Conference Program

2024 13th International Conference on Computer Technologies and Development (TechDev 2024)

Workshops

2024 7th International Conference on Information, Networks and Communications (ICINC 2024)

2024 3rd International Conference on Big Data Modeling and Optimization (BDMO 2024)

October 9-11, 2024

Huddersfield, UK

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Teoh Ai Ping, Universiti Sains Malaysia, Malaysia

Zhanshan Wang, Northeastern University, China

Welcome Message

Dear Colleagues,

It is my great pleasure to welcome our esteemed speakers and presenters for this year's 13th International Conference on Computer Technologies and Development and its workshops BDMO, ICINC. We are very pleased to see professors, researchers, students, speakers, and other participants from the following countries: Sweden, Kingdom of Saudi Arabia, Mexico, USA, Oman, Pakistan, South Korea, Philippines, China, India, Malaysia, Australia, Egypt and United Kingdom, about 14 countries across Asian, Far East, Middle East, Europe and United States. With your invaluable contributions to the conference, we would like to seize this great opportunity to exploit this academic platform for exchanging and communicating the latest research development and innovation. Topics of interest encompass digital image analysis and processing methods, next generation information systems, and software applications. I believe our authors will take this timely opportunity to showcase their cutting-edge research to help us keep abreast and appreciate these dynamic and rapid developing areas and effecting a strong academic as well as societal impact.

We have prepared a welcome package with exciting gadgets for our participants.

The scheduled timetable will be distributed to help you decide which sessions you are interested in. For the onsite participants, we provide lunch and dinner on the second day. Meanwhile, we have arranged a campus tour. We will arrange a visit to the university shop where you could purchase some interesting memorabilia, sport centre where students can chill out, research centres and department buildings, etc.

Lastly, as a conference chair this year in Huddersfield, I extend my gratitude to the conference coordinator and conference team who have superbly and conscientiously put this wonderful event.

We look forward to seeing you again in future events.

Professor Andrew Ball, Pro Vice-Chancellor for Research and Enterprise
Professor Joan Lu, Computer Science
Chair in 13th International Computer Technologies and Development
Huddersfield, October 9-11, 2024

Useful Information

Conference Venue

3M Buckley Innovation Centre
Address: Firth Street, Huddersfield, HD1 3BD, UK
How to find: We are at the bottom of the University campus on Firth Street, a 5-minute-walk from the town centre and 10-15-minute-walk from Huddersfield's railway and bus stations.

More details, please view: https://www.icctd.org/location.html

Time Zone:

UTC/GMT+1

Average Temperature of Huddersfield in October

✧ Average daily minimum temperature: 7.4°C (45.3°F)

✧ Average daily maximum temperature: 11.7°C (53.1°F)

Bank and Foreign Exchange

Currency: British Pound (GBP)

Important Phone Numbers

Fire: 999   Medical Emergency: 999   Police: 999

Important Notes:

Please take care of your belongings during the conference. The conference organizer does not assume any responsibility for the loss of personal belongings of the participants.

Please wear delegate badge during the conference. There will be NO access for people without a badge. Never discard your badge at will.

Accommodation is not provided. Early reservation is suggested to be made for delegates.
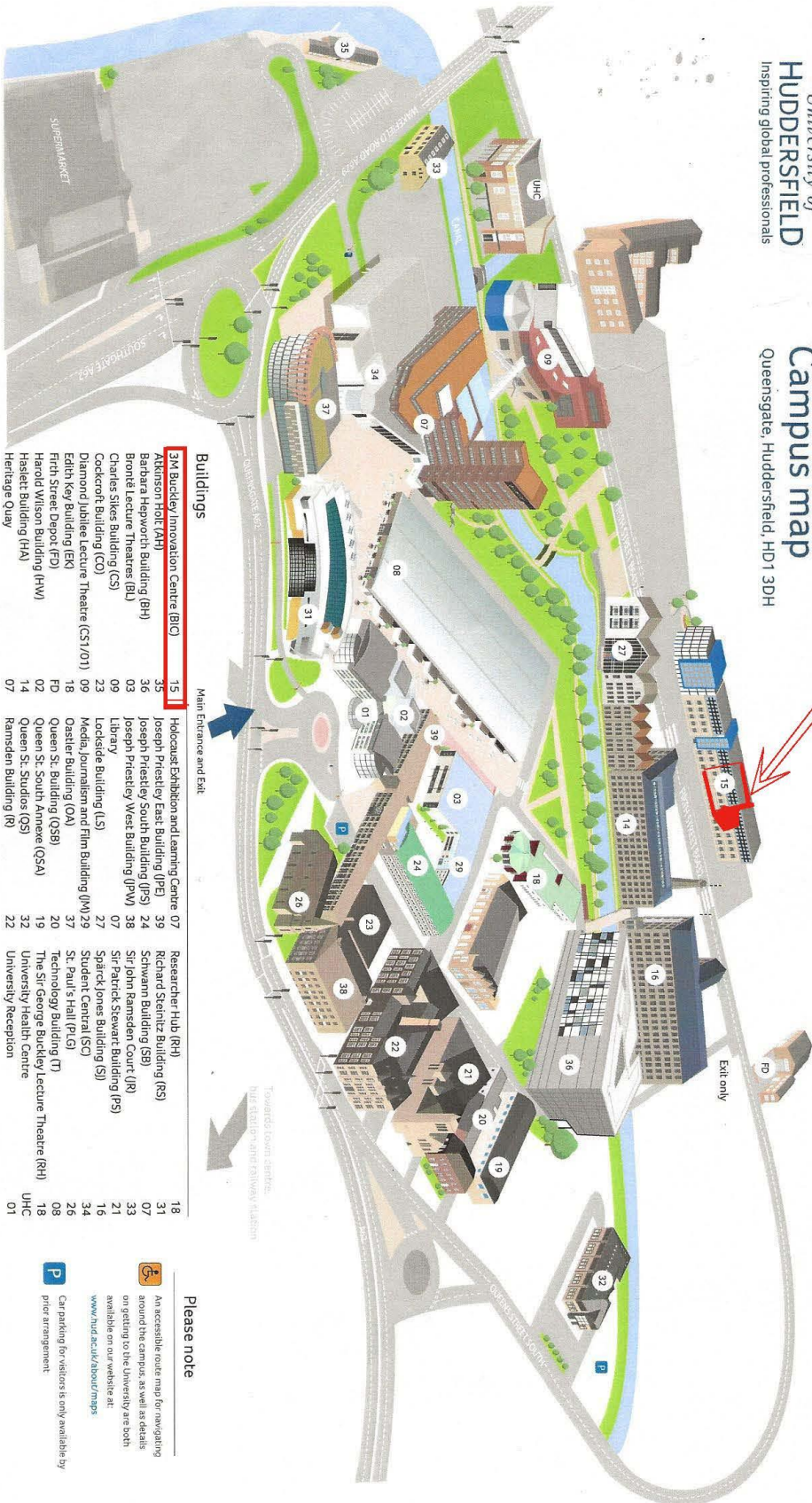
Please show the badge and meal coupons during lunch and dinner.

Don't stay too late in the city and don't be alone in the remote area. Be aware of the strangers who offer you service, signature of charity, etc., at scenic spots. More Tourist Information and Security tips are available online.

Campus Map and Conference Venue

University of **HUDDERSFIELD**
Inspiring global professionals

Campus map
Queensgate, Huddersfield, HD1 3DH

Buildings

Building	No.
3M Buckley Innovation Centre (BIC)	15
Atkinson Holt (AH)	35
Barbara Hepworth Building (BH)	36
Brontë Lecture Theatres (BL)	03
Charles Sikes Building (CS)	09
Cockcroft Building (CO)	23
Diamond Jubilee Lecture Theatre (CS1/01)	09
Edith Key Building (EK)	18
Firth Street Depot (FD)	FD
Harold Wilson Building (HW)	02
Haslett Building (HA)	14
Heritage Quay	07

Building	No.
Holocaust Exhibition and Learning Centre	07
Joseph Priestley East Building (JPE)	39
Joseph Priestley South Building (JPS)	24
Joseph Priestley West Building (JPW)	38
Library	07
Lockside Building (LS)	27
Media, Journalism and Film Building (JM)	29
Oastler Building (OA)	37
Queen St. Building (QSB)	20
Queen St. South Annexe (QSA)	19
Queen St. Studios (QS)	32
Ramsden Building (R)	22

Building	No.
Researcher Hub (RH)	18
Richard Steinitz Building (RS)	31
Schwann Building (SB)	07
Sir John Ramsden Court (JR)	33
Sir Patrick Stewart Building (PS)	21
Spärck Jones Building (SJ)	16
Student Central (SC)	34
St. Paul's Hall (PLG)	26
Technology Building (T)	08
The Sir George Buckley Lecture Theatre (RH)	18
University Health Centre	UHC
University Reception	01

Main Entrance and Exit

Please note

An accessible route map for navigating around the campus, as well as details on getting to the University are both available on our website at:
www.hud.ac.uk/about/maps

Car parking for visitors is only available by prior arrangement.

Last revised: 6 March 2019 – Campus map

Virtual Meeting Software

ZOOM Download Link: https://zoom.us/download

ZOOM Using & Presentation Instruction:
 http://www.icctd.org/kits.rar

Rename Screen Name Before Entering the Room	Examples
Authors: Paper ID-Name	HU1001- John Smith
Delegate: Delegate- Name	Delegate- John Smith
Keynote Speaker: Keynote-Name	Keynote- John Smith
Committee Member: Committee-Name	Committee- John Smith

Materials Prepared by the Presenters

✧ **Oral Presentation:**

PowerPoint or PDF files

PowerPoint Background Template: http://www.icctd.org/kits.rar

Duration of Each Presentation

✧ Keynote Speech: 45 Minutes of Presentation including Q&A.

✧ Invited Speech: 25 Minutes of Presentation including Q&A.

✧ Regular Oral Presentation: 15 Minutes of Presentation including Q&A.

Note

✧ The regular oral presentation time arrangement is for reference only. In case any absence or some presentations are less than 15 minutes, please join your session before it starts.

An excellent presentation will be selected from each session which will be announced and awarded an excellent presentation certificate.

Keynote Speaker I

09:05-09:50, Thursday, October 10 (GMT+1), UK Time

Meeting Room: BIC 1/25 Larchfield. Floor one, room 25

ZOOM Link: https://us02web.zoom.us/j/82370811752   Password: 20249911

Prof. Jinwen Ma

Peking University, China

Speech Title: The Improved Large Language Model for Mathematical Computing and Reasoning

Abstract: After the release of ChatGPT and GPT-4, the transformer-based large language models have shown tremendous performance improvements and achieved great success in natural language processing and artificial intelligence. However, the key bottleneck problems of the large language model on its further developments and applications are the low ability of mathematical computing and reasoning. In this speech, we investigate how to improve the large language model to get the high performance of mathematical computing and reasoning by adding the continual learning mechanisms and inserting a system of inference rules. We can also improve the mathematical performance of the large language model by adopting and fusing a knowledge database in some way. As long as the large language model has the real ability of mathematical computing and reasoning, it can become powerful and applicable in the real scenarios and make the great-leap-forward development in artificial intelligence.

Bio: Jinwen Ma received the Ph.D. degree in probability theory and statistics from Nankai University, Tianjin, China, in 1992. Then, he joined the Department or Institute of Mathematics of Shantou University, Guangdong Province, China, and become a full professor in 1999. Since September 2001, he has joined the Department of Information Science at the School of Mathematical Sciences, Peking University, where he has served as the chair and full professor as well as a Ph. D. tutor in applied mathematics and now he is a full professor and PhD tutor in the Department of Information and Computational Sciences at the School of Mathematical Sciences, Peking University. During 1995 and 2004, he visited several times to the Department of Computer Science & Engineering, the Chinese University of Hong Kong as a Research Associate or Fellow. From September 2005 to August 2006, he was a Research Scientist with the Amari Research Unit, RIKEN Brain Science Institute, Japan. From September 2011 to February 2012, he visited

as a Scientist to the Department of Systems Medicine and Bioengineering, The Methodist Hospital Research Institute, Houston, USA.

His main research interests include neural computation, machine learning, independent component analysis (ICA), computer vision, big data and large language models. He is the author or coauthor of more than 200 academic papers among which more than 60 papers were indexed by the Science Citation Index

(SCI)‐Expended. In fact, these papers have been cited over 4000 times. He has served as the Principal or

Major Investigator for eleven national and three provincial or ministerial and two other scientific research grants as well as over 10 cross-sectional research projects. At present, he is the vice-director member of the Signal Processing Society in the Chinese Institute of Electronics (CIE) and a member on the editorial board of "Signal Processing (in Chinese)". Moreover, he is the director of the Education Informationization Special Committee of China Chapter of International Information Study Society. He has served as a program committee member of several major international conferences such as ISNN, ICIC, ICONIP, ICSP. He was a co-chair of the program committee of 1999 Chinese Conference on Neural Networks and Signal Processing and the chair of the organization committee of the Third International Conference of Intelligence Science (ICIS 2018). He was selected in the 2017 AI Impact Scholars released by Ascemap and scholar.chinaso.com and the World's Top 2% Scientists 2020 (Career Scientific Impact) released by Stanford University.

Keynote Speaker II

09:50-10:35, Thursday, October 10 (GMT+1), UK Time

Meeting Room: BIC 1/25 Larchfield. Floor one, room 25

ZOOM Link: https://us02web.zoom.us/j/82370811752   Password: 20249911

Assoc. Prof. Hoshang Kolivand

Liverpool John Moores University, UK

Speech Title: How Machine Learning is Reshaping Mixed Reality

Abstract: In this talk, we delve into the profound impact of ML on Mixed Reality, uncovering the latest advancements and groundbreaking innovations that are reshaping our digital experiences. From sophisticated real-time simulations to personalized virtual environments, explore how AI's integration with Mixed Reality is driving unprecedented immersion and transforming the way we perceive and interact with the virtual world. Join us as we unravel the limitless possibilities and implications of this transformative fusion.

Bio: Hoshang Kolivand is an Assoc. Prof in AI and Mixed Reality at Liverpool John Moores University (LJMU). With an MS degree in Applied Mathematics and Computer Science and a PhD and a Postdoc in Augmented Reality, he is a leading expert in these fields. As the Head of the Applied Computing Research Group at LJMU, Dr. Kolivand leads a team of over 35 researchers, focusing on AI and Augmented Reality. He has published extensively with over 170 papers in international journals and has presented at numerous conferences. Dr. Kolivand is a Senior Member of the IEEE and has served as a keynote speaker at more than 55 international conferences. He has organized over 30 conferences in AR, VR, AI, and HCI. In addition to his academic contributions, Dr. Kolivand has authored book chapters and several products which received over 14 awards for his work in Virtual Reality and Augmented Reality. As a dedicated researcher and educator, Dr. Hoshang Kolivand plays a significant role in advancing AI and Mixed Reality technologies, making valuable contributions to the field through his expertise and leadership.

Keynote Speaker III

11:05-11:50, Thursday, October 10 (GMT+1), UK Time

Meeting Room: BIC 1/25 Larchfield. Floor one, room 25

ZOOM Link: https://us02web.zoom.us/j/82370811752　　Password: 20249911

Dr. Aminu Bello Usman
Head of the School of Computer Science

University of Sunderland, UK

Speech Title: Securing Tomorrow: Enhancing Biometric Image Privacy and Security through IoT and LPWAN Innovations

Abstract: "Securing Tomorrow: Enhancing Biometric Image Privacy and Security through IoT and LPWAN Innovations" the presentation explores advancements in securing biometric data within Internet of Things (IoT) ecosystems using Low Power Wide Area Networks (LPWAN). It focuses on addressing privacy and security challenges in biometric image transmission, storage, and processing. The presentation delves into how IoT and LPWAN technologies can be leveraged to create robust, scalable solutions for safeguarding sensitive biometric data, emphasising the need for innovative encryption techniques, secure protocols, and privacy-preserving mechanisms to protect against cyber threats and data breaches in an increasingly connected world.

Bio: Dr. Aminu Bello Usman served as the head of the School of Computer Science at the University of Sunderland. His research focuses on the Internet of Things (IoT), biometric security, applied AI, data privacy, trust, and user privacy. Dr. Usman is particularly passionate about IoT communication protocols, and his most recent works are on developing models, and frameworks that enhance user privacy and trust, addressing real-world security challenges of IoT and Edge computing.

Invited Speaker I

14:00 -14:45, Thursday, October 10 (GMT+1), UK Time

Meeting Room: BIC 1/25 Larchfield. Floor one, room 25

Prof. Kwang Sik Chung

Korea National Open University, South Korea

Speech Title: Learning Contents Difficulty Analysis by Text Mining and Deep Learning Model on Learning Contents

Abstract: Despite the development of the online learning environment, it is difficult to estimate the learning level of the learner in the online environment, and various analysis methods for the learner are being studied in situations where direct interaction between the learning content and the learner occurs. However, the analysis of the difficulty level of learning content is a relative factor to the learners who encounter the learning content, and it needs to be analyzed in line with the learner's learning level. In addition, it has become necessary to determine the difficulty level of text-based learning content (textbooks, lecture notes, final exams, etc.) based on the learner's level.

In this study, we analyze the difficulty of text-based learning content and develop a system that links it with relatively relevant learning support services according to the learner's learning ability. For this purpose, learning-connected keywords are extracted by analyzing the prerequisite and follow-up subjects of a specific subject in the computer science curriculum. Focusing on the extracted learning connection keywords, the learning proximity for the preceding subjects is extracted, and the learning proximity for the subsequent subjects to be learned in the future is extracted. By analyzing the text of a specific subject, a learning-related ontology related to the keywords of the preceding subject is constructed, and based on this, a learning difficulty score is assigned to the learning contents related to the specific subject. Learners' learning responses to learning content with a high learning content difficulty score (keywords with high proximity to previous subjects) and learning content with a low learning content difficulty score are extracted together. Finally, the correlation between learning content difficulty and learning response is extracted to verify the effectiveness of the learning content difficulty analysis model. In addition, by extracting the difficulty level of text-based learning content, it is possible to classify learning content tailored to each learner, and through this, individualized learning support for each learner is possible. The results of the difficulty analysis of learning content can be used as basic data for test preparation, learner learning counseling system, and student competency strengthening system. In many other fields, it can be used as base data for various services through analysis of the difficulty of learning content.

Bio: Kwang Sik Chung received the Bachelor of Science (1992), Master (1995), and the Doctorate degrees (2000) in Computer Science and Engineering from Korea University, Seoul, Korea. Upon completing his degree, he worked as the research fellow at the Department of Computer Science at the University College London (UCL), London, United Kingdom from September 2002 to November 2003. Ever since returning back to Korea in 2005, he has been lecturing at the Department of Computer science at Korea National Open University (KNOU) as tenure track assistant professor.

His research interests include distributed systems, fault tolerant systems, and grid computing systems. He has been conducting various researches in the fields related to learning analytics, virtual experiments/practice learning contents system development for e-learning, and learning cloud construction as an international cooperative researcher and a visiting researcher at various universities for about 20 years since the beginning of 2000. He researched advanced technology in the fields of learning analytics and learning cloud development with a number of researchers.

Invited Speaker II

16:00-16:25, Friday, October 11 (GMT+1), UK Time

ZOOM Link: https://us02web.zoom.us/j/82370811752   Password: 20249911

Assoc. Prof. Yi Gu

Middle Tennessee State University, USA

Speech Title: Multi-objective Optimization for Large-Scale Workflow Scheduling and Execution in Clouds

Abstract: Cloud computing has become the most popular distributed paradigm with massive computing resources and a large data storage capacity to run large-scale scientific workflow applications without the need to own any infrastructure. Scheduling workflows in a distributed system is a well-known NP-complete problem, which has become even more challenging with a dynamic and heterogeneous pool of resources in a cloud computing platform. The aim of this work is to design efficient and effective scheduling algorithms for multi-objective optimization of large-scale scientific workflows in cloud environments. We propose two novel genetic algorithm (GA)-based scheduling algorithms to assign workflow tasks to different cloud resources in order to simultaneously optimize makespan, monetary cost, and energy consumption. One is multi-objective optimization for makespan, cost and energy (MOMCE), which combines the strengths of two widely adopted solutions, genetic algorithm and particle swarm optimization, for multi-objective optimization problems. The other is pareto dominance for makespan, cost and energy (PDMCE), which is based on genetic algorithm and non-dominated solutions to achieve a better convergence and a uniform distribution of the approximate Pareto front. The proposed solutions are evaluated by an extensive set of different workflow applications and cloud environments, and compared with other existing methods in the literature to show the performance stability and superiority.

Bio: Prof. Yi Gu is an associate professor in the Department of Computer Science at Middle Tennessee State University (MTSU). She received her M.S. and Ph.D. degrees in Computer Science from University of Memphis in 2008 and 2011, respectively. She had worked as an assistant professor of Computer Science at University of Tennessee Martin from 2011 to 2013 before she joined MTSU as an assistant

professor in 2013. Her research interests include workflow scheduling and optimization, parallel and distributed computing, Cloud computing, wireless sensor networks, and cybersecurity. She has published 45+ technical papers in prestigious journals, international conferences, and book chapters. She has received university, state, and federal fundings, such as Tennessee Board of Regents (TBRs), National Science Foundation (NSF), etc.

Day 1- October 9, 2024
Wednesday, GMT+1, UK Time

Onsite Sign-in

Time	Event	Venue
14:00-15:00	**Onsite Sign-in**	**BIC 1/25 Larchfield. Floor one, room 25, 3M Buckley Innovation Centre**
15 :00-16 :00	**Campus Tour**	

Online Pretest Session

Time	Presenters	ZOOM Information
13:00-16:00	Keynote Speakers (Online), Session Chairs (Online), Committee Members (Online)	**Zoom Link:** https://us02web.zoom.us/j/82370811752
13 :00-16 :00	**Online Session 1:** Digital Image Analysis and Processing Methods HU3001, HU3007, HU3009, HU3025, HU3010, HU1009, HU2003, HU2005	**Zoom ID:** 823 7081 1752
	Online Session 2: Software and Information System Design Assoc. Prof. Yi Gu, HU1015, HU3005, HU1003, HU3023, HU1012, HU1014, HU3018, HU3017	**Password:** 20249911

Online Test Tips:

✧ Please get your presentation file ready for the pretest.

✧ Please unmute audio and start video while your presentation.

✧ It's suggested to use headset with microphone or earphone with microphone.

Day 2- October 10, 2024
Thursday, GMT+1, UK Time

Opening Ceremony and Keynote Speeches *Meeting Room: BIC 1/25 Larchfield. Floor one, room 25* *Zoom Link: https://us02web.zoom.us/j/82370811752 Password: 20249911*	
09:00-09:05	**Welcome Message** Prof. Joan Lu University of Huddersfield, United Kingdom
09:05-09:50	**Keynote Speech I** Prof. Jinwen Ma Peking University, China **Speech Title:** *The Improved Large Language Model for Mathematical Computing and Reasoning*
09:50-10:35	**Keynote Speech II** Assoc. Prof. Hoshang Kolivand Liverpool John Moores University, UK **Speech Title:** *How Machine Learning is Reshaping Mixed Reality*
10:35-11:05	**Coffee Break & Group Photo**
11:05-11:50	**Keynote Speech III** Dr. Aminu Bello Usman Head of the School of Computer Science University of Sunderland, UK **Speech Title:** *Securing Tomorrow: Enhancing Biometric Image Privacy and Security through IoT and LPWAN Innovations*
11:50-14:00	**Lunch (BIC 1/25 Larchfield. Floor one, room 25)**

Onsite Session *Topic: Next Generation Information Systems and Communication Technologies* *Session Chair: Prof. Joan Lu, University of Huddersfield, United Kingdom* *Meeting Room: BIC 1/25 Larchfield. Floor one, room 25*		
14:00-15:25	**Part I**	**Invited Speaker I:** Prof. Kwang Sik Chung, Korea National Open University, South Korea HU3030, HU3004, HU3031, HU3008
15:25-16:00	**Coffee Break & Group Photo (BIC 1/25 Larchfield. Floor one, room 25)**	
16:00-17:30	**Part II**	HU3033-A, HU3026, HU3032, HU1004, HU2006-A, HU3034
17:30-20:00	**Dinner**	

Day 3– October 11, 2024
Friday, GMT+1, London Time

Online Parallel Sessions		
10:00-12:00	**ZOOM ID :** **823 7081 1752** https://us02web.zoom.us/j/82370811752 **Password:** 20249911	**Online Session 1– Digital Image Analysis and Processing Methods** **Session Chair: Prof. Qiang Li, Northwestern Polytechnical University, China** HU3001, HU3007, HU3009, HU3025, HU3010, HU1009, HU2003, HU2005
12:00-14:00		**Break Time**
14:00-16:25	**ZOOM ID :** **823 7081 1752** https://us02web.zoom.us/j/82370811752 **Password:** 20249911	**Online Session 2–Software and Information System Design** **Session Chair: Dr. Shyam Balagurumurthy Viswanathan, City University of New York, USA** **Invited Speaker II: Assoc. Prof. Yi Gu, Middle Tennessee State University, USA** HU1015, HU3005, HU1003, HU3023, HU1012, HU1014, HU3018, HU3017, Invited Speaker II-Assoc. Prof. Yi Gu

Onsite Oral Session: *Next Generation Information Systems and Communication Technologies*

Time: 14:00-17:30 | Thursday, October 10, 2024 (GMT+1, UK Time)
Session Chair: Prof. Joan Lu, University of Huddersfield, United Kingdom
Meeting Room: BIC 1/25 Larchfield. Floor one, room 25

Invited Speaker I **HU3027-A** 14:00-14:25	**Title: Learning Contents Difficulty Analysis by Text Mining and Deep Learning Model on Learning Contents** **Author:** Prof. Kwang Sik Chung **Invited Speaker:** Prof. Kwang Sik Chung, Korea National Open University, South Korea **Abstract:** Despite the development of the online learning environment, it is difficult to estimate the learning level of the learner in the online environment, and various analysis methods for the learner are being studied in situations where direct interaction between the learning content and the learner occurs. However, the analysis of the difficulty level of learning content is a relative factor to the learners who encounter the learning content, and it needs to be analyzed in line with the learner's learning level. In addition, it has become necessary to determine the difficulty level of text-based learning content (textbooks, lecture notes, final exams, etc.) based on the learner's level.
HU3030 14:25-14:40	**Title: The Application of Machine Learning in Student Performance Prediction in Higher Education Institutions: A Systematic Literature Review** **Authors:** Zhoutian Dai, Joan Lu **Presenter:** Zhoutian Dai, University of Huddersfield, United Kingdom **Abstract:** The purpose of this review is the application of machine learning techniques in predicting student performance. We systematically review the trends, commonly used algorithms and their potential problems in this field. This review includes stages of planning (search objectives, research questions, inclusion and exclusion criteria), searching, selection, and literature consolidation. In terms of algorithms, although techniques such as Decision Tree, Random Forest, Support Vector Machines (SVMs) and Neural Networks have been widely used for student performance prediction, they still have some issues of data quality, accuracy, performance and data security when analysis complex data in educational settings. This review focuses on these challenges and suggests possible future research directions.
HU3004 14:40-14:55	**Title: E-Government in Oman: Trends and Future Perspectives** **Author:** Mamoun Ghaleb Awad **Presenter:** Mamoun Ghaleb Awad, Department of IT and mathematics CPS Sultan Qaboos University, Oman Abstract: This academic research paper aims to explore the current trends and prospects of e-government in Oman. The study examines the key initiatives, challenges, and opportunities in implementing e-government services in the country. It also analyses the impact of e-government on enhancing public service delivery, improving citizen

engagement, and fostering socio-economic development. This study endeavors to elucidate contemporary trends and prospective trajectories of e-government implementation within the Sultanate of Oman. It undertakes an investigation into the principal initiatives, obstacles, and prospects inherent in this sphere, thereby furnishing valuable insights capable of informing the developmental trajectory of e-government endeavors in Oman and stimulating additional scholarly inquiry within this domain. The research provides valuable insights into the potential advancements and future directions of e-government in Oman.

HU3031 14:55-15:10	**Title: Leveraging Artificial Intelligence and Large Language Models for Enhanced Teaching and Learning: A Systematic Literature Review** **Authors:** Jiacheng Gu, Joan Lu **Presenter:** Jiacheng Gu, University of Huddersfield, United Kingdom **Abstract:** Artificial Intelligence (AI) and Large Language Models (LLMs)—perhaps more significantly—have changed educational paradigms, enabling a significant reinvention in how teaching and learning happens today. Through this systematic literature review, the paper aims to offer a deep understanding of how AI and LLMs are implemented in educational settings today, providing examples of where these tools were used for personalization (both targeting students' academic performance and choosing content that aligns best with learner's aspirations), accessibility enhancements as well as their potential applications related to resource management automation. The central themes probed include the application of AI to help deploy appropriate learning strategies according to individual learner profiles (adapting educational content on the fly), LLMs for improved responsive and interactive education tools, and the potential for autonomous assessment machines with associated feedback mechanisms. The opportunities for the aid of AI and LLMs to improve teaching and learning are vast, but this review will also question some associated challenges such as ethical issues, data privacy concerns and risks of algorithmic bias. It is concluded by suggesting future research and application directions for the ethical development of inclusive technologies, which are secure from a privacy point of view too. This is followed by a reflection on the strategic implications of such technologies for those in charge of education policy and development hoping ideas related to how AI-LLMs rejoice more efficacious learning experiences could be born out. This review systematically explores the scope, key findings, and overall significance of integrating Artificial Intelligence (AI) and Large Language Models (LLMs) in educational contexts.
HU3008 15:10-15:25	**Title: Real-time Resource Management Mechanism for Mobile IoT Devices in 5G-enabled Edge Computing** **Author:** Abdullah M. Alqahtani **Presenter:** Abdullah M. Alqahtani, Department of Electrical and Electronic Engineering, Collage of Engineering and Computer Science, Jazan University, Kingdom of Saudi Arabia **Abstract:** The time-sensitive Internet of Things (IoT) applications within 5G and edge computing environments presents unique challenges in network resource management. Current systems struggle with efficiently managing the high-density and variable conditions typical in such mobile networks. This study aims to address these challenges by introducing the Federated Learning-Enhanced Resource Management System for Mobile IoT networks (FLERMS-IoT). The proposed FLERMS-IoT system incorporates a novel

	federated learning framework that incorporates localized data processing at the edge to reduce latency and bandwidth usage. It includes algorithms that adaptively manage computational and network resources. The core of the system is a dual-module approach that dynamically adjusts to network conditions, enhancing both stability and scalability. Empirical evaluations demonstrate significant enhancements in resource utilization efficiency, with FLERMS-IoT achieving 90% in high-density scenarios and 85% in variable network conditions in comparison with 5GTFF, JCSR, and SKUNK.
15:25-16:00	**Coffee Break & Group Photo (BIC 1/25 Larchfield. Floor one, room 25)**
HU3033-A 16:00-16:15	**Title: Designing and Building an Online Movie Ticket Booking Application Based on ASP.NET MVC** **Author:** Jiacheng Gu **Presenter:** Jiacheng Gu, University of Huddersfield, United Kingdom **Abstract:** This project introduces an advanced online ticket booking system for movies. The main goal is to improve the process of buying tickets by reducing the time for users. For the implementation, ASP.NET Core MVC is used to build a responsive user interface. The design allows working correctly on different devices. The security of user data is ensured by complex credentials. The interaction with external APIs makes it possible to verify and integrate with existing services, and a compelling recommendation for new movies based on the user's previous choices. The system is tested for different conditions to get reliable performance and provide a strong base for further integrations. The project gives an example of how the digitalization of traditional industries can transform them to improve users' accessibility, process efficiency and customer experience.
HU3026 16:15-16:30	**Title: Enhancing Object Detection for Autonomous Machines in Private Construction Sites Through Federated Learning** **Authors:** Mohammadreza Mohammadi, Maghsood Salimi, Mohammad Loni, Sima Sinaei **Presenter:** Sima Sinaei, RISE Research Institutes of Sweden, Sweden **Abstract:** A critical enabler of autonomous construction equipment is object detection, a computer vision task integral to navigation, task execution, and safety. However, challenging conditions at construction sites, such as mud splashes, dirt, and vibrations, can degrade object detection performance by causing sensor occlusions and image blurriness. Traditional adversarial training methods, which enhance model robustness by using perturbed data, are limited in construction environments due to the scarcity of diverse real-world adversarial data and the dynamic nature of these sites. While generative models can create synthetic adversarial examples, they often struggle to generalize to the unpredictable scenarios encountered on construction sites, as they rely on rigid assumptions about data distributions. Additionally, privacy concerns and site-specific data variability hinder data sharing across different construction sites. To overcome these challenges, this paper explores Federated Learning as a solution to enhance the robustness and adaptability of object detection models while preserving data privacy. FL enables continuous online learning without direct data exchange, offering a scalable and privacy-preserving approach to training models across diverse construction environments. Experimental results demonstrate that our FL-based approach improves model performance on the ConstScene dataset by up to $\approx 4.4\%$ compared to the centralized AI model for object detection.

HU3032 16:30-16:45	**Title: Development of a Machine Learning-Based Web Application for Predicting CO2 Emissions in Light-Duty Vehicles** **Authors:** Jeffrey Udoh, Joan Lu **Presenter:** Jeffrey Udoh, University of Huddersfield, United Kingdom **Abstract:** The transportation sector significantly contributes to global greenhouse gas emissions, particularly CO2. This research aims to develop a user-friendly web application that accurately predicts CO2 emissions of light-duty vehicles using machine learning models. By using datasets from the UK Vehicle Certification Agency (VCA), various regression models such as Decision Tree, Random Forest, and Gradient Boosting, were trained and evaluated for predicting CO2 emission. The model was deployed as a Streamlit web application to allow users to estimate vehicle emissions based on input variables. This research underscores the potential of machine learning and artificial intelligence in supporting the digital transformation of the transportation sector, providing a cost-effective tool for stakeholders to assess CO2 emissions and support environmental sustainability. Future work involves exploring additional machine learning algorithms and enhancing the web application for broader use.
HU1004 16:45-17:00	**Title: Rate Allocation in Cooperative Multi-source Systems for Different Rate Stream** **Author:** Francisco de Asis Lopez-Fuentes **Presenter:** Francisco de Asis Lopez-Fuentes, Universidad Autonoma Metropolitana-Unidad Cuajimalpa, Mexico **Abstract:** In the last years, videoconferencing technology has become one very important topic in the modern business or education. Through videoconferencing the remote teams can interacts together although to be in different time zones. Multimedia contents with different rate streams can be generated from multiple users during a video conferencing. This paper presents an analytical study for rate allocation in a collaborative multi-source multicast framework for unbalanced (different) rate streams. The rate allocation tries to maximize the overall throughput for joint rate allocation for different rate streams. The analyzed framework has been deployed on a peer-to-peer (P2P) network. The framework tries to exploit the different benefits introduced by this type of network. Our analysis allows us know about limitations and challenges when we have this type of scenario.
HU2006-A 17:00-17:15	**Title: Optimization and Visualization of Sport Team Ticket Pricing** **Author:** Younghan Lee **Presenter:** Younghan Lee, Mississippi State University, USA **Abstract:** This study was part of a consulting project aimed at providing strategic advice to the top management of a professional soccer team in Korea, following their decision to relocate the team from its original hometown. One of the main objectives was to devise an effective pricing strategy. The research focused on understanding local fans' ticket purchase behavior, preferences, and the importance of various attributes, including price sensitivity. Conjoint analysis, a common business technique, was used to identify the most influential attributes for selecting the optimal mix of benefits for ticket purchases. To enhance the research, information visualization and optimization techniques were incorporated. Data visualization tools, such as bar charts, pie charts, and heat maps, were used to create clear and insightful representations of the data. These visualizations helped

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identify trends and patterns in fans' ticket purchase behavior and preferences, making the data more accessible and actionable for management.

Optimization techniques (e.g., conjoint analysis) were employed to identify the most influential attributes for selecting the optimal mix of benefits for ticket purchases. These techniques were applied to develop the most effective pricing strategy. By utilizing mathematical models and algorithms, the research team determined the optimal ticket prices that would maximize revenue while maintaining fan satisfaction. This approach ensured that the pricing strategy was both data-driven and optimized for the best possible financial outcomes.

The research findings provided several insights for management on constructing a pricing strategy. Fans in the region perceived the presence of a player with a hometown background as the most significant attribute influencing their ticket purchase decisions, followed by price, coupons, and points. Although price was the most influential attribute for the middle/high school segment, the presence of a hometown player was still considered more significant for retaining this segment in the long term.

The importance of both coupons and points was significantly lower than that of players and price. However, the fact that coupons were more important than points indicates that fans prefer immediate benefits over accumulating points for future use. To maximize profit without losing a significant number of fans, the recommended ticket price ranges were $9 ($14 for premium seats) to $10 ($16) for general and college groups, and $7 to $8 for middle/high school groups.

HU3034

17:15-17:30

Title: Analysing the Impact of Policies Enacted to Reduce Greenhouse Gas Emissions in the Transportation Sector
Author: Jeffrey Udoh
Presenter: Jeffrey Udoh, University of Huddersfield, United Kingdom

Abstract: This research examines global efforts to mitigate the transportation sector's contribution to climate change, with a focus on policies addressing greenhouse gas (GHG) emissions, particularly carbon dioxide (CO_2). The transportation sector has become a major source of CO_2 emissions, surpassing the power sector in recent years. Three primary strategies - improving vehicle efficiency, reducing vehicle miles traveled, and transitioning to low-carbon fuels, are identified as crucial for emission reduction. Using the United Kingdom as a case study, the research assesses various policies, such as the "Road to Zero" and the Ultra Low Emission Zone (ULEZ), designed to reduce transportation-related emissions.
Despite significant progress, gaps remain, especially in addressing material efficiency across the vehicle lifecycle. The research highlights the challenges in CO_2 policy implementation and provides recommendation for a comprehensive policy development, to achieve the UK's ambitious carbon neutrality goals by 2060.

Online Session 1: *Digital Image Analysis and Processing Methods*

Time: 10:00-12:00 | Friday, October 11 (GMT+1, UK Time)
Session Chair: Prof. Qiang Li, Northwestern Polytechnical University, China
Zoom link: https://us02web.zoom.us/j/82370811752   Password: 20249911

HU3001 10:00-10:15	**Title: Detect Fire Using Weighted Box Fusion Algorithm** **Authors:** Yunyu Ma, Wenxian Yang, Kexiang Wei, Leigh Fleming, Andrew Ball, Robert Cattley **Presenter:** Wenxian Yang, University of Huddersfield, UK **Abstract:** Frequent fires pose a grave risk to both lives and property. Detecting these fires accurately is crucial for effective mitigation efforts. In the past, scholars have attempted to detect them by using infrared camera to capture fire flames. However, infrared thermal images of flames often suffer from unclear flame features and low pixel resolution. Moreover, it is unlikely to expect that an algorithm can extract all image features conducive to fire flame detection. Consequently, algorithms frequently misidentify similar flame-like objects, leading to a notable reduction in recognition accuracy. To address this issue, this paper proposes an integrated model W3YAD for fire detection. The model integrates three weakly supervised learning models (i.e., YOLOX, Deformable DETR, and Autoassign) that are trained using a limited number of image samples. The fusion of the three models' prediction results is achieved using the Weighted Box Fusion (WBF) algorithm to generate new fused prediction boxes. The experiments have shown that this integrated model fully harnesses the strengths of the three individual models, resulting in higher fire detection accuracy.
HU3007 10:15-10:30	**Title: Non-Invasive Breast Cancer Screening: Leveraging InceptionV3 and GoogLeNet for Thermal Image Analysis** **Authors:** Reem Jalloul; K H. Chethan; Ramez Alkhatib **Presenter:** Reem Jalloul, Department of Computer Science & Engineering Maharaja Institute of Technology Mysore, Karnataka, India **Abstract:** Breast cancer remains a leading cause of mortality worldwide, highlighting the need for early detection. This research demonstrates the potential of combining thermal imaging and deep learning for non-invasive, cost-effective breast cancer screening. This study applies deep learning models, specifically InceptionV3 for feature extraction and classifiers such as GoogLeNet, DenseNet121, and MobileNetV2, to analyze thermal images for breast cancer diagnosis. Using the Database for Mastology Research (DMR), thermal images were preprocessed and augmented to improve the dataset. Transfer learning with pre-trained models enhanced diagnostic accuracy. The InceptionV3 + GoogLeNet model achieved the highest performance with an accuracy of 96.49%, an AUC of 99.72%, a precision of 98.25%, and an F1-score of 96.55%, outperforming other combinations. Despite the promising results, the study has limitations, including a relatively small dataset and the need for further validation. Nevertheless, it paves the way for improved early detection strategies, potentially reducing breast cancer mortality rates globally.

HU3009 10:30-10:45	**Title: A Taxonomy of Factors that Influence the Multiple-Cloud Computing Utilization** **Author:** Hassan saad Al-Qahtani **Presenter:** Hassan saad Al-Qahtani, Saudi Electronic University, Kingdom of Saudi Arabia **Abstract:** There are various factors that associated with the architecture of Multiple-Cloud Computing, which have negative impact that reduce the utilization of MCC. Our study is proposing a comprehensive taxonomy of these factors. The proposed classification will help to apply efficient solutions/approaches that prevent, avoid, or reduce the negative impact of these factors; and enhance dealing with these factors. This study identifies and categorizes the factors into five primary dimensions: operational factors, data privacy and integrity factors, performance factors, and law and legislations factors. The responsibilities of the involved stakeholders have been defined for each dimension.
HU3025 10:45-11:00	**Title: PM4Urban: A Scriptable Parametric Modeling Interface for Conceptual Urban Layout Design Using PM4VR** **Author:** Wanwan Li **Presenter:** Wanwan Li, University of Tulsa, USA **Abstract:** Conceptual urban layout design is a critical aspect of urban planning and architecture design that focuses on the arrangement and organization of physical spaces in a city or urban area. However, traditional urban layout design requires sophisticated tools to visualize and manipulate large-scale layouts efficiently. This paper introduces PM4Urban, a scriptable parametric modeling interface designed to enhance and facilitate conceptual urban layout design experience. By extending the PM4VR framework with new features, PM4Urban enables urban planners and architects to dynamically create, modify, and visualize complex, realistic, and immersive parametric urban environments in virtual reality. After being validated through numerical experiments, the PM4Urban interface supports various parametric design techniques, offering a versatile solution for early-stage urban design and planning.
HU3010 11:00-11:15	**Title: Rendering 3D Quadratic Bezier Curves By Accumulation** **Author:** Yufan Wang **Presenter:** Yufan Wang, Independent Researcher, China **Abstract:** Quadratic Bézier curves play a crucial role in vector graphics, particularly in rendering smooth, scalable images. While extensive studies have been conducted on rendering 2D Bézier curves, the transition to 3D introduces unique challenges due to the complexities of depth and perspective. This paper models the appearance of a parametric curve on the observing screen as a double line integral. Based on this model, we propose a novel rendering routine for 3D quadratic Bézier curves and provide a corresponding implementation using the wgpu API. Our approach addresses the difficulties of 3D rendering by treating the curve as a uniform light strip and offers solutions to ensure order independence of curve segments and continuous color values, while avoiding common artifacts. The implementation results demonstrate the effectiveness of our method, highlighting its potential for high quality 3D rendering. Additionally, we identify areas for future work to further refine and optimize the rendering process. This

	paper contributes to advancing the field of vector graphics by providing a new method for rendering 3D quadratic Bézier curves with improved visual fidelity and computational efficiency.
HU1009 11:15-11:30	**Title: Disruptive Technology Research Pathway: Term and Keyword View** **Authors:** Yonggang Luo, Jing Liu **Presenter:** Yonggang Luo, Shanghai University, China **Abstract:** This study provides a comprehensive analysis of disruptive technology (DT) research trends from 1996 to 2018. Using term and keyword clustering methods, we reveal a significant shift in focus areas, from initial emphasis on behavioral aspects to a growing emphasis on nature and vision perspectives. The research underscores the global attention DT has garnered, particularly in engineering, computer science, and business economics. Employing bibliometric tools, we identify 'disruptive innovation' as a central theme with the highest citation bursts, and the Gartner Hype Cycle as a pivotal framework. We also note the increasing volume of DT research publications and citations, with a marked upsurge between 2012 and 2015. The study concludes by emphasizing the importance of continuous trend analysis for DT researchers to stay abreast of industry and technology implications, suggesting future research directions that include multi-modal data analysis and real-time feedback systems.
HU2003 11:30-11:45	**Title: Machine Learning-Based Prediction of Breast Cancer** **Authors:** Maab Abd Alqaher Srour, Mohamed Mahmoud Dweib, Ibrahim Mohammed Dweib **Presenter:** Ibrahim Mohammed Dweib, Sultan Qaboos University, Oman **Abstract:** Breast cancer stands as a significant global health challenge, affecting millions of women annually. The urgency of early detection as a pivotal factor in mitigating its impact has prompted the exploration of advanced diagnostic tools, particularly Computer-Aided Detection and Diagnosis (CAD) technologies. This study capitalizes on recent developments in CAD systems and associated methodologies to enhance the early detection of breast cancer. Utilizing the Wisconsin Breast Cancer Diagnostic (WBCD) dataset, this research conducts a thorough analysis of multiple machine learning models. Despite the dataset's modest size, it offers valuable insights. The information undergoes careful examination and is applied to various machine learning models, including random forest, logistic regression, decision tree, and K-nearest neighbor, for predictive analysis. Upon comparative evaluation, the logistic regression model emerges as the most promising, achieving an accuracy of 98%. The outcomes of this research contribute valuable insights to the refinement of breast cancer prediction models, promising advancements in timely and effective interventions.

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HU2005 11:45-12:00	**Title: An Analysis of Disengagements in Autonomous Vehicles** **Authors:** Md Liakat Ali, Nicholas Castro, and Michael Varchetto **Presenter:** Md Liakat Ali, Rider University, USA **Abstract:** Autonomous vehicles represent one of the most interesting applications of artificial intelligence. However, the current technology still has room for improvement, as it is still in beta. There are situations in which the autonomous system must be disengaged for safety concerns. This study aims to analyze a dataset regarding disengagements in autonomous vehicles and to attempt to predict the reasons for disengagement using machine learning algorithms. First, background information will be provided regarding autonomous vehicles and disengagements. Next, related research in the field of autonomous vehicle disengagements will be discussed. An overview of the experiment will be supplied, including a review of the dataset and extracted features, preprocessing, model architecture, training procedure, and evaluation metrics used. Finally, the results of the experiment are discussed and interpreted.

Online Session 2: *Software and Information System Design*

HU1015

14:00-14:15

Title: AidConnect: A Telehealth Web-based System with Smartwatch Integration for Enhanced Medical Tracking Support in Aged Care Facilities for Caregivers of Elderly Individuals in the Philippines System

Authors: Mary Jane C. Samonte, Frances Denielle C. Magno, Kimberly Gale Y. Ang and Kim Emmanuelle M. Lalap

Presenter: Frances Denielle C. Magno, Mapua University, Philippines

Abstract: The aging population in the Philippines has increased the demand for quality elder care services, particularly in aged care facilities. Caregivers in these facilities face challenges in effectively monitoring the health and well-being of the elderly residents. This study presents the development of AidConnect, a telehealth web-based system with smartwatch integration designed to enhance medical tracking support for caregivers of elderly individuals in the Philippines. AidConnect aims to streamline the monitoring process, improve data management, and facilitate better communication between caregivers, authorized family members, and elderly residents. The system was evaluated through functionality and performance testing, System Usability Scale (SUS), and Single Ease Questionnaire (SEQ) assessments. Usability testing yielded a high System Usability Scale (SUS) score of 84.5 and a Single Ease Questionnaire (SEQ) score of 4.25, indicating ease of use and effectiveness. Compatibility testing confirmed optimal performance across major web browsers. Security evaluation with Nessus identified mild risks and issues needing attention, such as weak SSL hashing and server flaws. Overall, AidConnect effectively meets its objectives, enhances health monitoring, and highlights areas for future improvement. The results indicate that AidConnect provides a reliable and user-friendly platform for caregivers, supporting enhanced medical tracking and better decision-making in aged care facilities.

HU3005

14:15-14:30

Title: Enhancing Search and Recommendation Systems with AI-Powered Semantic Indexing and Multi-Modal Integration: An Evaluation Using OpenAI's Embedding API and PineconeDB

Authors: Xinke Wang, Yu Sun

Presenter: Xinke Wang, Chadwick School, United States

Abstract: This research paper explores the development and evaluation of a recommendation and search algorithm using OpenAI's embedding API and PineconeDB, focusing on creating an accessible, efficient, and scalable system capable of handling multimodal content. The study is divided into several sections, including a comprehensive introduction to the challenges and proposed solutions for modern search systems, detailed method analysis, and experimental validation. Two primary experiments were conducted: the first assessed the search algorithm's semantic indexing

accuracy with different datasets, and the second tested the system's capability to handle searches involving both textual and visual data. Results from the first experiment indicated that while the system performs exceptionally well with semantically rich content (92% accuracy), it struggles with content of lower semantic quality (58% accuracy), highlighting the need for advanced semantic processing techniques. The second experiment demonstrated the system's proficiency in multi-modal searches, achieving an average precision of 87% and recall of 80%, confirming its suitability for complex search tasks across various data types. These findings validate the effectiveness of using vector embeddings in improving search and recommendation systems, while also pointing out areas for future enhancement, particularly in handling content with vague or sparse semantic details. This paper contributes to the ongoing discussion about the feasibility and efficiency of building sophisticated search systems using state-of-the-art AI technologies.

HU1003

14:30-14:45

Title: Multi-GW Simulation for LoRa LPWANs

Authors: Alaa Amar, Tallal Elshabrawy, and Minar El-Aasser

Presenter: Alaa Amar, German University in Cairo, Egypt

Abstract: The rapid growth of IoT has led to LPWAN technologies like LoRa (Long Range), which offer long-range coverage, low power consumption, and scalability, making them ideal for IoT applications. LoRa technology utilizes spreading factors to optimize signal transmission. It uniquely relies on six different spreading factors (SFs). Each end device (ED) uses a SF that ensures correct signal demodulation at the intended gateway (GW). The long communication range LoRa provides relies on utilizing high values of SF. Such high values of SF also impose low data rate and consequently longer duration of packet transmission time resulting in greater collision probability and reduced network performance. Therefore, for a certain network area under inspection, multiple GW deployments will allow EDs to have more options for GW connectivity, enabling them to select GWs that are closer, utilize lower SFs and thus enhance overall network performance. This paper emphasizes the importance of multiple GW deployment in LoRa telecommunication and investigates its impact on overall network performance. We first developed an OMNeT++ LoRa multi-GW simulation model. We tested two different deployment strategies and analyzed the network performance by observing the effects on two key metrics: success rate and success probability. The developed simulation model serves as a valuable tool for testing and analyzing detailed multiple-GW LoRa LPWANs prior to actual deployment.

HU3023

14:45-15:00

Title: Code Re-use Recommendation Based on Software Requirements Using Natural Language Processing in Python
Authors: Hareem Farooqi, Wasi Haider Butt, Obaid Ullah Khan
Presenter: Hareem Farooqi, National University of Sciences and Technology, Pakistan

Abstract: Code reuse is a pivotal practice in software development, promoting efficiency, reducing redundancy, and ensuring higher quality software products. Recommender systems play a crucial role in this process by suggesting relevant code snippets or components based on specific requirements, thus easing the task of code reuse for developers. In this research paper, we present a Python code re-use recommendation system based on software requirements using Natural Language Processing (NLP). By employing the BERT model, we assess the similarity between

	software requirements in the e-commerce domain. The resulting software is then pre-processed and evaluated using the CodeBERT model to determine code similarity. Our findings show that similar requirements can indeed produce similar software, promoting efficient code reuse. This system can significantly benefit requirement engineers and developers by enabling the re-utilization of existing code within the same domain, demonstrating the broader applicability of our approach.
HU1012 15:00-15:15	**Title: AidVenture: A Mobile Application Tracker for Lower Limb Rehabilitation Integrated with Internet-of-Things based Four-Legged Walkers** **Authors:** Mary Jane Samonte, Tyrone Joshua Salaver, Din Marvin V. Anave, JIAN-LUC ARTREAUX RESARI **Presenter:** Tyrone Joshua Salaver, Mapua University, Philippines **Abstract:** This study introduces a telerehabilitation system for individuals undergoing lower-limb rehabilitation, combining a mobile application and a smart walker. The AidVenture system offers a comprehensive approach to lower-limb rehabilitation to enhance the experience for patients and physical therapists. Extensive validation, which includes rigorous software development and statistical analysis, has proven the system's effectiveness in monitoring patient progress. The user-centered design integrates advanced features such as tilt and fall detection, ensuring patient safety during exercises. Comprehensive testing has confirmed the system's robustness and accuracy under realworld conditions, meeting all necessary standards. Additionally, the system's practicality and readiness for clinical use have been validated through the System Usability Scale (SUS) and User Experience Questionnaire (UEQ) surveys. Functionality tests have affirmed the reliability of all system components and mobile applications. User Acceptance Testing (UAT) further highlighted the system's usability and performance, with favorable feedback on Wi-Fi connectivity, fall detection, and overall interface design. Results showed positive results from all the functionality and usability testing done in this study.
HU1014 15:15-15:30	**Title: Refining Interaction Design: A Study on Usability and User Experience in X-Mech** **Authors:** William P. Rey **Presenter:** William P. Rey, Mapua University, Philippines **Abstract:** This study evaluates the X-Mech System using both quantitative and qualitative methods. Data was collected from a diverse group of participants, employing the System Usability Scale (SUS) to gauge usability and the User Experience Questionnaire (UEQ) to assess various aspects of user experience. The X-Mech system achieved an outstanding usability score of 86.88, indicating an "Excellent" rating. The UEQ provided insights into the system's attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. The analysis synthesizes findings from both SUS and UEQ, highlighting areas of convergence and divergence to offer a comprehensive understanding of XMech's performance. The interplay between usability and user experience metrics uncovers valuable insights, pointing to specific opportunities for improvement. The study's findings pave the way for practical enhancements, ensuring X-Mech continues to meet and exceed user expectations.

HU3018 15:30-15:45	**Title: Preventing Cyber Adversaries: Examining BlackCat Ransomware's Tactics and Preventive Measures for Enhanced Cybersecurity** **Authors:** Eric B. Blancaflor, Cailyn Rae Bautista, Bryce Angeles, Donald Oliver S. Gavino Jr., Jose Roberto J. Kam **Presenter:** Eric B. Blancaflor, Mapua University, Philippines **Abstract:** Ransomware attacks serve as an example of how cyber adversaries provide a constant and changing threat in the digital age, making it imperative to fully comprehend their strategies and take preventative action to reduce risks. This study explores the subtleties of the highly skilled cyber threat known as BlackCat ransomware, examining its strategies and suggesting countermeasures to strengthen cybersecurity. By looking at this, the study hopes to provide cybersecurity experts and companies with the information they need to strengthen their defenses against the growing threat of ransomware.
HU3017 15:45-16:00	**Title: Empowering Barangay Residents with Mobile Apps for Fire Response** **Authors: Jefferson A. Costales, Arlene P. Evangelista, Jocelyn P. Perez** **Presenter: Jocelyn P. Perez, Eulogio "Amang" Rodriguez Institute of Science and Technology Manila, Philippines** **Abstract:** This study enhances fire safety in the barangay by utilizing image processing and temperature sensing technologies to develop an effective fire detection system. The main objectives are to detect fires and trigger alarms, enable real-time monitoring, develop a notification system, and log fire incidents. The system employs a Raspberry Pi 3B, a webcam, and a DS18B20 temperature sensor, integrating Python libraries (YOLOv5, OpenCV, Firebase Admin) with a React.js interface and a Firebase real-time database. Testing showed high detection accuracy, confirmed by chi-square tests (p-value = 0.855 for image processing, 1.0 for temperature sensing, and 0.855 for combined accuracy). The ISO 25010 evaluation rated the system highly in functionality, usability, reliability, security, and maintainability. The alarm feature proved effective in 30 trials, ensuring prompt responses to fire incidents. This project marks a significant advancement in fire prevention technology, providing a reliable solution for early detection and improved community safety. Future work will focus on adding sensors, optimizing data processing, and enhancing mobile application features.
Invited Speaker II 16:00-16:25	**Title: Multi-objective Optimization for Large-Scale Workflow Scheduling and Execution in Clouds** **Author: Yi Gu** **Invited Speaker: Assoc. Prof. Yi Gu, Middle Tennessee State University, USA** **Abstract:** Cloud computing has become the most popular distributed paradigm with massive computing resources and a large data storage capacity to run large-scale scientific workflow applications without the need to own any infrastructure. Scheduling workflows in a distributed system is a well-known NP-complete problem, which has become even more challenging with a dynamic and heterogeneous pool of resources in a cloud computing platform. The aim of this work is to design efficient and effective scheduling algorithms for multi-objective optimization of large-scale scientific workflows in cloud environments. We propose two novel genetic algorithm (GA)-based scheduling algorithms to assign workflow tasks to different cloud resources in order to

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simultaneously optimize makespan, monetary cost, and energy consumption. One is multi-objective optimization for makespan, cost and energy (MOMCE), which combines the strengths of two widely adopted solutions, genetic algorithm and particle swarm optimization, for multi-objective optimization problems. The other is pareto dominance for makespan, cost and energy (PDMCE), which is based on genetic algorithm and non-dominated solutions to achieve a better convergence and a uniform distribution of the approximate Pareto front. The proposed solutions are evaluated by an extensive set of different workflow applications and cloud environments, and compared with other existing methods in the literature to show the performance stability and superiority.

About Huddersfield

Huddersfield is a town in the Metropolitan Borough of Kirklees in West Yorkshire, England. It is the administrative centre and largest settlement in the Kirklees district. The town is in the foothills of the Pennines. The River Holme's confluence into the similar-sized Colne is to the south of the town centre which then flows into the Calder in the north eastern outskirts of the town.

University of Huddersfield

The University of Huddersfield (informally Huddersfield University) is a public research university located in Huddersfield, West Yorkshire, England. It has been a University since 1992, but has its origins in a series of institutions dating back to the 19th century. It has made teaching quality a particular focus of its activities, winning the inaugural Higher Education Academy Global Teaching Excellence Award in 2017, and achieving a Teaching Excellence Framework (TEF) Gold Award, in 2017 and 2023. The university has also put an increasing focus on research quality, and as of 2022 more than three quarters of its academic staff hold a doctorate, the third highest rate in England. Its chancellor George W. Buckley, a graduate of the university and a former CEO of 3M, was appointed in 2020.

Huddersfield Art Gallery

Huddersfield Art Gallery, located in the heart of Huddersfield, West Yorkshire, is an important cultural institution dedicated to showcasing a diverse range of artworks. Opened in 1883, the gallery features a Victorian architectural style and serves as a focal point for local art and culture. The gallery's collection includes significant works from the 19th and 20th centuries, particularly focusing on artists from the Yorkshire region. It regularly hosts temporary exhibitions that highlight contemporary artists' creations across various mediums, including painting, sculpture, and photography. Huddersfield Art Gallery actively engages in educational programs, offering art workshops and talks for schools and the community, aimed at enhancing public appreciation and participation in the arts. The gallery is usually free to the public, welcoming visitors of all ages to explore, enjoy art, and participate in a rich cultural atmosphere.

Yorkshire Sculpture Park

Yorkshire Sculpture Park is the leading international centre for modern and contemporary sculpture, set within the 500-acre, 18th-century Bretton Hall estate in West Yorkshire. Founded in 1977, YSP was the first sculpture park in the UK, and is the largest of its kind in Europe, providing the only place in Europe to see Barbara Hepworth's The Family of Man in its entirety alongside a significant collection of sculpture, including bronzes by Henry Moore, and site-specific works by Andy Goldsworthy, David Nash and James Turrell. YSP was named Art Fund Museum of the Year in 2014 and celebrated its 40th birthday in 2017.

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