444

Title: Failure Detection Under Sensing Uncertainty in Vehicular Systems
Author: Sofiane Aissani, Mawloud Omar, Khaled Hamouid
Presenter: Khaled Hamouid, LIGM, UGE, Noisy-le-Grand, France

Abstract: The advancement of autonomous vehicles depends on the integration of sophisticated sensors that perceive their environment in real-time. However, these sensors are prone to uncertainties that, if not properly managed, could undermine the vehicle's decision-making process and elevate road safety risks. In response to this challenge, we present an embeddable solution designed to filter uncertain data using a machine learning model. Our solution not only resists to inconsistencies in sensor data but also quantifies the degree of anomaly in sensor outputs. This capability is essential for enabling e□ective predictive maintenance by identifying potentially failing systems before they compromise the overall performance. Through simulations, we demonstrate that the anomaly system detector enhances the vehicle's resilience against discordant data.

ONLINE SESSION

OS02: Software Design, Testing and Verification

Chair: Masita Abd Jalil, Universiti Malaysia Terengganu, Malaysia

10:00-11:45 | Feb. 22, 2025 | 863 8588 5223 | Password: 022023

TAIK DETAILS	
Time	**Presentation**
10:00-10:15 CT1058	Title: Software Quality Assurance Process and Engineering Practice of City Commercial Banks Author: Wei Bao Presenter: Wei Bao, College of Computer Engineering and Artificial Intelligence, Jilin University of Architecture and Technology, China Abstract: If city commercial banks want to go nationwide and not limit to local development. they need to depend on information technology. The development of information technology needs more scientific and standardized methods and processes, so we refer to CMMI (Capability Maturity Model Integration) to improve the software process. Based on the （Software Quality Assurance） SQA work of IT department of domestic city commercial banks, this paper gives the process of quality assurance, which is divided into three major processes, namely, planning process, execution process and summary process, and each process contains several activities. Through the application of this process in software projects of city commercial banks, SQA breaks the conventional practice of traditional quality assurance, supervises and guarantees the whole process of project and project quality from all directions and perspectives. SQA makes a complete digital measurement assessment on the execution status of software projects in real time, and evaluates the projects from the schedule, quality, problems, evaluation, risk and scale. SQA reports the project status to relevant leaders and stakeholders every week, and coordinates and handles the problems and risks found in time. Through the above work, SQA has greatly improved the efficiency and quality of software projects.
10:15-10:30 CT1075	Title: Beyond One-Size-Fits-All: An Experiemental Study on Evaluating Layout-Agnostic Tactile Stencils for In-Vehicle Touchscreen Interaction Author: Sarmad Soomro, Ahsanullah Abro Presenter: Sarmad Soomro, Whitecliffe College, New Zealand Abstract: Touchscreen interfaces in modern vehicles offer access to numerous functions but often increase cognitive load and driver distraction due to the absence of tactile feedback. Prior research has proposed tactile stencils as overlays to mitigate this issue, but these designs are typically layout-specific, limiting their applicability to dynamic interface configurations. This study investigates the feasibility of layout-

agnostic tactile stencils designed to adapt to various touchscreen configurations, aiming to reduce visual demands on drivers. A controlled driving simulation was conducted to evaluate two prototype stencils against standard touchscreen interactions. Contrary to expectations, the results indicated that the stencils increased cognitive load and impaired driving performance. This outcome suggests potential challenges with either the stencil design or the concept of layout-agnostic tactile feedback itself. Future research will analyze the underlying factors contributing to these findings, including potential flaws in the design or limitations inherent to layout-agnostic tactile systems, to guide further innovation in driver-interface interaction.

10:30-10:45
CT1042

Title: Integrating Cryptocurrency and Fiat Payments for a Serverless Water Billing System on Hyperledger Fabric
Author: GLICERIO ALLANIC BAGUIA, CHRIS JORDAN ALIAC, LARMIE S FELISCUZO, CHERRY LYN CANDO STA. ROMANA
Presenter: Glicerio a. Baguia, CEBU institute of Technology-University, Philippines

Abstract: This research investigates the integration of modern payment methods into a serverless water billing system utilizing Hyperledger Fabric. Following the successful implementation of real-time water consumption tracking on a blockchain network, this study aims to incorporate cryptocurrency payments through Coinbase Commerce alongside fiat payments via PayPal. This dual approach not only expands payment options but also enhances the system's flexibility. The primary objective is to assess the feasibility, security, and efficiency of these payment systems within a decentralized billing framework. By offering cryptocurrency as an alternative for users who favor digital assets, while ensuring broader accessibility through PayPal, this research addresses the diverse needs of users. Additionally, the study delves into the technical integration of these payment methods, focusing on transaction security, scalability, and user experience within the blockchain environment. Ultimately, this research aspires to develop a comprehensive model for modernizing water billing systems, incorporating secure, flexible, and efficient payment solutions that enhance customer satisfaction and operational efficiency.

10:45-11:00
CT1026

Title: Designing Layout-Agnostic Stencils to Minimize Visual Distraction in In-Vehicle Touchscreens
Author: Sarmad Soomro, Ahsanullah Abro
Presenter: Sarmad Soomro, Whitecliffe College, New Zealand

Abstract: Touchscreen interfaces are increasingly common in vehicle systems, providing access to various functions. However, the lack of tactile feedback often increases cognitive load, leading to driver distraction. While previous research has explored tactile stencils for touchscreen overlays, these were typically designed with fixed cutouts, making them incompatible with dynamic vehicle interfaces. This paper presents the design of layout-agnostic tactile stencils that adapt to different interface configurations. The stencils could reduce visual demands and provide consistent tactile feedback, aiming to improve driver focus, enhance usability, and minimize cognitive load during touchscreen interaction.

11:00-11:15
CT1062

Title: Bridging the Security Gap: An Empirical Analysis of LLM-API Integration Vulnerabilities and Mitigation Strategies
Author: Sandro Hartenstein
Presenter: Sandro Hartenstein, Berlin School of Economics and Law, Germany

Abstract: The integration of Large Language Models (LLMs) through Web APIs into modern software systems presents unique security challenges that extend beyond traditional API security concerns. This paper examines the intersection of conventional API security and LLM-specific vulnerabilities, focusing on the implications of non-deterministic behavior and emergent computational capabilities in LLM-powered services. Through a comprehensive triangulation methodology combining OpenAPI specification analysis of 4289 public APIs, expert validation from ten domain specialists, and systematic adversarial testing, we investigate current security practices and their effectiveness in LLM-API integrations. Our findings reveal significant gaps between traditional API security mechanisms and LLM-specific security requirements, particularly in areas of authentication, transport layer security, and fairness implementations. Analysis of major LLM providers demonstrates varied security attribute implementation, with privacy protection showing consistent high performance (>89%) across providers, while fairness metrics exhibit substantial variation (40.8-73.5%). The research contributes to the field by identifying critical security challenges in LLM-API integration and proposing structured approaches for developing more robust security measures. Using the Goal Question Metric (GQM) approach, we outline future directions for practical implementation guidelines and standardization efforts to address the unique security requirements of LLM-integrated systems.

11:15-11:30
CT1091

Title: Road Incident Detection System
Author: Nallapula Karthik, Sai Rahul Reddy Kona, Vutti Akshay, Hansika Pagadala, Gauri Sameer Rapate
Presenter: Nallapula Karthik, PES University, India

Abstract: Road experiences numerous mishaps and as much as 85% of them experience slow response to the mishaps besides loss of lives. Road accident kills one person every
three and a half minutes. This paper proposes the Road Incident Detection System RIDS which has the ability to classify the accidental or any violent event on a real time basis from the captured CCTV footage. Using advanced computer vision and deep learning, the system delivers significantly higher quality video that can partly solve
difficult tasks like dehazing and shooting in low light which are extremely detrimental to the object detection process. The approach for the detection of the accident is completed using the CNN models while the use of violent incidents is completed using the Vision Transformer (ViT). Microservices are addressed by RabbitMQ with real-time message queuing, increasing scalability, fault tolerance, and appropriate usage of resources. That enables the analysis of certain frames as potential suspects and investigate them separately to improve the assessment result and provide timely reports on incidents. These performance tests prove conclusively that the system can handle real-time data at low latency as expected. The future work of enhancing this

work focuses on adding the identification of fire severity; this is valuable to the model when judging safety and traffic situations for the public.

11:30-11:45
CT1101

Title: An Empirical Exploration of Cybersecurity Threats and Mitigation Strategies in Software Testing
Author: Hussein Ali Al Hashimi
Presenter: Hussein Ali Al Hashimi, King Saud University, Saudi Arabia

Abstract: Software testing is a fundamental process of software development since it ensures the superior quality of the software products developed and that they are delivered without defects and with the required functionality. As software applications become increasingly integral to business operations and everyday life, the proliferation of cyber threats poses significant threats that can compromise data integrity, user privacy, and overall system functionality. This study investigates common cybersecurity threats, including SQL injection, cross-site scripting, and vulnerabilities associated with third-party libraries, by analyzing data collected from surveys with industry professionals alongside a review of existing literature. The study's findings reveal a critical gap between awareness of cybersecurity threats and the effective implementation of security practices within the testing lifecycle. While many organizations recognize the importance of cybersecurity, there is often a lack of structured methodologies to incorporate security testing alongside functional testing. The paper identifies key factors influencing the successful integration of security measures, including organizational culture, resource allocation, and the use of automated testing tools. This paper proposes a framework by using an online questionnaire survey to enhance cybersecurity resilience during software testing, emphasizing best practices such as threat modeling, continuous security integration, and the adoption of DevSecOps methodologies. This framework aims to foster a proactive security mindset among development and testing teams, ensuring that security is not an afterthought but an integral component of the software development lifecycle. By shedding light on the current state of cybersecurity in software testing and offering actionable insights for practitioners, this research contributes to the growing body of knowledge in the field. The paper ultimately aims to promote safer digital environments by equipping organizations with the necessary tools and strategies to mitigate cybersecurity threats in their software applications effectively.

ONLINE SESSION

OS03: Machine Learning in Image Processing

Chair: Kasthuri A/P Subaramaniam. University of Malaya, Malaysia

13:00-14:30 | Feb. 22, 2025 | 894 3270 7266 | Password: 022023

TAIK DETAILS	
Time	**Presentation**
13:00-13:15 CT1067	Title: Enhancing Global Air Quality Classification Using Efficient Machine Learning Techniques Author: MUHAMMAD HAIKEL NUR KAMIL PUTRA MULYANA, ERNA HIKMAWATI, RIZZA INDAH MEGA MANDASARI Presenter: MUHAMMAD HAIKEL NUR KAMIL PUTRA MULYANA, School of Applied Science, Telkom University, Indonesia Abstract: Air quality problems have become a global problem due to an important impact on human and environmental health. The goal of this research is to improve the accuracy of the air quality prediction using the method of learning with the machine. How to select the features that are used to receive data are used to identify the most involved parameters such as carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxide (NO2), the temperature is similar to the industrial area and measurement. Efficiency, such as AUC and MCC K-Nearest, two, the main algorithm called neighbors (KNN) is used to show that the decision-making plan is the best results with AUC 0.9380 and CA at 0.8820 while KNN also. There is significant improvement after selecting this method of choosing this method not only But improving the analysis of efficiency data but still has more accurate predictions This research is a trend for further development, including the application of all the methods or the combination of additional parameters to solve more complex challenges in the future.
13:15-13:30 CT0108	Title: A Review on Lung Cancer Segmentation and Classification Using Deep Learning Techniques Author: Hozan Akram Abdulqader, Adnan Mohsin Abdulazeez Presenter: Hozan Akram Abdulqader, Duhok Polytechnic University, Akre University for Applied Science- Technical College of Informatics- Akre- Department of Information Technology. Iraq, Kurdistan Region, Duhok Abstract: Lung cancer is a leading cause of mortality, making early detection critical for better outcomes. This review explores advancements in deep learning (DL) for lung cancer segmentation and classification, focusing on recent techniques and their impact. DL methods, particularly convolutional neural networks (CNNs), have enhanced diagnostic precision by automating the detection process. Segmentation models like U-Nets and 3D-CNNs have achieved strong performance in delineating

lung nodules, while hybrid models and attention mechanisms have further improved results. Despite progress, challenges remain in computational demands and generalizability across clinical settings. Classification models using CNNs and transfer learning have shown very high accuracy in distinguishing malignancies. However, their resource intensity poses limitations for widespread use. Future direction should focus on making DL models more efficient, adaptable, and supported by diverse datasets to facilitate clinical integration and improved patient care.

13:30-13:45
CT0328

Title: Compressed Attentional Representation Learning for Disease Prediction
Author: Rofida Akram, Nadine Amir, Mai Hassam, Ali Hamdi
Presenter: Rofida Akram, MSA University, Eygpt

Abstract: Parkinson's disease (PD) is a neurodegenerative disorder of motor control with early vocal impairments, offering a critical pathway for early diagnosis by means of voice analysis. However, the diagnostic models proposed so far often result in low accuracy and precision, thus limiting their clinical utility. This study presents a cutting-edge framework integrating advanced feature extraction, compression, and attention mechanisms, achieving remarkable accuracy for Parkinson's disease diagnosis.Our feature extraction process adopts various methods, including ing time-frequency analysis, Mel-frequency cepstral coefficients (MFCC), wavelet transforms, vocal fold features, and tunable Qfactor wavelet transform (TQWT), which capture comprehensive vocal characteristics indicative of PD. Optimal feature selection is done using the mRMR method and the features are compressed using autoencoders, which is further fed into an Multi-Head Attention (MHA) mechanism that learns complex dependencies within these compressed features. Of the four configurations evaluated, Scenario 3, where autoencoder compression is followed by an MHA mechanism operating on these compressed features, it yields the highest accuracy of 93\% and precision of 97\%, surpassing previous state-of-the-art methods. This integrated approach provides a new benchmark in the accuracy and precision of PD detection and may be considered as a promising tool for early diagnosis and follow-up in telemedicine applications.

13:45-14:00
CT0437

Title: Accurate Predictive Modeling of Global Coral Reef Bleaching Using Machine Learning
Author: Gordon Hung
Presenter: Gordon Hung, Independent Researcher

Abstract: Coral reef bleaching, caused by environmental stressors such as rising sea temperatures and pollution, threatens the biodiversity and ecological balance of marine ecosystems. This study introduces a robust machine learning (ML) framework for predicting coral reef bleaching using global datasets spanning from 1980 to 2020. We employ three powerful classification models-Random Forest, Gradient Boosting, and K-Nearest Neighbors (KNN)-to forecast bleaching patterns based on features such as turbidity, depth, temperature, windspeed, and sea surface temperature anomalies (SSTA). Our study addresses the limitations of previous works, including insufficient feature selection and the lack of robust predictive modeling, and demonstrates that Random Forest achieves superior accuracy compared to many existing studies. This paper offers invaluable insights into tackling the global issue of coral bleaching.

14:00-14:15
CT1071

Title: Enhancing Panic Attack Predictions: Addressing Data Imbalance in Machine Learning Models
Author: FAZRUL RIDHA ALLIANDRE, ERNA HIKMAWATI
Presenter: FAZRUL RIDHA ALLIANDRE, School of Applied Science Telkom University, Indonesia

Abstract: Panic disorder (PD) is a prevalent mental health condition characterized by recurring panic attacks, affecting millions globally. Despite advancements in machine learning (ML) for mental health predictions, data imbalance remains a significant challenge, often impairing model performance. This study aims to enhance the accuracy and reliability of panic attack prediction models by implementing a novel data balancing strategy. Using the College Student Mental Health Dataset, ML models-Decision Tree and Random Forest-were evaluated before and after applying data balancing techniques. Initial findings revealed suboptimal model performance due to imbalanced data, with AUC values of 0.434 (Decision Tree) and 0.527 (Random Forest). Post-balancing, significant improvements were observed, with AUC increasing to 0.768 and 0.612, respectively. This study highlights the critical role of data balancing in optimizing ML models, even with limited datasets, and provides a foundation for future research on scalable predictive technologies for mental health disorders. The findings underscore the potential of simple yet effective strategies in advancing early detection systems for mental health conditions

14:15-14:30
CT1077

Title: Soil Classification and Crop Suitability in LGU Using Convolutional Neural Network with GIS Mapping
Author: Ador Y. Franco, Arnel C. Fajardo, Mark Jovic A. Daday
Presenter: Ador Y. Franco, Isabela State University Cauayan Campus, Philippines

Abstract: This study presents a novel approach integrating Convolutional Neural Networks (CNN) and Geographic Information Systems (GIS) mapping for soil classification and crop suitability assessment in Cauayan City, Isabela, Philippines. The robust GIS spatial analysis and visualization tool overlapped CNN's soil type classifications with spatial data on elevation, hydrology, and vegetation. This process involved training the CNN model with the spatial data to learn the features that distinguish different soil types and then using the GIS tool to visualize and analyze the results. The integration provided a comprehensive understanding of land suitability for rice, corn, and upland varieties. This unique integration enhances the study's accuracy and applicability, demonstrating the pivotal role of GIS in precision agriculture.The results of this study underscore the significant potential of CNN-GIS integration to revolutionize agricultural practices. By enabling precise zoning for rainfed, irrigated, and upland systems, this approach offers a beacon of hope for sustainable farming strategies. The integration also provides a systematic way to identify vulnerable areas and zones prone to flooding and drought, which can guide climate-resilient land management. This transformative role of AI and geospatial technologies in advancing agricultural productivity and resilience in the face of climate variability is a cause for optimism and inspiration for the future of agriculture, particularly for LGUs and agricultural planners.

ONLINE SESSION

OS04: Advanced Information Networks and Computer Models

Chair: N. Ch. Sriman Narayanalyengar, Sreenidhi Institute of Science and Technology (SNIST), India

13:00-14:45 | Feb. 22, 2025 | 863 8588 5223 | Password: 022023

TAIK DETAILS	
Time	**Presentation**
13:00-13:15 CT1009	Title: A Reproducible VPN Benchmarking Framework for Comparison Across Implementations Author: Manuel Fuchs, Stefan Machmeier, Sven Zelch, Vincent Heuveline Presenter: Stefan Machmeier, Heidelberg University, Germany Abstract: In today's digital age, safeguarding our online presence cannot be overstated, as digital infrastructures are integrated into all aspects of our lives. The internet leaves traces that allow companies and organisations to track our identities, locations, and preferences. Furthermore, it gives attackers information to steal and sell our credentials online. These examples demonstrate the importance of anonymising and securing our online identity. In response, Virtual Private Networks (VPNs) have emerged as a beacon of digital security, offering users a shield against the dangers of an interconnected world by encrypting traffic and hiding our IP addresses. However, using VPNs requires additional resources and may slow data transfer, making them less appealing for everyday use. This paper presents a reliable and reproducible VPN benchmarking framework that allows users to test and compare VPN implementations and versions with each other, providing security and reassurance. Our experiments show reproducible results, thus enabling transparency for VPN connection establishment. Additionally, our framework supports a wide range of visualisation functionalities. Lastly, we argue that benchmarking can help in the task of performance enhancement of VPNs.
13:15-13:30 CT1065	Title: Multilevel Structural Equation Model Analysis Using Mplus : The Cross-level Role of Creative Classroom Environment in Children's Creativity Education Author: Chang Liu, Xingli Zhang, Jiannong Shi Presenter: Chang Liu, INSTITUTE OF PSYCHOLOGY, CAS, CHINA Abstract: The application of programming statistical analysis software is becoming more and more extensive, and it also plays a great role in the exploration of psychological mechanism. On the basis of previous literature, this paper constructs a multi-layer model based on statistical theoretical model framework and programming software, trying to explore the influence mechanism of class and family environment on children's psychological needs and creativity. A test and questionnaire survey were conducted on 408 students from 16 classes in grades 1 to 3 in four primary schools

in a city in China. SPSS 2 3.0 and a computer programming statistical software Mplus 8.3 were used to conduct a multi-level regression equation model analysis. This paper reveals the theoretical basis of data analysis and shows the idea of cross-layer model through part of programming code. Finally, the results showed that (1) Parental psychological control negatively predicted children's creativity potential; (2) Parental psychological control and behavioral control negatively predicted the satisfaction of children's basic psychological needs; (3) The satisfaction of basic psychological needs positively predicted the development of children's creativity potential. (4) Basic psychological needs play a mediating role between parental psychological control and children's creativity potential. (5) Creative classroom environment positively predicted the satisfaction of some children's basic psychological needs. (6) Basic psychological needs play a cross-level mediating role between creative classroom environment and children's creativity potential.

13:30-13:45
CT1084

Title: Development of a System of Deriving Geological Structure with Its Formation Process
Author: Ryohei Morita and Taito Toyoshima and Kazuko Takahashi
Presenter: Kazuko Takahashi, Kwansei Gakuin University, Japan

Abstract: We design and develop a system that handles geological structures represented symbolically. A pair of stratigraphic datasets obtained through borehole drilling is represented as a symbolic sequence. The system derives a model of the geological structure, specifically focusing on layer composition and adjacency relationships, for the space between data collection locations. It also provides the formation process as a symbolic sequence. The goal of the system is to support the geologist's task of determining geological structures using a method based on logical models.

13:45-14:00
CT1102

Title: Biomechanics of Lumber Spine using Microstructurally Realistic 3D Finite Element Modeling
Author: Haider Ali, Zartasha Mustansar
Presenter: Haider Ali, National University of Sciences and Technology, Pakistan

Abstract: This study presents the development of image based finite element (FE) model of the lumbar spine (L1–L5) using MRI data and computer solvers. The model incorporates anatomically faithful details of microstructure of bone along with ligaments employing realistic material properties and boundary conditions. A compressive load of 1000 N was applied to the L1 vertebra, with the L5 vertebra fixed, simulating a scenario where a load is carried on the head. The results demonstrate a maximum displacement of 2.5 mm at the L1 vertebra, progressively decreasing to negligible levels at L5, aligning with the physiological load distribution along the lumbar spine. The intradiscal pressure within the nucleus pulposus of intervertebral disc (IVD4) reached a peak value of 14,000 N/m2, indicating asymmetric stress patterns attributable to the inherent spinal curvature. This study highlights the transformative potential of finite element modeling in spine biomechanics, providing critical insights for developing ergonomic solutions and insights to mitigate injury risks effectively

Title: Innovative Modeling Approach to Investigate Joint Loading in Astronaut Biomechanics
Author: Ayesha Jan, Zartasha Mustansar, Syed Irtiza Ali Shah
Presenter: Ayesha Jan, National University of Sciences & Technology (NUST), SINES, Pakistan

14:00-14:15
CT1107

Abstract: This paper explores the effects of varied gravity, with a particular focus on the joint loading mechanisms of astronauts in different gravitational conditions, using physics- based simulations. Although microgravity has been extensively studied, the impact of varied gravity on joint loading remains largely under explored, and detailed studies of joint loading mechanisms in these environments are still limited. Traditional experimental techniques, which are often expensive and challenging to implement, have hindered comprehensive analysis. However, recent advancements have made it possible to simulate microgravity and other gravity conditions using physics- based tools like OpenSim and Blender. This study aims to address these research gaps by proposing a novel methodology that integrates physics-based simulations, biomechanics, motion capture data, and machine learning techniques. By utilizing simulation tools and motion capture systems like Qualisys, we can gain a deeper understanding of joint loading across various gravity environments, overcoming the challenges of direct measurement in space. This paper presents a new approach to studying joint health and performance in space, with potential applications for astronaut training, rehabilitation, and performance optimization

Title: Efficient Resource Allocation in Network Slicing Using Modified Waterfill Algorithm with Differential Evolution Optimization

Author: Abdullah Al-Atawi

Presenter: Abdullah Al-Atawi, Department of Computer Science Applied College, University of Tabuk, Saudi Arabia

14:15-14:30
CT0109

Abstract: The complexity of resource allocation in network slicing arises from the presence of resource constraints and the dynamic nature of Quality of Service (QoS) requirements, adding to the intricacy of the problem. To address this challenge, heuristic algorithms offer practical solutions by quickly finding reliable resource allocation configurations. This paper introduces the Modified Waterfill-based Resource Allocation (MWFRA) model, which adapts the Water-Filling Algorithm (WFA) to handle Resource Augmented and decrement scenarios. The MWFRA model categorizes resources and performs ERA while meeting QoS requirements.

Title: Design and Development of non-invasive RF-Based Prototype for Bone Health Evaluation
Author: Ayesha Inam Tarar, Zartasha Mustansar, Hafiz M. Yasir Bhatti, Khujasta Khalid, Waqar Ahmad Malik, Mohaira Ahmad
Presenter: Zartasha Mustansar, National University of Sciences and Technology, Pakistan

14:30-14:45
CT1103

Abstract: In response to the prevalent skeletal health challenges in developing

nations, this research focuses on developing a non-invasive RF-based prototype for evaluating bone health. Utilizing highresolution CT scans using Nikon Custom XCT setup at the University of Manchester UK. With its high-power 225 kV and 320 kV x-ray sources, a detailed 3D model of femur bone is constructed, to accurately represent anatomical complexities, including cortical and trabecular layers. Our approach involved designing and optimizing microstrip patch antennas for on-body operation within the ISM band, specifically at 915 MHz. Using simulations and experimental setups, we strategically placed antennas to analyze EM energy transfer characteristics in a bone model setup designed indigenously for this research. Our results revealed variations in transmission coefficients provided crucial insights into bone porosity, correlating with dielectric properties assigned to each bone layer. This study highlights the potential of non-invasive RF technology in advancing orthopedic diagnostics, offering a promising avenue for more effective and accessible bone health assessments.

ONLINE SESSION

OS05: AI-Based Digital Image Analysis and Processing Technology

Chair: Yong Yue, Xi'an Jiaotong-Liverpool University (XJTLU), China

16:00-18:15 | Feb. 22, 2025 | 894 3270 7266 | Password: 022023

TAIK DETAILS	
Time	**Presentation**
16:00-16:15 CT1025	Title: Copra Dryness Assessment using ResNet50 Author: Joseph Benedict Bacanto Espiritu, Edrick Rabina Madlangbayan, Jocelyn Flores Villaverde Presenter: Edrick Rabina Madlangbayan, Mapúa University, Philippines Abstract: Copra, the dried coconut kernel from which coconut oil is derived, is typically dried using methods such as sun drying, smoke drying, or kiln drying. Copra quality is primarily determined through visual inspection, assessing factors like moisture content, oil content, free fatty acid (FFA), and meat color. While previous studies have utilized advanced machine learning models for copra dryness assessment, their complex architecture poses challenges for mobile deployment due to high computational requirements. This study aims to address these challenges by using transfer learning with ResNet50 to create a portable, lightweight copra dryness assessment system. The system will be deployed on a Raspberry Pi 4 with a webcam, making it feasible for real-time use in farms. The study will assess three categories of copra dryness—over-dried, optimally dried, and under-dried—based on images collected from local farms. A portable copra dryness assessment system was successfully developed using a Raspberry Pi 4B with a web camera, utilizing transfer learning with ResNet50 to classify copra dryness based on user-captured images. The system achieved a classification accuracy of 91.43%, as determined through a confusion matrix analysis.
16:15-16:30 CT1093	Title: Beyond the Bat: A Novel Video-Based Framework for Cricket Technique Emulation Through Image Processing Author: Sai Charan Papineni , Oshin Saraf , Karun VR , Sudeepa Roy Dey , Sai Krishna Muralidharan Presenter: Sai Charan, PES University, India Abstract: Cricket is one of the most famous sports in the world that involves no competition alone, but a lively community of players, supporters, coaches, and technology development. There is a lack of automated systems offering useful, personalized feedback to enable the players to improve their techniques in trying to imitate their idols. This paper presents a data-agnostic framework that integrates data visu- alization, machine learning, and computer vision to allow users to analyze and

emulate various stances of professional cricket players. Results obtained using a carefully curated dataset of classic cricket shots, including famous pull shots and cover drives, demonstrate how well the presented framework analyzes and contrasts bat- ting strategies. It generates detailed results comprising a similarity comparison score and a two-dimensional visualization of posture differences, thus enabling users to further refine their techniques. Designed initially for cricket, the framework's flexibility bridges the gap in emulating idols and allows for adaptation to other sports, demonstrating its broad applicability and innovative approach.

16:30-16:45
CT1104

Title: Self-Attention-Enhanced Framework for Multi-Label Fundus Disease Detection in Imbalanced Datasets
Author: ZhiPeng Yu, Haonan Qin, Han Jiang, Pengfei Zhang
Presenter: ZhiPeng Yu, Tibet University, China

Abstract: Color fundus photographs provide an effective means to observe biomarkers and identify early lesions. Their non-invasive nature and low cost make them suitable for large-scale screening, which is crucial for the identification and early prevention of retinal diseases. However, previous studies have predominantly focused on single diseases, and there remain limitations in the concurrent detection of multiple diseases from fundus images. Therefore, this study developed a system capable of simultaneously detecting various fundus diseases based on 4492 color fundus photographs and 18 disease labels. We employed Convolutional Neural Networks (CNNs) for feature extraction and integrated a multi-head attention mechanism to capture both local and global contextual features of the images. To address the severe data imbalance inherent in this task, we applied resampling techniques, weighted loss functions, and ensemble strategy to enhance the model's accuracy and robustness. The experimental results show competitive performance, with mAP, AUC, F1-scores, and Kappa scores reaching 90.20%,95.50%,82.14%,and 80.12%, respectively. The proposed diagnostic system has improved the speed and efficiency of fundus lesion screening to a certain extent.

16:45-17:00
CT0319

Title: Digital Research and Application of Yunnan Tile Cats
Author: Jiani Pan, Yang Cao
Presenter: Jiani Pan, Nanjing Normal University Fine Art School, China

Abstract: With the development of digital technology, digital preservation has become a powerful booster for the protection of contemporary intangible cultural heritage. This paper takes the intangible cultural heritage of Yunnan Tile Cat as an example to study the advantages of digital technology in the digital preservation of intangible cultural heritage.Through field visits, combined with the local museum objects and the restoration results of local craftsmen, the images of tile cats in the three main areas of Heqing, Chenggong and Yuxi in Yunnan are digitally restored in Zbrush and Blender,adding to the dissemination of intangible cultural heritage.

Title: Vision Assist: Enhancing Accessibility for the Visually Impaired through Advanced Video Captioning
Author: Pranav Sridhar, Pratheek K N, Pravard M, Pritam S Gurav, Surabhi Narayan
Presenter: Pranav Sridhar, PES University, India

17:00-17:15
CT0324

Abstract: Assistive technologies play a prominent role in fostering inclusivity, especially from the perspective of visually impaired people. While much has been achieved to date, visually impaired users are still unable to grasp much information about their environments, which undermines their independence and safety. Vision Assist aims to address this gap by using computer vision and machine learning techniques to generate detailed and contextually rich descriptions of indoor environments. The model is experimented on the Charades dataset that contains around 7,000 short clips of a very broad range of indoor human activities. When trained and tested on it, the model demon strated exceptional progress in video-description tasks where it outperforms existing methods by obtaining more contextual and nuanced narratives. This approach not only captures the nuances of complex indoor scenarios but also ensures a higher degree of precision and relevance in descriptions.

Title: Improving Predictive Accuracy of Sales and Satisfaction Analysis Using Mean Imputation and Machine Learning Models
Author: RAFI BAGUS PRAYOGA, ERNA HIKMAWATI, RIZZA INDAH MEGA MANDASARI
Presenter: RAFI BAGUS PRAYOGA, School of Applied Science, Telkom University, Indonesia

17:15-17:30
CT1069

Abstract: This study aims to improve the predictive accuracy of sales and satisfaction analysis by addressing missing data using mean imputation and machine learning models. Numerical missing values were handled with mean imputation, while categorical missing values were excluded. The dataset was split into 80% for training and 20% for testing. Predictive models were built using Decision Tree, k-Nearest Neighbors (KNN), and Random Forest algorithms. Model performance was evaluated using metrics such as AUC, accuracy, F1-score, precision, recall, and MCC. Results demonstrate that the imputation process significantly enhanced model performance, with Random Forest achieving the highest AUC (0.999) and classification accuracy (0.982). This highlights the critical role of imputation in improving data quality and predictive reliability. Moreover, the study establishes Random Forest as a robust method for handling missing values and achieving superior predictive outcomes in similar datasets.

Title: Modeling and Visualizing Human Experience in a Knowledge Graph: Understanding and Predicting Emotional Reactions to Life Events
Author: Otmane Azeroual, Renaud Fabre, Radka Nacheva
Presenter: Otmane Azeroual, German Centre for Higher Education Research and Science Studies (DZHW), 10117 Berlin, Germany.

17:30-17:45
CT1020

Abstract: This paper introduces an innovative approach to modeling and visualizing

human emotional responses to life events using a knowledge graph. We leverage federated learning to predict and analyze emotional reactions across distributed datasets while ensuring privacy and security compliance. By integrating federated learning with a knowledge graph framework, we demonstrate how decentralized data sources, including social media, healthcare, and IoT data, can be collaboratively used to model human experiences at scale. The use of federated learning facilitates privacy-preserving predictions of emotional reactions, particularly in sensitive areas such as mental health and personalized recommendations, thereby directly contributing to a deeper understanding of search engines.

17:45-18:00
CT1070

Title: Enhancing Lung Cancer Diagnosis Prediction: A Feature Selection Approach to Improve Model Performance
Author: DANENDRA SATRIYO BUWONO, ERNA HIKMAWATI
Presenter: DANENDRA SATRIYO BUWONO, School of Applied Science, Telkom University, Indonesia

Abstract: Lung cancer remains to be a major cause of cancer-related mortality worldwide, that underscores the necessity of an early and precise diagnosis. This study investigates how feature selection can improve machine learning models for the diagnosis of lung cancer. Utilizing the Lung Cancer Dataset, we employed ranking-based feature selection methods, specifically Information Gain and Gini Decrease, for determining the most important features for model training. Three classifiers—Random Forest, Decision Tree, and Support Vector Machine (SVM)—were evaluated using measures including AUC, Classification Accuracy, F1 Score, Precision, Recall, and MCC. The results demonstrated notable improvements in model performance with feature selection, highlighting its importance in reducing computational complexity and improving diagnostic accuracy. The Random Forest model demonstrated the most favorable AUC performance of 0.980 and an accuracy of 94.4%, underscoring its robustness in predicting lung cancer outcomes. This study emphasizes the value of integrating feature selection into machine learning workflows to build efficient, interpretable, and clinically applicable models for lung cancer diagnosis.

18:00-18:15
CT1105

Title: Using Kazakh Ner Datasets for Multiclass Classification in the Legal Domain: A Comparative Study of Bert, Gpt, and Lstm Models
Author: ORALBEKOVA DINA, MAMYRBAYEV ORKEN, AKHMEDIYAROVA AINUR, KASSYMOVA DINARA, ZHIBEK ALIBIYEVA
Presenter: ORALBEKOVA DINA, Institute of information and computational technologies. Almaty, Kazakhstan

Abstract: This study presents an in-depth comparative analysis of the performance of three key approaches in natural language processing (NLP) - transformers, recurrent neural networks (RNNs), and traditional machine learning methods - in the task of multiclass text classification within the legal domain in the Kazakh language. A specialized dataset for named entity recognition (NER), adapted to legal topics, was utilized for the analysis. The primary focus is on the classification of legal texts.
Standard evaluation metrics, such as accuracy, recall, precision, and the area under

the curve (AUC), were employed to provide an objective assessment of the models' efficiency in text classification tasks. Special attention was given to the processing of the Kazakh language, which belongs to the category of under-researched languages in computational linguistics. This highlights the necessity of developing specialized algorithms and adapting existing methods to work effectively with this language and its legal terminology.

The conducted research not only expands the understanding of the capabilities of existing models for text processing in low-resource languages but also emphasizes the importance of further efforts to automate legal services. This can facilitate the development of more accessible and scalable tools for legal assistance.

ONLINE SESSION

OS06: AI-Based Model Design, Algorithm Optimization and Data Analysis

Chair: K.Damodhar Rao, Sreenidhi Institute of Science and Technology, India

16:00-18:30 | Feb. 22, 2025 | 863 8588 5223 | Password: 022023

TAIK DETAILS	
Time	**Presentation**
16:00-16:15 CT1015	Title: How adaptable is the ChatGPT large language model for translating different text types? An Empirical Study Author: Xinwei Qiu, Hui Jia Presenter: Xinwei Qiu, East China University of Science and Technology, China Abstract: Recent advancements in Artificial Intelligence and Large Language Models, such as ChatGPT, have improved machine translation capabilities. However, little research explores their adaptability across different text types. This study evaluates ChatGPT's translation quality using Reiss' text typology theory, focusing on three text types: informative, expressive, and operative. Through a corpus-based approach, the study combines automated and human evaluations, with textual features analyzed using Coh-Metrix 3.0. The results show significant variation in ChatGPT's translation quality, with the best performance in informative texts and lower quality in expressive and operative ones. The study also shows that while ChatGPT captures general variations in text types, it struggles to replicate the nuanced characteristics of specific genres as accurately as human translators.
16:15-16:30 CT1072	Title: Integrating Freudian Psychological Constructs—Id, Ego, and Superego—into AI-Based Insurance Recommendation Systems through Dialogue Analysis Author: XIN XIE, RONGYU CUI Presenter: RONGYU CUI, Chengdu Neusoft University, China Abstract: This work studies the integration of Freudian psychological constructs—the Id, Ego, and Superego—into AI-based insurance recommendation systems built for sales professionals through dialogue analysis. Traditional AI recommendation systems generally focus on demographic and behavioral data to assist sales professionals in making product suggestions. However, by including psychological profiling based on these three characteristics, we intend to strengthen the system's ability to offer sales professionals more tailored, empathic, and effective insurance recommendations, thereby enhancing their grasp of consumer needs and conversion rates. This research analyzes customer contacts with sales professionals, utilizing a data augmentation strategy based on a big language model to address data scarcity, and identifies the impact of consumers' psychological profiles on their decision-making processes. The results from a controlled experiment involving 20 sales staff

reveal that AI systems applying psychological profiling considerably improve suggestion accuracy (by 24.7%), conversion rates (by 17.6%), and salesperson satisfaction (by 21.1%). This research proposes a novel approach for incorporating psychology into AI-driven systems for sales support. It demonstrates the potential to alter the insurance sector by delivering more intuitive, user-centered recommendation methodologies for sales professionals.

16:30-16:45
CT0329

Title: Arabic Large Language Models for Medical Text Generation
Author: Abdulrahman Allam, Seif Ahmed, Ali Hamdi
Presenter: Abdulrahman Allam, MSA University, Jordan

Abstract: Efficient hospital management systems (HMS) are critical worldwide to address challenges such as overcrowding, limited resources, and poor availability of urgent health care. Existing methods often lack the ability to provide accurate, real-time medical advice, particularly for irregular inputs and underrepresented languages. To overcome these limitations, this study proposes an approach that fine-tunes large language models (LLMs) for Arabic medical text generation. The system is designed to assist patients by providing accurate medical advice, diagnoses, drug recommendations, and treatment plans based on user input. The research methodology required the collection of a unique dataset from social media platforms, capturing real-world medical conversations between patients and doctors. The dataset, which includes patient complaints together with medical advice, was properly cleaned and preprocessed to account for multiple Arabic dialects. Fine-tuning state-of-the-art generative models, such as Mistral-7B-Instruct-v0.2, LLaMA 2-7B, and GPT-2 Medium, optimized the system's ability to generate reliable medical text. Results from evaluations indi cate that the fine-tuned Mistral-7B model outperformed the other models, achieving average BERT (Bidirectional Encoder Representations from Transformers) Score values in precision, recall, and F1-scores of 68.5%, 69.08%, and 68.5%, respectively. Comparative benchmarking and qualitative assessments validate the system's ability to produce coherent and relevant medical replies to informal input. This study highlights the potential of generative artificial intelligence (AI) in advancing HMS, offering a scalable and adaptable solution for global healthcare challenges, especially in linguistically and culturally diverse environments.

16:45-17:00
CT1081

Title: Breaking the Trackers: A Multi-Module Privacy Framework through Fingerprint Injection and Data Isolation
Author: Pannag Kumaar, Himank Bansal, Maryam Khan, Tania Somanna N, Sarasvathi V
Presenter: Pannag Kumaar, PES University, India

Abstract: Modern web tracking mechanisms rely heavily on browser fingerprinting, cross-site tracking, and persistent cookies to build unique user profiles. Traditional privacy measures are inadequate against these advanced techniques. This paper presents a multi-faceted approach combining JavaScript injections for anti-fingerprinting, per-profile cookie containerization, and temporary email generation. These methods collectively enhance anonymity by injecting randomized data into browser attributes, isolating cookies within user profiles, and offering disposable email

addresses. The proposed techniques significantly outperform existing solutions by allowing users to control their identity on the web, ensuring robust privacy.

17:00-17:15
CT0331

Title: MLAR: Multi-layer Large Language Model-based Robotic Process Automation Applicant Tracking
Author: Mohamed Younes, Omar Walid, Mai Hassan, Ali Hamdi
Presenter: Mohamed Younes, MSA University, Jordan

Abstract: This paper introduces an innovative Applicant Tracking System (ATS) enhanced by a novel Robotic process automation (RPA) framework or as further referred to as MLAR. Traditional recruitment processes often encounter bottlenecks in resume screening and candidate shortlisting due to time and resource constraints. MLAR addresses these challenges employing Large Language Models (LLMs) in three distinct layers: extracting key characteristics from job postings in the first layer, parsing applicant resume to identify education, expe-rience, skills in the second layer, and similarity matching in the third layer. These features are then matched through advanced semantic algorithms to identify the best candidates efficiently. Our approach integrates seamlessly into existing RPA pipelines, automating resume parsing, job matching, and candidate notifica-tions. Extensive performance benchmarking shows that MLAR outperforms the leading RPA platforms, including UiPath and Automation Anywhere, in high-volume resume-processing tasks. When processing 2,400 resumes, MLAR achieved an average pro-cessing time of 5.4 seconds per resume, reducing processing time by approximately 16.9% compared to Automation Anywhere and 17.1% compared to UiPath. These results highlight the potential of MLAR to transform recruitment workflows by providing an efficient, accurate, and scalable solution tailored to modern hiring needs.

17:15-17:30
CT0441

Title: Challenges in Data Integration for Different Data Types: A Systematic Review
Author: MIMI HARYANI TASANI, MOHD KAMIR YUSOF
Presenter: Mimi Haryani Tasani, University Sultan Zainal Abidin, Malaysia

Abstract: Data integration is the process of combining information from different sources, including unstructured, semi-structured, and structured data. Custom integration strategies are required because each category presents unique processing and analysis challenges. The main challenge is effectively merging these various information formats. While semi-structured and unstructured data necessitate more complex strategies due to their variability and lack of established frameworks, structured data can be effectively managed with traditional techniques. Methods for integrating various data types are examined in this study. Semi-structured data is processed using parsing tools like XML and JSON, structured data is managed with ETL and SQL, and unstructured data is processed using machine learning and natural language processing. Performance and accuracy were evaluated using real-world datasets. This evaluation will assist in identifying areas that need attention in upcoming research. This study was carried out by gathering 635 articles from digital libraries, specifically ScienceDirect, ACM, IEEE, Web of Science and Springer. Following an extensive evaluation, the 45 selected publications were relevant, well-regarded, and unique. Findings indicate that structured and semi-structured data can be effectively integrated using standard tools, whereas unstructured data

	necessitates more advanced methods. Hybrid methods that merge traditional and contemporary approaches proved to be the most effective, emphasizing the necessity for flexible integration frameworks.
17:30-17:45 **CT0445**	Title: Parameter Efficient Fine-Tunning of LLMs: Application to Machine Translation from English to Portuguese Author: Daniel Santos, Vitor Beires Nogueira, Paulo Quaresma Presenter: Daniel Santos, University of Évora, Portugal Abstract: Fine-tuning Large Language Models (LLMs) for specific tasks, such as machine translation, is a computationally expensive process that often requires substantial hardware resources. Parameter-Efficient Fine-Tuning (PEFT) methods, such as Low-Rank Adaptation (LoRA) and Quantized Low-Rank Adaptation (QLoRA), offer a resource-efficient alternative by significantly reducing the number of trainable parameters and memory requirements. In this work, we compare the performance and memory efficiency of LoRA and QLoRA on English Portuguese translation tasks, utilizing two cutting edge LLMs, Meta LLaMA 3.1 8B and Mistral 7B. Our experiments demonstrate that both LoRA and QLoRA achieve substantial memory savings. Moreover, this work underscores the practical advantages of LoRA and QLoRA in resource-constrained environments, providing a foundation for further optimization and experimentation in machine translation using large language models.
17:45-18:00 **CT1110**	Title: Distributed Inference of Large Language Models on Edge Devices Author: Karthik Namboori, Rohit P Suresh, Sathwik HJ, Shriansh Mohanty, Jayashree R Presenter: Karthik Namboori, PES University, India Abstract: We aim to propose a novel architecture to improve the performance of Large Language Models (LLMs) during inference on edge devices, particularly focused on mobile phones through a distributed computing environment. By utilizing the resources available across the local network, our architecture optimizes inference while maintaining the quality of generated text. Our study compares the number of nodes across the network while inferring an LLM and highlights the performance optimization in the average inference time per token with a greater number of nodes. We saw an improvement of up to 74% when the distributed system was scaled to four nodes. Our study advances the democratization of local LLMs and paves the way for research and applications that follow it.
18:00-18:15 **CT1064**	Title: Utilization of Process Mining to Analyze and Identify Improvement Opportunities in the New Student Admission Process Author: Ihfan Aditya Ghafur, Lukman Abdurrahman, and Seno Adi Putra Presenter: Ihfan Aditya Ghafur, Telkom University, Indonesia Abstract: New Student Admission is one of the crucial processes in higher education institutions that affects the efficiency and effectiveness of student selection. However, this process often faces challenges such as long duration, bottlenecks, and inconsistencies. This study aims to analyze the student admission process using a process mining approach to identify bottlenecks, workflow patterns, and improvement

opportunities by applying the Process Mining Project Methodology (PM2) to explore event logs from the student admission information system. The Process Mining Project Methodology (PM2) method enables process visualization, bottleneck detection, and workflow pattern analysis to identify the factors causing long waiting times from registration to result announcement, enhance transparency, and integrate systems for process optimization. The results of this study indicate several bottlenecks that hinder the smooth execution of the process, particularly in the stages of registration number and virtual account (VA) generation, biodata completion, and exam result processing. This study concludes that process mining provides valuable insights for decision-making regarding process efficiency improvement. The application of these findings is expected to create a more efficient, transparent, and integrated student admission system in higher education institutions.

Title: Integration of AI in STEM Education: A Systematic Review

Author: Anh Hong Nguyen, Duc Minh Nguyen, Anh Duc Do, Lan Thi Ha Nguyen, Minh Hong Pham, Anh Thi Minh Do, Ban Quy Tran

Presenter: Duc Minh Nguyen, FPT University, VIETNAM

18:15-18:30
CT1007

Abstract: This systematic literature review examines the integration of Artificial Intelligence (AI) into STEM education, motivated by the need to understand how AI tools and methods are transforming educational landscapes. As AI technologies evolve rapidly, their potential to enhance teaching and learning within Science, Technology, Engineering, and Mathematics (STEM) disciplines warrants thorough investigation. This review delves into the applications of machine learning, deep learning, natural language processing, and reinforcement learning across various educational levels, drawing on 19 relevant studies identified through comprehensive database searches. The analysis reveals that AI significantly enriches teaching methods and student outcomes by offering innovative tools and methods for content generation, recognition, prediction, skill assistance, and evaluation, with a strong focus on enhancing mathematics education at the primary level. However, the limited number of studies included, and the absence of a meta-analysis highlight the need for ongoing research. Future studies are encouraged to expand the scope of literature searches and employ quantitative synthesis techniques to assess the impact of AI more robustly in STEM education. This review sets the stage for future explorations that could profoundly influence educational strategies and policies.

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