2023 4th Asia Service Sciences and Software Engineering Conference (ASSE 2023)

Workshop: 2023 4th International Artificial Intelligence and Blockchain Conference (AIBC 2023)

October 27-29, 2023

University Of Aizu, Aizu-Wakamatsu, Japan

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http://www.asse.net/

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Welcome Message

It is our great pleasure to invite you to join our international conference - 2023 4th Asia Service Sciences and Software Engineering Conference (ASSE 2023) and 2023 4th International Artificial Intelligence and Blockchain Conference (AIBC 2023). This event will provide a unique opportunity for editors and authors to get together and share their latest research findings and results. We look forward to welcoming you at Aizu-Wakamatsu, Japan.

We're confident that over the two days you'll get the theoretical grounding, practical knowledge, and personal contacts that will help you build long-term, profitable and sustainable communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in Service Sciences, Software Engineering, Artificial Intelligence and Blockchain.

On behalf of all the conference committees, we would like to thank all the authors as well as the technical program committee members and reviewers. Their high competence, their enthusiasm, their time and expertise knowledge, enabled us to prepare the high-quality final program and helped to make the conference become a successful event.

We truly hope you'll enjoy the conference and get what you expect from the conference.

Organizing Committee
October 2023

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Keynote Speakers Introductions

Keynote Speaker I

Prof. Chin-Chen Chang
(IEEE Fellow)
Feng Chia University

Professor C.C. Chang obtained his Ph.D. degree in computer engineering from National Chiao Tung University. He's first degree is Bachelor of Science in Applied Mathematics and master degree is Master of Science in computer and decision sciences. Both were awarded in National Tsing Hua University. Dr. Chang served in National Chung Cheng University from 1989 to 2005. His current title is Chair Professor in Department of Information Engineering and Computer Science, Feng Chia University, from Feb. 2005.

Prior to joining Feng Chia University, Professor Chang was an associate professor in Chiao Tung University, professor in National Chung Hsing University, chair professor in National Chung Cheng University. He had also been Visiting Researcher and Visiting Scientist to Tokyo University and Kyoto University, Japan. During his service in Chung Cheng, Professor Chang served as Chairman of the Institute of Computer Science and Information Engineering, Dean of College of Engineering, Provost and then Acting President of Chung Cheng University and Director of Advisory Office in Ministry of Education.

Professor Chang's specialties include, but not limited to, data engineering, database systems, computer cryptography and information security. A researcher of acclaimed and distinguished services and contributions to his country and advancing human knowledge in the field of information science, Professor Chang has won many research awards and honorary positions by and in prestigious organizations both nationally and internationally. He is currently a Fellow of IEEE and a Fellow of IEE, UK. On numerous occasions, he was invited to serve as Visiting Professor, Chair Professor, Honorary Professor, Honorary Director, Honorary Chairman, Distinguished Alumnus, Distinguished Researcher, Research Fellow by universities and research institutes. He also published over 1,100 papers in Information Sciences. In the meantime, he participates actively in international academic organizations and performs advisory work to government agencies and academic organizations.

Keynote Speaker II

Prof. Incheon Paik
The University of Aizu, Japan

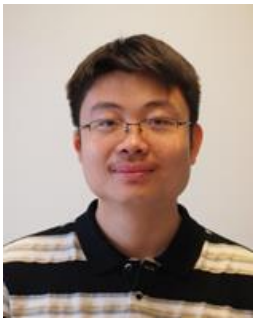
Prof. Incheon Paik is an accomplished academic who holds both a Master of Engineering degree and a Ph.D. in Electronics Engineering, which he received from Korea University in 1987 and 1992, respectively. From 1993 to 2000, he worked as an associate professor at Soonchunhyang University in Korea. During this time, Dr. Paik also served as a visiting researcher at the State Key Laboratory in Beihang University, Beijing, China from 1996 to 1998. In 2001, Dr. Paik moved to Japan and became a professor in the Intelligent Data Analytics Lab at the University of Aizu. He remains in this position to this day. Prof. Paik's research interests include various aspects of data analytics, such as Deep Learning Applications in Semantic Web Services Composition, Natural Language Processing, and Web Data Analysis. He also has expertise in Big Data Infrastructure and Analytics. Prof. Paik has organized several international conferences throughout his career and has also served as a reviewer or editor for journals such as JIPS, IEICE, IEEE, and MDPI. He is a senior member of IEEE and is currently the director of IEIE Japan Branch. Dr. Paik has also been an executive committee member of IEEE Sendai section and previously served as the chair of IEICE Service Computing Technical Committee.

Keynote Speaker III

Prof. Saman Halgamuge
(IEEE Fellow)
The University of Melbourne, Australia

Prof. Saman Halgamuge is a Fellow of IEEE, a Professor in the Department of Mechanical Engineering of School of Electrical, Mechanical and Infrastructure Engineering. He is a highly cited expert in his field and listed as one of the top 2% cited experts for AI and Image Processing in the Stanford University Database published in 2020. His most-cited paper being "Self-organizing hierarchical particle swarm optimizer with time-varying acceleration coefficients", with over 3300 citations, according to GoogleScholar. He is a Distinguished Speaker/Lecturer on Computational Intelligence appointed by IEEE. He has supervised 45 PhD scholars to completion and delivered over 50 keynotes at International and national conferences. He has previously served as Director/Head, Research School of Engineering of the Australian National University (2016-18) and as a member of Australian Research Council (ARC) College of Experts for Engineering, Information and Computing Sciences (2016-18). He was the founding Director of the PhD training centre Melbourne India Postgraduate Program (MIPP) of University of Melbourne and contributed as Associate Dean (2013-15) and Assistant Dean (2008-13) in International Engagement at the Faculty of Engineering and IT. He is also a member of various International advisory committees including the Visiting Committee of Chinese University of Hong Kong (2018) and Research Advisory Council of University of Technology PETRONAS (2015-18). He is an honorary Professor of Australian National University. His research interests are in AI and Data Engineering including Inclusive Learning algorithms and Active data gathering sensor systems, Unsupervised Learning, Big Data Analytics focusing on applications in Mechatronics, Energy and Bioengineering. These applications vary from Sensor Networks in Irrigation, Smart Grids, and Sustainable Energy generation to Bioinformatics and Neuro-Engineering.

Keynote Speaker IV



Assoc. Prof. Weizhi Meng
Technical University of Denmark (DTU), Denmark

Dr. Weizhi Meng is currently an Associate Professor in the Department of Applied Mathematics and Computer Science, Technical University of Denmark (DTU), Denmark. He obtained his Ph.D. degreein Computer Science from the City University of Hong Kong, Hong Kong SAR. Prior to joining DTU, he worked as Research Scientist in Institute for Infocomm Research, A*Star, Singapore. He won theOutstanding Academic Performance Award during his doctoral study, and is a recipient of the Hong Kong Institution of Engineers (HKIE) Outstanding Paper Award for Young Engineers/Researchers in both 2014 and 2017. He also received the IEEE ComSoc Best Young Researcher Award for Europe, Middle East, & Africa Region (EMEA) in 2020. His primary research interests are cyber security and intelligent technology in security, including blockchain, intrusion detection, AI security, IoT security, biometric authentication, and trust management. He serves as associate editors / editorial board members for many reputed journals such as IEEE TDSC, as well as chair for various international conferences such as ACM CCS'23 and ESORICS'22. He is an ACM Distinguished Speaker.

Invited Speakers Introductions

Invited Speaker I

Prof. Laura Ricci
University of Pisa, Italy

Laura Ricci received the Ph.D. degrees in Computer Science from the University of Pisa, Italy where she is currently a Full Professor. Her research interests include cryptocurrencies, blockchains, web3 and metaverse, and social network analysis. She has published over 150 papers in international journals and conference/workshop proceedings, served as Local coordinator of the H2020 European Helios project, and chaired several workshops. She is currently co-chair of the BRAIN workshop on Blockchain theory and Applications. Laura has also been a TPC co-chair of ICBC 2023 (International Conference on Blockchain and Cryptocurrencies), and of ICBTA (International Conf. on Blockchain Technology and applications), and a member of the Italian National commission for the definition of a national strategy for blockchain. She is the principal investigator of the Italian National Project "AWESOME: Analysis framework for WEb3 SOcial MEdia ", starting in Autumn 2023.

Invited Speaker II

Assoc. Prof. Hoshang Kolivand
Liverpool John Moores University, UK

Hoshang Kolivand is an Associate Professor specializing in AI and Mixed Reality. He holds an MS degree in Applied Mathematics and Computer Science from Amirkabir University of Technology, Iran, and a PhD from Universiti Teknologi Malaysia (UTM). With a Post-Doctoral background in Augmented Reality from UTM, he has a wealth of expertise in the field. Previously, Dr. Kolivand worked as a lecturer at Shahid Beheshti University in Iran and later as a Senior Lecturer at UTM. Currently, he serves as a Associate Professor and Head of Applied Computing Research group at Liverpool John Moores University, UK. Dr. Kolivand has published extensively in international journals, conference proceedings, and technical papers. He is an active member of various international conferences and journals as well as Senior member of IEEE. Additionally, he has authored several books on object-oriented programming and mathematics. His research interests encompass AI, AR/VR and HCI, where he explores innovative applications and advancements.

General Information

Instructions for Oral Presentations

Materials Provided by the Presenters:

PowerPoint or PDF Files

Duration of each Presentation:

Regular Oral Presentation: about **15 Minutes** including Presentation and **2-3 Minutes** of Question and Answer.

Instructions for the Online Tool "ZOOM" (For online presentation authors)

➢ Equipment Needed:
(a) A computer with an internet connection (wireless connection will be provided onsite). (b) USB plug-in headset with a microphone (recommended for optimal audio quality). (c) Webcam (optional): built-in or USB plug-in. (d) Please set up your laptop time in advance.
➢ Download the ZOOM:
https://zoom.us/download;
https://www.zoom.com.cn/download.
➢ Learn the ZOOM skills:
https://support.zoom.us/hc/en-us/articles/201362033-Getting-Started-on-Windows-and-Mac
➢ How to use ZOOM:
(a) Set the language. (b) Test computer or device audio. (c) Join a meeting: Join the meeting with the "meeting ID" provided in the program, tap the name as "paper ID+name", eg.: "P0001-Kira", then click "Join". (d) Get familiar with the basic functions: Rename, Chat, Raise Hands, Start Video, Share Computer Sound and Share Screen, etc.
➢ Environment Requirement:
(a) Quiet Location. (b) Stable Internet Connection. (c) Proper Lighting.
➢ Voice Control Rules during the Presentation:
(a) The host will mute all participants while entering the meeting. (b) The host will unmute the speakers microphone when it is turn for his or her presentation. (c) Q&A goes after each speaker, the participant can raise hand for questions, the host will unmute the questioner. (d) After Q&A, the host will mute all participants and welcome next speaker.
➢ Conference Material:
All presented papers will be issued with soft copy of conference materials: Receipt/Invoice, Participation and presentation certificate, etc.
➢ Notes:
(a) Log in the meeting room 15 minutes ahead of the session. (b) Learn the zoom skills. (c) Your punctual arrival and active involvement in each session will be highly appreciated. (d) The conference will be recorded; we will appreciate your proper behavior.

Best Presentation Award

One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded after each session.

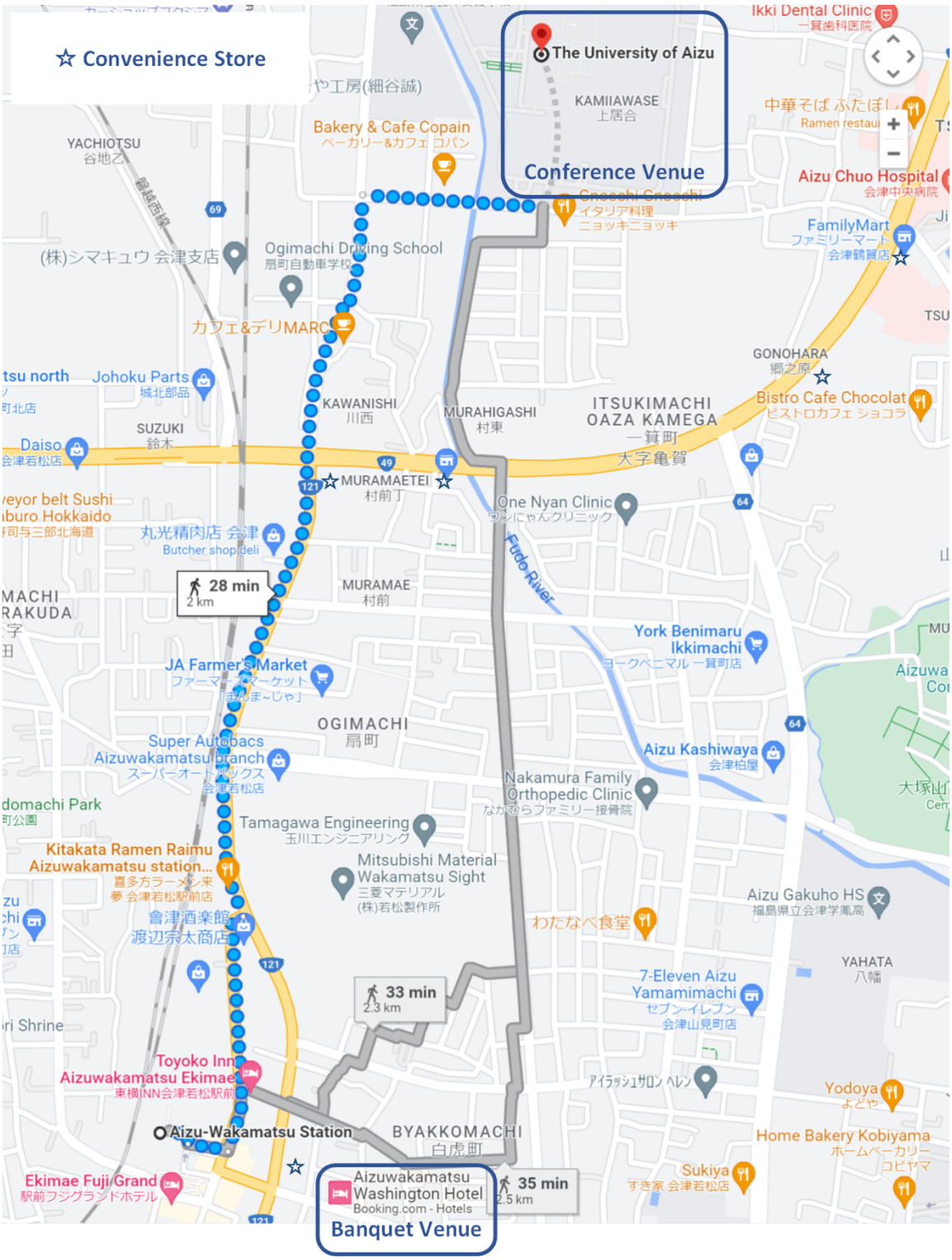
Conference Venue

University of Aizu, Japan

Address: Aizu Wakamatsu, Fukushima-ken, 965-8580, JAPAN

The University of Aizu (Japanese: 会津大学, romanized: Aizu Daigaku) in Aizuwakamatsu, Japan, is the first university dedicated to computer science engineering in Japan. UoA was ranked 18th (2nd among public universities) and was ranked 7th in the field of computer science in "THE World University Rankings Japan 2022" by Times Higher Education (THE), a British education magazine, released on March 25, 2021. This ranking evaluates universities based on 16 indicators in four areas: educational resources, educational enrichment, educational outcomes, and internationalization, and the University of Aizu was ranked second among public universities. It was ranked 1st in Fostering Entrepreneurship Number of university-launched ventures (Public universities in Japan). The UoA is recognized by many companies and has maintained nearly a 100% of employment rate since its foundation.

Local Map: From Aizu-Wakamatsu station to the university

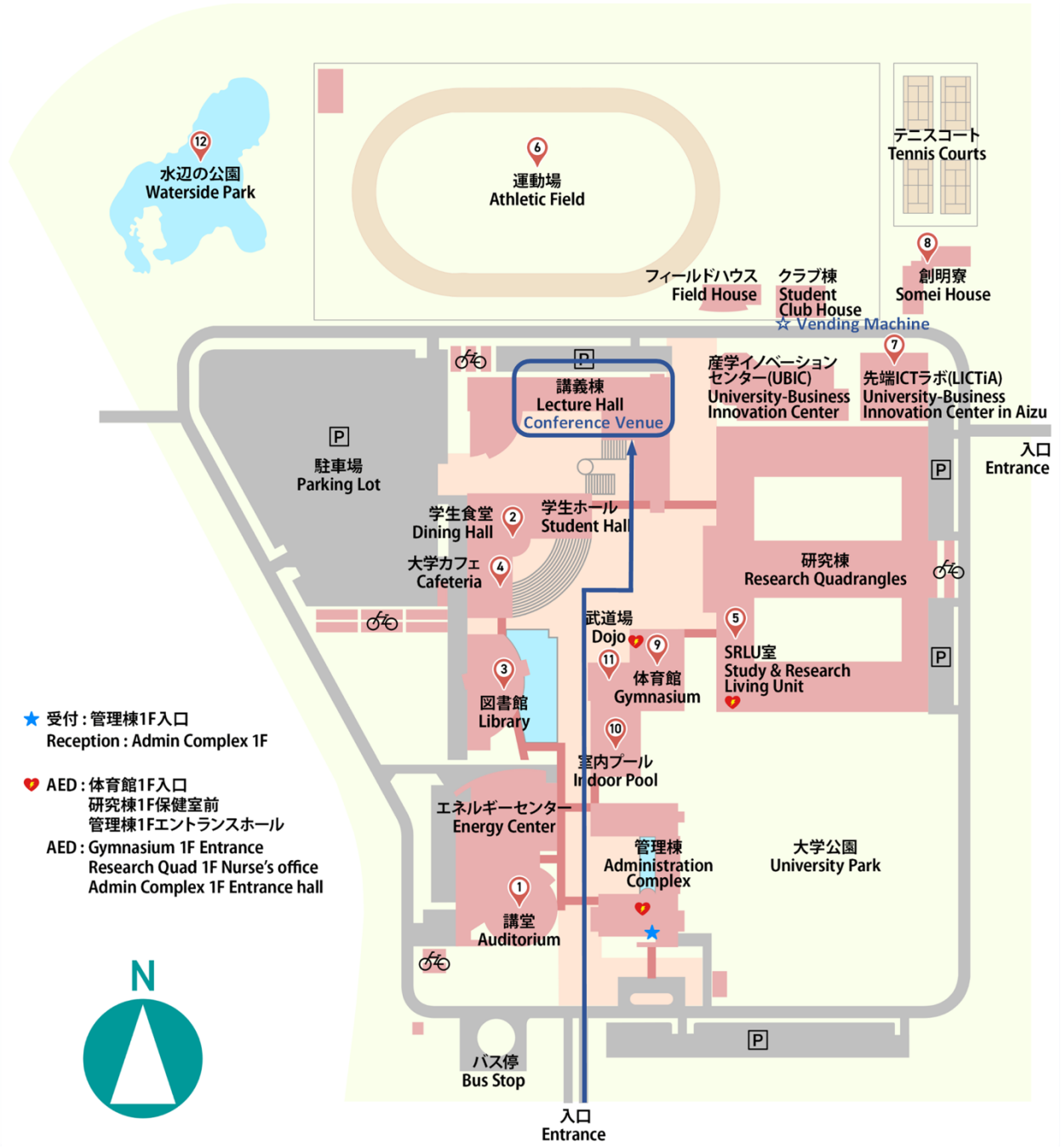


Taxi: 0120-692-468, 0242-37-1533

*If you want to call a taxi from campus, please ask the conference staff at the welcome desk.

(Room M10 on Oct. 27 and M6 on Oct. 28)

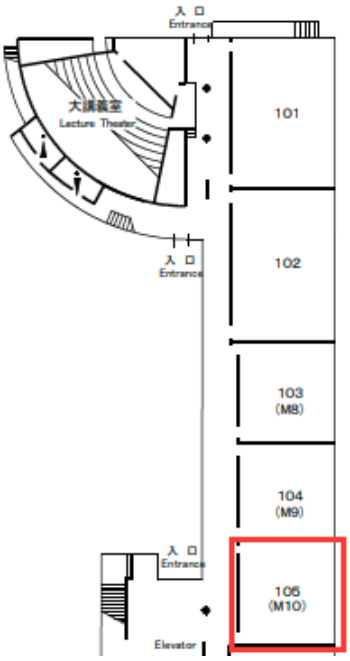
Conference Venue: Campus Map (University of Aizu)



Registration Room on October 27

Address: Lecture Room M10 (105), Lecture Hall 1F

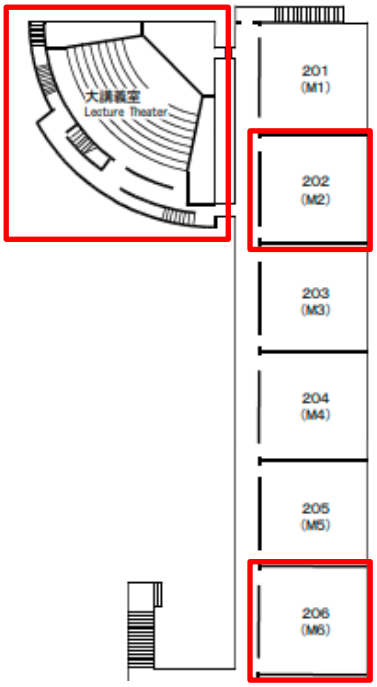
101　コンピュータ演習室〔３〕（Computer Exercise Room [3]）
102　コンピュータ演習室〔４〕（Computer Exercise Room [4]）
103　中講義室Ｍ８（Lecture Room M8）
104　中講義室Ｍ９（Lecture Room M9）
105　中講義室Ｍ１０（Lecture Room M10）



Registration Room and Conference Room on October 28

Address:
Registration: Lecture Room M6 (206), Lecture Hall 2F
Conference: Lecture Theater, Lecture Hall
Lecture Room M2 (202), Lecture Hall 2F

201　中講義室Ｍ１（Lecture Room M1）
202　中講義室Ｍ２（Lecture Room M2）
203　中講義室Ｍ３（Lecture Room M3）
204　中講義室Ｍ４（Lecture Room M4）
205　中講義室Ｍ５（Lecture Room M5）
206　中講義室Ｍ６（Lecture Room M6）
207　中講義室Ｍ７（Lecture Room M7）
208　ハードウェア実験室（１）（Hardware Workshop [1]）
209　ハードウェア準備室（Hardware Preparation Room）
210　ハードウェア実験室（２）（Hardware Workshop [2]）



Schedule Simple Version

October 27, 2023

Registration

Tips: The time in the schedule is according to Japan Local Time (GMT+9)

For Attend Onsite Conference

Time: 13:30-16:30

Venue: Lecture Room M10 (105), Lecture Hall 1F, The University of Aizu

Address: Aizu Wakamatsu, Fukushima-ken, 965-8580, JAPAN

Registration Steps

1. Arrive at the **University of Aizu;**
2. Inform the conference staff of your paper ID;
3. Sign your name on the Participants list;
4. Sign your name on Lunch & Dinner requirement list;
5. Check your conference kits: (1 conference program, 1 lunch coupon, 1 dinner coupon, 1 name card, 1 laptop bag);
6. Finish registration.

Tips: Please arrive at the conference to upload or copy Slides (PPT) into our laptop in the conference room 10 minutes before the session begins.

Note:
(1) The organizer doesn't provide accommodation, and we suggest you make an early reservation.
(2) One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session.
(3) One regular registration can cover one participant.
(4) The organizers cannot accept liability for personal injuries, or for loss or damage of property belonging to meeting participants, either during, or as a result of the meeting. Please take care of all your belongings.
(5) Along with your registration, you will receive your name badge, which must be worn when attending all official conference sessions and activities. Participants without a badge will not be allowed to enter the venue building. Please don't lend your name badge to others.

For Attend Virtual Conference Test

Zoom link: https://us02web.zoom.us/j/82372603081

Zoom Room ID: 82372603081

Time	Sessions	Presenter
13:20-13:30	Keynote speaker 3	Prof. Saman Halgamuge
13:30-14:00	Session 4 (Online)	AE0009, AE5006, AE0002, AE0038, AE0013
14:00-14:30	Session 5 (Online)	AE5013, AE5017, AE0044, AE5004, AE5024
14:30-15:00	Session 6 (Online)	AE5009, AE5018, AE0015, AE0039, AE0017, AE0019
15:00-15:10	Keynote speaker 4	Assoc. Prof. Weizhi Meng
15:10-15:20	Invited Speaker 1	Prof. Laura Ricci
15:20-15:30	Invited Speaker 2	Assoc. Prof. Hoshang Kolivand

* If you want to attend online test at another time, please contact your conference secretary in advance

October 28, 2023

Keynote Speeches, Invited Speeches and Onsite Sessions

Conference Room:

Lecture Theater, Lecture Hall

Lecture Room M2 (202), Lecture Hall 2F

Zoom link: https://us02web.zoom.us/j/82372603081

Zoom Room ID: 82372603081

Time	Each talk includes Q&A time	Presenter	Room
8:30-8:40	Opening Remark	Prof. Akihito Nakamura, University of Aizu, Japan Prof. Chia-Chen Lin, National Chin-Yi University of Technology	Lecture Theater
8:40-9:20	Keynote Speech 1 Speech Title: Information Steganography Using Magic Matrix	Prof. Chin-Chen Chang Feng Chia University	
9:20-10:00	Keynote Speech 2 Speech Title: Deep Learning Generation Based on Service Composition and Proposal of AGI Inference	Prof. Incheon Paik The University of Aizu, Japan	
10:00-10:40	Keynote Speech 3 Speech Title: Can AI be socially responsible?	Prof. Saman Halgamuge The University of Melbourne, Australia	
10:40-11:00	Coffee Break & Group Photo Time		
11:00-12:45	Session 1 (Onsite) AI -based image processing technology and application Session Chair: Prof. Chunhua Su, University of Aizu, Japan	AE5003-A, AE0025-A, AE5012, AE0033, AE5020, AE0035, AE0043	
12:45-14:00	Lunch Time		Lecture Theater
14:00-14:40	Keynote Speech 4 Speech Title: DevLeChain: An Open Blockchain Development Platform for DApps and Education	Assoc. Prof. Weizhi Meng Technical University of Denmark (DTU), Denmark	Lecture Theater
14:40-15:00	Invited Speech 1 Speech Title: Three killer blockchain applications: NFTs, supply chains and digital identities	Prof. Laura Ricci University of Pisa, Italy	

15:00-15:20	Invited Speech 2 Speech Title: AI and Mixed Reality Challenges: Current and Future Directions	Assoc. Prof. Hoshang Kolivand Liverpool John Moores University, UK	
15:20-15:40	Break Time		
15:40-17:40	Session 2 (Onsite) Software design and data model Session Chair: Dr. Md. Mostafizer Rahman, Dhaka University of Engineering & Technology, Bangladesh	AE0022, AE0042-A, AE0030, AE0036, AE0041, AE0029, AE0031, AE0037	
15:40-17:10	Session 3 (Onsite) Advanced blockchain technology and data security Session Chair: Prof. Chia-Chen Lin, National Chin-Yi University of Technology, Taiwan	AE5010-A, AE5015, AE5016, AE5022, AE0018, AE0034	Lecture Room M2 (202)
18:30-20:30	Dinner Time		Aizuwakamatsu Washington Hotel

***To connect Zoom smoothly, please upload or copy Slides (PPT) into our laptop in the conference room 10 minutes before the session begins and use our laptop.**

October 29, 2023

Online Sessions

Zoom link: https://us02web.zoom.us/j/82372603081

Zoom Room ID: 82372603081

Time	Each talk includes Q&A time	Presenter
10:00-11:15	Session 4 (Online) Software and application program design Session Chair: Dr. Noel E. Estrella, UNIVERSITY OF SANTO TOMAS, Philippines	AE0009, AE5006, AE0002, AE0038, AE0013
11:15-13:30	Lunch Time	
13:30-14:45	Session 5 (Online) Intelligent image analysis and artificial intelligence technology Session Chair: Prof. Dickson Lukose, Tabcorp Holdings Limited, Victoria, Australia	AE5013, AE5017, AE0044, AE5004, AE5024
14:45-15:00	Break Time	
15:00-16:30	Session 6 (Online) Network based digital communication and mobile platform construction Session Chair: Dr. Rohan Singh Rajput, Headspace, USA	AE5009, AE5018, AE0015, AE0039, AE0017, AE0019

Schedule Detailed Version

October 28, 2023

Japan Local Time (GMT+9)

Conference Room: Lecture Theater, Lecture Hall

Zoom link: https://us02web.zoom.us/j/82372603081

Zoom Room ID: 82372603081

Opening Remarks (8:30-8:40)

Addressed by
Prof. Akihito Nakamura, University of Aizu, Japan
Prof. Chia-Chen Lin, National Chin-Yi University of Technology

Keynote Speech 1 (8:40-9:20)

By Prof. Chin-Chen Chang, Feng Chia University

Title: Information Steganography Using Magic Matrix

Abstract - Steganography is the science of secret message delivery using cover media. A digital image is a flexible medium used to carry a secret message because the slight modification of a cover image is hard to distinguish by human eyes. In this talk, I will introduce some novel steganographic methods based on different magic matrices. Among them, one method that uses a turtle shell magic matrix to guide cover pixels' modification in order to imply secret data is the newest and the most interesting one. Experimental results demonstrated that this method, in comparison with previous related works, outperforms in both visual quality of the stego image and embedding capacity. In addition, I will introduce some future research issues that derived from the steganographic method based on the magic matrix.

Keynote Speech 2 (9:20-10:00)

By Prof. Incheon Paik, The University of Aizu, Japan

Title: Deep Learning Generation Based on Service Composition and Proposal of AGI Inference

Abstract - Although deep learning (DL) has achieved significant success in the industry, the involvement of artificial intelligence (AI) experts in developing customized DL services results in high costs and hinders its widespread application in the business domain. An automatic DL generation system can generate customized DL services without requiring the involvement of AI experts. In this presentation, two approaches for automatic DL generation to address this problem are presented. One is based on semantic service composition, and the other is based on inference using a large language model (LLM) that can be considered as a spark of Artificial General Intelligence (AGI). The first approach utilizes human knowledge in ontology and reasoning rules from traditional AI techniques. Reasoning with the ontology and rules can infer the appropriate DL architecture from the user's request. The second approach leverages the inference ability (though not complete) of LLM. We expect that an aligned LLM, using data from ontology and rules with supervised fine-tuning and reinforcement learning based on human/machine feedback, can efficiently infer DL architectures.

Keynote Speech 3 (10:00-10:40)

By Prof. Saman Halgamuge, The University of Melbourne, Australia

Title: Can AI be socially responsible?

Abstract - The 21st century AI needs to be socially responsible and equipped with capabilities to face serious threats like dangerous epidemics and climate emergencies. Several major technical issues hinder the creation of such AI with democratized access that would bring most of this technology to almost all people on Earth. AI used in applications evade regulations in most parts of the world. I will introduce these major technical issues of AI as well as the opportunities current AI can create for the developing world. My talk will focus on two groups of AI applications: well-known applications of AI of value to the planet including the developing world, e.g., Health, Agriculture, Energy, Transportation and Environment and specific applications of AI mostly useful to the developing countries.

Coffee Break & Group Photo Time: 10:40-11:00

Onsite Session 1 (11:00-12:45)

Conference Room- Lecture Theater

Topic: AI -based image processing technology and application

Session Chair: Prof. Chunhua Su, University of Aizu, Japan

AE5003-A (11:00-11:15)

SiamUnet Network For Barrier Recognition And Its Application To Morphological Change

Hsien-Kuo Chang[1], Wei-Wei Chen[1], Chih-Chung Wen[2], Jin-Cheng Liou[1] and Shao-Gu Kuo[3]

1: National Yangming Chiaotung University, Taiwan

2: HungKuang University, Taiwan

3: CECI Engineering Consultants, Inc. Taiwan

Abstract - Barrier change is a complex evolution process of coastal topography, which attracts some scholars' interest in exploring its mechanism. The Waisanding Barrier (WSDB) in Taiwan has suffered from continuous beach erosion and land aggression in recent decades. The traditional method to understand the change in beach bathymetry is to calculate the difference in bathymetrical elevation from pre-post site measurements. Because of the lack of early measurements and the frequency of measurements being not dense enough, it is impossible to accurately understand the characteristics of barrier changes. The full collection of satellite images and the use of state-of-the-art image processing techniques are available to automatically derive a Satellite-Derivatived Shoreline (SDS). We developed a SiamUnet network to efficiently and accurately detect waterline for 207 SPOT 5-7 high-resolution satellite images available from 2004 to 2021. After obtaining the barrier waterline shape of each image under the condition of the corresponding tidal level that deviates from the mean sea level within ±15 cm is obtained, the attenuation rate of these land areas is estimated to be -0.344 km2/year using the linear fitting. We found two special morphological changes, such as the separation and L-shaped turning of the southern end of WSDB from all detected waterlines. The time when these two phenomena occurred can be determined from long-term images. The year-by-year length of the L-shaped end is also discussed.

AE0025-A (11:15-11:30)

Observation of Text Generation by GPT Language Model Fine-Tuned by Generated Ontology

Marika Kuwabara and Incheon Paik

The University of Aizu, Japan

Abstract - Deep learning has developed rapidly in recent years, making advances in a variety of fields. In particular, the release of ChatGPT has increased attention to the ability of AI to generate sentences. ChatGPT is enabled by a huge corpus of sentences on the Web and long training times to enable superior performance. However, when using a text corpus as a dataset, it is necessary to collect new sentence data and relearn when data updates or modifications occur. There have been researches to integrate the existing large language

model (LLM) with knowledge data to improve performance. Here, the knowledge data has been constructed by humans or specific tools. The approaches cannot afford flexible reasoning from text generation. Therefore, this research aims to integrate generated knowledge into the LLM. Our ontology generation algorithm uses lexical patterns and filtering to generate new knowledge to be applied to fine-tune the existing LLM. Ontologies were used as the dataset format, and an ontology generator was used to create the dataset by generating ontologies from SQuAD v2.0 and inserting them as tags in SQuAD v2.0. The model was fine-tuned using the ontology dataset with OpenAI's GPT-2 model, which is excellent for sentence generation. Three evaluation metrics are performed, and one of them, the result of perplexity shows a performance improvement of 0.135 over the pre-fine-tuning and 0.037 over the SQuAD v2.0 dataset model without the ontology.

AE5012 (11:30-11:45)

Humanode: The First Crypto-Biometric Network

Dato Kavazi[1], Victor Smirnov[1], Sasha Shilina[1,2], Jonathan Shomroni[3], Rafael Contreras[1], Hardik Gajera[4], Dmitry Lavrenov[5]

1: Paradigm, Grand Cayman, Cayman Islands

2: Lomonosov Moscow State University, Moscow, Russia

3: Arison School of Business, Reichman University, Herzliya, Israel

4: Dhirubhai Ambani Institute of Information and Communication Technology, India

5: Belarusian State University, Belarus

Abstract - We present a novel 1 Human = 1 Node blockchain protocol which aims to overcome problems arising from plutocratic principles upon which Proof-of-Work (PoW) and Proof-of-Stake (PoS) heavily rely on. The advent of blockchain technology has led to a massive wave of different decentralized ledger technology (DLT) solutions. Projects such as Bitcoin and Ethereum managed to shift the paradigm of how to transact value in a decentralized manner, yet their core technologies give rise to a significant early adopters' control bias and have led to financial systems flawed by massive inequality and centralization of power. In this paper we propose an alternative to modern decentralized financial networks by introducing the Humanode network. Humanode is a network safeguarded by cryptographically secure bio-authorized nodes on which users are able to deploy nodes by staking their encrypted biometric data. This approach can potentially lead to the creation of a truly public, permissionless financial network, based on consensus between equal human nodes with algorithmic emission mechanisms targeting real value growth and contribution-based wealth distribution.

AE0033 (11:45-12:00)

A Multi-label Classification Method for Positive and Unlabeled Dataset

HIKARU TAKAHASHI and ZHAO QIANGFU

University of Aizu, Japan

Abstract - Positive and Unlabeled (PU) learning is a learning method which can be applied to various field such as recommendation and big data analysis. A direct method to solve PU learning is transform it into a weighted classification problem. However, previously proposed methods assume a strict condition. In this paper, we first investigate if the condition can be satisfied in real world situations and then propose a normalized weighted method which can relax the difficultly of PU learning.

AE5020 (12:00-12:15)

Dimension-Wise Feature Selection of Deep Learning Models for In-Air Signature Time Series Analysis Based on Shapley Values

Yuheng Guo, Lingfeng Zhang, Yepeng Ding, Junwei Yu and Hiroyuki Sato
The University of Tokyo, Japan

Abstract - This paper performs a comprehensive evaluation of Smartwatch in-air signature classification based on multiple deep learning models. We leverage the Shapley value in dimension-wise feature selection to provide the in-air signature community with the most and least dominant dimension regarding the accuracy of in-air signature classification. Our experiment results highlight InceptionTime as the top-performing model, achieving an accuracy of 97.73%. Through our Shapley Value analysis, among all the sensors embedded in the Smartwatch, we find that the y dimension of the gyroscope and the z dimension of the gyroscope contribute the most to classification accuracy with 12.57% and 12.51% respectively, while the x dimension of the accelerometer produces the least contribution with 8.71%.

AE0035 (12:15-12:30)

Performance and Cost Balancing in Vision Transformer-Based Image Captioning

YAN LYU, Yong Liu and Qiangfu Zhao
The University of Aizu, Japan

Abstract - Image captioning connects computer vision and natural language processing. Many deep learning models have been proposed for solving this problem, such as Transformer-based, CLIP-based and Diffusion-based models. However, the primary focus has been on increasing the accuracy of generating human-like descriptions for given images, which has led to expensive SOTA models that cannot be implemented on computation-limited devices. For better performance, we propose a ViT-LSTM model for solving image captioning tasks by addressing the challenge of long-range dependencies. Our model consists of a ViT model pre-trained using ImageNet 21k dataset, which captures global context, and an LSTM that generates captions reflecting both local and global visual cues. Additionally, we use convolutional layers to reduce feature map dimensionality while preserving spatial relationships and local patterns, allowing the model to understand local details and relationships between regions, achieving better performance with less computational cost.

AE0043 (12:30-12:45)

AI-based Quality-driven Decomposition Tool for Monolith to Microservice Migration

MUHAMMAD HAFIZ, HASAN, MOHD HAFEEZ, OSMAN, NOVIA INDRIATY, ADMODISASTRO and MUHAMAD SUFRI, MUHAMMAD
Universiti Putra Malaysia, Malaysia

Abstract - Businesses and organizations are increasingly moving their business-critical systems to the cloud environment to take advantage of cloud benefits, thus improving its agility, maintainability, and flexibility. Businesses decompose their legacy monolith applications to cloud-native architecture such as microservice to leverage the cloud-native potential. With the expanding distributed nature of migrated applications, new challenges in determining the migrated architecture quality arise. Previous migration framework gives

minimal attention to the post-migration quality aspect. This paper presents the Structural Quality (S-Quality) tool - a quality-driven decomposition tool that uses machine learning for migrating monolith applications to the microservice architecture. This tool utilizes various clustering techniques on monolith structural design properties to determine the service boundaries. In addition, this tool facilitates identifying the best microservice candidates based on migration architectural quality objectives through the scoring algorithm method, hence another contribution of this work. We validate our developed tool and scoring algorithm using a semi-structured interview with experts from the industry. Overall, findings indicate that the proposed scoring algorithm shows positive feedback from the experts and the acceptance of the S-Quality tool applicability by the industries.

Lunch Time: 12:45-14:00

Keynote Speech 4 (14:00-14:40)

By Assoc. Prof. Weizhi Meng, Technical University of Denmark (DTU), Denmark

Title: DevLeChain: An Open Blockchain Development Platform for DApps and Education

Abstract - Blockchain has become popular in various domains and networking environments. The development of smart contract has extended the usage of blockchain from a simple ledger database for decentralized cash transaction system into a platform that provides transaction intelligence. With all conveniences that smart contract has brought; it does not affect the underlying characteristics of solid data integrity and transaction auditability. However, to apply these new technologies into existing systems may not be easy. For this issue, this talk first introduces DevLeChain, a blockchain development platform that comes with unified access method, easy-to-understand development workflow, and constant design philosophy. It provides an easy toolset to customize and control the underlying blockchain's behavior to support DApps development and blockchain education. Then this talk will introduce decentralized applications (DApps) based on DevLeChain.

Invited Speech 1 (14:40-15:00)

By Prof. Laura Ricci, University of Pisa, Italy

Title: Three killer blockchain applications: NFTs, supply chains and digital identities

Abstract - Blockchain technology has a wide range of applications across various organizations due to its decentralized, transparent and secure nature. This talk will introduce three of the most impactful blockchain applications: Non Fungible Tokens, which allow to prove the ownership of an asset, supply chain which exploit the transparency and traceability of blockchain by recording every transaction and movement of assets, and self sovereign identity that can help individuals to control their personal data, and simplify the identity verification processes.

Invited Speech 2 (15:00-15:20)

By Assoc. Prof. Hoshang Kolivand, Liverpool John Moores University, UK

Title: AI and Mixed Reality Challenges: Current and Future Directions

Abstract - In this talk, we delve into the profound impact of AI 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.

Break Time: 15:20-15:40

Onsite Session 2 (15:40-17:40)

Conference Room - Lecture Theater

Topic: Software design and data model

Session Chair: Dr. Md. Mostafizer Rahman, Dhaka University of Engineering & Technology, Bangladesh

AE0022 (15:40-15:55)
Enhancing Programming Learning with LLMs: Prompt Engineering and Flipped Interaction
Brendan Cowan, Yutaka Watanobe and Atsushi Shirafuji
University of Aizu, Japan

Abstract - Due to their robustness, large language models (LLMs) are being utilized in many fields of study, including programming and edu-cation. Notably, they can be used by programmers by interfacing with their IDEs to assist with development, and in education by giving students meaningful and immediate feedback. In this paper, we propose and explore the groundwork of a framework designed to combine these two applications of LLMs. The framework acts as a facilitator between the LLM and the student by reading the student's prompts before filtering and modifying them and sending them to the LLM. The intent is that this will improve the responses from the LLM, thereby improving the student's learning experi-ence. We discuss the framework in detail and analyze the value of individual responses returned from the LLM as a result of our framework. We conclude that the framework causes the LLM to give helpful responses in comparison to how it would respond without the framework.

AE0042-A (15:55-16:10)
Dynamic Subscription Pricing in a Freemium Model
Cheng-Han Wu and Ling-Ya Huang
National Cheng Kung University, Taiwan

Abstract - The recent "freemium" business model allows users free product access, paying for added features. This study explores optimal pricing and investment strategies for enterprises using freemium models, considering various subscription plans and market settings. Businesses can divide users through pricing, gaining ad revenue from free users and monthly subscriptions from paying ones. Initial fixed costs can be lowered through continual investment or feature development to attract subscribers. Users' d ecisions hinge on current and reference prices. This study establishes a dynamic control model, finding that reference prices lower subscription rates, and advertising revenue affects pricing. Profitability is influenced by ad revenue rates. Equilibrium pricing rises over time. Advertising subscriptions are advantageous unless high costs are incurred. Standard subscriptions yield higher profits if advertising costs exceed a threshold.

AE0030 (16:10-16:25)

Integrated Coding Environment for Programming Exercise

KIYOHIRO MURAI and YUTAKA WATANOBE
University of Aizu, Japan

Abstract - Programming education has become important due to the recent development of ICT. However, there are some barriers for beginners to learn programming. The first is a technical problem that construction of an execution environment is not easy. The second is the lack of graders for solving programming and algorithmic problems. The third is that learners cannot receive sufficient reviews. The fourth is that it is not easy to grasp the learning status of learners. This paper proposes an environment called Integrated Coding Environment to solve these problems. So far, the functional and architectural interactions of online learning services have not been sufficiently discussed. In addition, there is not enough discussion on how to systematically interact with online learning services in the learner's workflow. This paper describes the environment designed to support this workflow, focusing on the comprehensive components it contains and their interactions. The environment has been implemented and utilized, and experiences in its operation are also discussed.

AE0036 (16:25-16:40)

Verification of Relational Database Languages Codes Generated by ChatGPT

PUTSADEE PORNPHOL[1] and **SUPHAMIT CHITTAYASOTHORN[2]**
1: Phuket Rajabhat University, Thailand
2: King Mongkut's Institute of Technology Ladkrabang, Thailand

Abstract - The potential of using large language model artificial intelligence systems to generate program codes for application development is significant. Database codes in SQL (Structured Query Language), which is the standard relational database language, can be generated by such systems. Generative AI systems know database languages syntax through their training data and the text patterns from various sources that include SQL queries and related text. Thus, the generated codes may not be perfect and need verification before usage. This paper verifies the relational completeness of the SQL codes generated by ChatGPT, one of the most widely used large language model systems. Relational algebra operators are used for the relational complete verification. An equivalent relational calculus statement is generated for each SQL and relational algebra statement. The results confirmed that ChatGPT has the ability to generate relational complete SQL, relational algebra, and relational calculus codes.

AE0041 (16:40-16:55)

Analysis of the Programming Languages Preferred by Novice Programmers for Solving Programming Problem

Md Faizul Ibne Amin[1], Md. Mostafizer Rahman[2], Atsushi Shirafuji[1] and Yutaka Watanobe[1]
1: University of Aizu, Japan
2: Dhaka University of Engineering and Technology, Bangladesh

Abstract - In ICT education, most of the courses particularly those focused on programming, are designed to enhance computational and practical skills. However, the selection of appropriate programming languages holds great significance for novice programmers embarking on their journey of learning programming. This

paper presents a comprehensive analysis utilizing real-world data to gain insights into the prevalent trends in programming language selection for problem-solving among novice programmers. The study leverages solution submission logs from an online judge (OJ) system, employed as an educational tool within an introductory programming course. The analysis specifically focuses on topic #1 consists of four problems of this course. Our investigation revolves around programmers' first attempts to solve these problems, taking into account the programming languages they employ. The findings of our detailed statistical analysis shed light on the preferred programming languages used by programmers to tackle these problems. These insights not only aid fledgling novice programmers in making informed decisions when selecting a programming language, but also offer educators, instructors, and academic institutions valuable information for curating programming language choices within introductory programming courses.

AE0029 (16:55-17:10)

LSA: A Novel State-Of-The-Art Sorting Algorithm for Efficient Arrangement of Large Data

ARIFUL ISLAM SHIPLU[1], **MD. MOSTAFIZER RAHMAN[2]** and YUTAKA WATANOBE[2]
1: Dhaka University of Engineering & Technology, Gazipur, Bangladesh
2: University of Aizu, Japan

Abstract - Over the years, data generation from various sources (social media, business, medical, education, programming, images, videos, etc.) has increased exponentially due to technological development, application, and daily usage. Organizing these large amounts of data efficiently is not a trivial task. Therefore, an efficient sorting algorithm can be helpful in processing and arranging these large data. To address this issue, we propose a novel sorting algorithm called the Layered Sorting Algorithm (LSA) that organizes data using a layering approach. The LSA aims to improve sorting efficiency by exploiting the inherent structure and characteristics of the data. The algorithm divides the input data into layers, where the data of each layer has the same length (or digits). Single-length data is on layer 1, double-length data is on layer 2, and so on. Within each layer, a specific sorting technique is applied to efficiently arrange the elements. In this paper, we conducted experiments with more than one million random integer data, which have a maximum length of 10. The experimental results show that LSA obtained better results in terms of time complexity and comparisons compared to existing state-of-the-art sorting algorithms. The results demonstrate that LSA achieves the best case and average case when sorting data. Moreover, LSA reduces a significant number of comparisons than the original algorithms when sorting data as well as reduces time complexity. Furthermore, the proposed LSA can be used with existing sorting algorithms to achieve better performance for sorting large-scale data.

AE0031 (17:10-17:25)

Knowledge Experience Model for Designing Data Exploration Tools in Museums

ATSUKI YANADA, ERI MIYAOKA and RENTARO YOSHIOKA
University of Aizu, Japan

Abstract - A design methodology was proposed to improve the effectiveness of data exploration and to coordinate the presentation of "views" and "metadata" using a knowledge experience model to elicit insights. Through the museum case study, we analyzed user behavior and identified the need to improve the design of end-user data tools. Future work includes refining the user model, developing tools, and validating the model to contribute to user satisfaction.

AE0037 (17:25-17:40)

An IoT-Based Health Care Solution: A Smart Medical Box

Adib Mahamud Khan[1], **Raihan Kabir[2]**, Nigar Sultana Sudha[1], Nadeem Ahmed[1], Yutaka Watanobe[2] and Md Rashedul Islam[1]

1: University of Asia Pacific, Bangladesh

2: University of Aizu, Japan

Abstract - IoT in healthcare is intended to keep people safe and healthy, with the primary goal of lowering healthcare costs and reducing the involvement of caregivers in the coming years. This research proposes a smart IoT-based health- care system, which includes an intelligent medical box connected to a mobile app for continuous health monitoring. Patients can get regular health care with the help of this medical box with a dedicated app and web server. The proposed system helps the patients to check their heart rate, temperature, and oxygen level, all using just one device. It provides an easy way for the user to do this checkup by themselves without any help from caregivers or even doctors. Moreover, the proposed system assists the patients in taking the proper medicinal drugs in due time with an SMS and buzzer alarm. It additionally creates a clean verbal exchange between medical doctors and patients rather than bodily contact. The proposed system can be accessed through an app that stores all the detailed health reports about the patient. Doctors can easily check the patient's report and can change the prescriptions based on the condition of the reports, if necessary. This box also consists of an emergency button that the user can use in case of any emergency to notify their respective caregiver immediately.

Onsite Session 3 (15:40-17:10)

Conference Room - Lecture Room M2 (202)

Topic: Advanced blockchain technology and data security

Session Chair: Prof. Chia-Chen Lin, National Chin-Yi University of Technology, Taiwan

AE5010-A (15:40-15:55)

Blockchain at the service of Patient Participation and Informed Consent in Clinical Trials

Olivier Simon[1], Harold Kinet[2], Steve Vansimpsen[2] and **Ingrid Van Rompaey[1]**

1: Viso Clinical, Belgium

2: BeBlockchain, Belgium

Abstract - Numerous challenges arise in the execution of clinical trials aimed at supporting the development of new drugs and treatments. One such challenge is the issue of Patient Informed Consent, which continues to be listed as one of the top audit findings by health authorities, despite various available commercial solutions. Blockchain technology offers a trustworthy, transparent, decentralized and tamper-proof environment that address the inherent needs of the highly regulated clinical trial environment. We have thoroughly analyzed these challenges and we have developed a patient centric solution relying on the blockchain model for patients informed consent. This solution ensures traceability and transparency of transactions and also guarantees that clinical trialsparticipants always have access to the latest and most accurate information regarding the trial they are participating in. The solution provides immediate access for auditors and health authorities to review. Our solution covers subjects trial participation in all clinical phases. The benefits of this innovative blockchain solution include enhanced patient trust, improved efficiencies, reduced errors and delays, and increased accessibility of trials for patients. It can facilitate the connection between patients with rare diseases and clinical trials, thereby promoting the advancement of therapies for orphan indications.

AE5015 (15:55-16:10)

Application and Limitations of Digital Signature Schemes for Implementing Non-Fungible Token (NFT)

Kei Ikebe[1], Yudai Hata[1], Toru Nakamura[2], Takamasa Isohara[2] and **Kouichi Sakurai**[1]

1: Kyushu University, Japan

2: KDDI Research, Inc., Japan

Abstract - The ERC721 standard defines a Non-Fungible Token (NFT) as an identifier that uniquely identifies digital data recorded on a blockchain. The NFT currently in use claim to ensure the uniqueness of the contents associated with the NFT by taking advantage of the tamper-resistant characteristics of the blockchain data. Besides, digital signatures based on public-key encryption is a representative technique to prevent digital data from being falsified, and its application to NFT is also discussed. In this study, we first consider an NFT implementation by applying a designated confirmer signature using an interactive verification method without using blockchain technology. We design an NFT issuance protocol that guarantees the uniqueness of data with a designated confirmer signature, and evaluate the security of the protocol. Moreover, we compare

it with existing blockchain implementations. By analyzing the both methods, we aim to provide insights into the potential applications and performance in using designated confirmer signatures for NFT. Our findings contribute to the ongoing research on secure and efficient mechanisms for ensuring the integrity and uniqueness of digital assets in decentralized systems.

AE5016 (16:10-16:25)

Blockchain in Action Enhancing Transparency and Traceability in the Pharmaceutical Supply Chain - A Case Study from Vietnam

Trong Tien Hoang and **Cong Doan Truong**
Vietnam National University, Hanoi, Vietnam

Abstract - This study explores the critical role of digital advancements in supply chain management within the pharmaceutical industry, particularly focusing on the potential of blockchain technology to rectify the prevailing information access imbalance. The research establishes the link between the importance of increased transparency and traceability of pharmaceutical products and the prospective solutions that blockchain technology can offer. To substantiate this, we propose a novel application to facilitate end-to-end inclusion in the supply chain process. This application, developed to suit the specific requirements of the Vietnamese pharmaceutical industry, records pertinent product details in a centralized MS SQL database. A selection of these details is then transferred to a blockchain network, enhancing traceability and transparency by rendering the information immutable, verifiable, and widely accessible. It also underscores the promising horizon of integrating blockchain technology into supply chain management for the establishment of more efficient, resilient, and transparent systems in the era of digital transformation.

AE5022 (16:25-16:40)

VeriAnon: an Anonymous, Verifiable, and Tamper-proof Commenting System Based on Ring Signature and Clustering Merkle Tree for Decentralized Trading

Junwei Yu, Yuheng Guo, Yepeng Ding and Hiroyuki Sato
University of Tokyo, Japan

Abstract - As blockchain technology continues to evolve, decentralized markets have been progressively expanding, offering novel avenues for participation in economic activities. However, within this evolving landscape, the commenting systems of decentralized trading have not yet reached a state of comprehensive refinement. Such shortcomings have impeded participants' trust in the platforms and have constrained the further proliferation of the decentralized trading model. An integral feature within the commenting system is anonymous evaluation, which holds significance not only for safeguarding participants' privacy but also for playing a pivotal role in establishing reputation and credibility for trading platforms. Nonetheless, devising mechanisms to manage anonymous evaluations and establishing a trustworthy commenting system presents substantial challenges, owing to the inherent characteristics of decentralized systems that lack third-party intermediaries and regulatory bodies. Therefore, motivated by ensuring the authenticity, impartiality, and effectiveness of anonymous evaluations, along with preventing malicious evaluations and undesired behaviors like credit manipulation, we propose a robust anonymous comment management mechanism, leveraging ring signature and clustering Merkle tree for decentralized trading. Besides, we implement VeriAnon, a commenting system integrating our mechanism to enable privacy-preserving authentication of anonymous evaluators, cost-efficient management of anonymous comments, and effective verification of

comment integrity and authenticity.

AE0018 (16:40-16:55)
Deduplicating and Ranking Solution Programs for Suggesting Reference Solutions
Atsushi Shirafuji and Yutaka Watanobe
University of Aizu, Japan

Abstract - Referring to solution programs written by other users is helpful for learners in programming education. However, current online judge systems just list all solution programs submitted by users for references, and the programs are sorted based on the submission date and time, execution time, or user rating, ignoring to what extent the programs can be helpful to be referenced. In addition, users struggle to refer to a variety of solution approaches since there are too many duplicated and near-duplicated programs.
To motivate learners to refer to various solutions to learn better solution approaches, in this paper, we propose an approach to dedu-plicate and rank common solution programs in each programming problem. Inspired by the nature that the many-duplicated program adopts a more common approach and can be a general reference, we remove the near-duplicated solution programs and rank the unique programs based on the duplicate count. The experiments on the solution programs submitted to a real-world online judge system demonstrate that the number of programs is reduced by 60.20%, whereas the baseline only reduces by 29.59% after the deduplication, meaning that users only need to refer to 39.80% of programs on average. Furthermore, our analysis shows that top-10 ranked programs cover 29.95% of programs on average, indicating that users can grasp 29.95% of solution approaches by referring to only 10 programs. The proposed approach shows the potential of reducing the learners' burden of referring to too many solutions and motivating them to learn a variety of solution approaches.

AE0034 (16:55-17:10)
A Novel Data Hiding Scheme based on Block Features Enhanced AMBTC
CHIA-CHEN LIN, HIZRAWAN DWI OKA and ENTING ZHU
National Chin-Yi University of Technology, Taiwan

Abstract - In this paper, we first improve Chen et al.'s ternary representation-based Absolute Moment Block Truncation Coding (AMBTC), then we combine block features and AMBTC to design our novel block feature enhanced-AMBTC-based data hiding scheme called BFI-AMBTC-based DH scheme. In our scheme, AMBTC blocks are classified into three types: complex, smooth, and flat according to the distribution of pixels in a block. For each block type, we propose different data hiding strategies according to their unique features. Experiments confirm that our hybrid data hiding strategies work well. The image quality of stego images with our hybrid data hiding strategies not only has been significantly improved but also is much closer to that offered by the conventional AMBTC compared with other existing AMBTC-based data hiding schemes. In addition, the hiding capacity achieved by our BFI-AMBTC-based DH scheme is confirmed almost two times Ou and Sun's scheme.

Dinner Time: 18:30-20:30

Aizuwakamatsu Washington Hotel

October 29, 2023 Japan Local Time (GMT+9)

Online Session 4 (10:00-11:15)

Zoom link: https://us02web.zoom.us/j/82372603081

Zoom Room ID: 82372603081

Topic: Software and application program design

Session Chair: Dr. Noel E. Estrella, UNIVERSITY OF SANTO TOMAS, Philippines

AE0009 (10:00-10:15)

FEDesk: A Web and Mobile Document Management System for the University of Santo Tomas Office for Faculty Evaluation and Development

AINAH GAIL F. REYES, CARLOS NEIL A. PARALEON, RALPH VINCENT V. BIBERA, SOPHIA JHYNNE EVELYN B. GARCIA and **NOEL E. ESTRELLA**

University of Santo Tomas, Philippines

Abstract - With the increasing number of individuals working from home and the development of information technology, more information is being disseminated over the Internet. Regardless of the industry, several aspects must be implemented in order for the workplace environment to be efficient and operate smoothly. Documents are the most essential assets of any organization, therefore understanding how to properly maintain a paper trail may have a significant impact on how efficiently things run on a daily basis.

With this, the developers were inspired to develop a web and mobile application named FEDesk for the Office for Faculty Evaluation and Development (OFED) of the University of Santo Tomas. The developers strongly believe that this project is beneficial as it enables the stakeholders to organize and centralize their files, manage the tracking of documents and materials being received, filed, and sent, as well as to provide a platform for efficient communication and collaboration with various academic and administrative units of the university through a document management system.

The development team used the Agile-Waterfall methodology as the process model to implement the project since it helps identify project shortcomings, resolve them immediately, and improve the end result. The strategy is to adapt rapidly in a short development period if there is a threat or harm to the development process's efficiency.

In the post-developmental phase, the developers gathered significant information from the FEDesk web and mobile application by undertaking different testing methods such as unit and integration testing to address the functionality and reliability requirements on both web and mobile applications, testing for security, performance, usability, reliability, scalability, portability, and lastly, the user acceptance test. In terms of the application’s usability, end users were given the opportunity to provide feedback on the application and indicate potential areas for development. Moreover, the non-functional requirements of the system were assessed through automated test tools such as Google Lighthouse and UptimeRobot. Following the results, the developers concluded that FEDesk effectively met the project's objectives while adhering to the scope and limitations defined in Chapter 1.

Furthermore, recommendations for the FEDesk application were obtained from end users during acceptance testing, recommendations from panels during the final defense, and from the developers themselves. The

following are the recommendations, providing bulk downloading and submission of files; allowing multiple recommendation filing and submission; integration of file merging and appending a digital signature to files; implementing the FEDesk application in the iOS platform; adding helpful information such as unsuccessful events, errors, and user activities in the audit logs.

AE5006 (10:15-10:30)

FoodS and FoodIM: Food-Testing Item Recommendation Models for Two Different Users with Different Usage Abilities

Zhixiao Qi[1], Yongfeng Huang[1], Jinzhu Wu[1] and Songbin, Li[2]

1: Tsinghua University, China

2: Haikou Lab, Institute of Acoustics, Chinese Academy of Sciences, China

Abstract - Recommendation systems should adopt different recommendation strategies for different users' usage abilities. For the question of what testing items are required for a food, we have designed two food-testing item recommendation models, called Food Similarity recommendation (FoodS) and Food Testing Item Matching recommendation (FoodIM). FoodS is suitable for unprofessional users who are not aware of testing items. FoodS processes different attributes by different techniques to calculate the similarity between foods, and directly recommends the testing items of the most similar food as the results. FoodIM is suitable for professional users who are aware of testing items. FoodIM calculates the degree of matching between food and testing items through the two-tower structure, and recommends the testing items that match the food. We use macBERT for embedding in FoodIM and named entity recognition (NER) to enhance the representation of food. To improve inference speed, we use GPT-3 for data augmentation and obtain embedding by contrastive learning instead of macBERT. Our experiments on the food-testing item dataset show that both of our recommendation models outperform state-of-the-art methods.

AE0002 (10:30-10:45)

Disaster Online Reporting Application v4

Castro, Michaela Marie N., Cuadra, John Lester G., Maruno, Hitomi B., Quitor, Cedric John D. and **Zhuo, Eugenia R.**

University of Santo Tomas, Philippines

Abstract - The Philippines frequently suffers typhoons, earthquakes, floods, volcanic eruptions, landslides, and fires as a result of its location on the "Pacific Ring of Fire" and close proximity to the Pacific typhoon belt. Urban and metropolitan communities across the country are both at risk. The fourth version of Disaster Online Reporting Application, an android-based mobile application that aims to improve upon the features of the previous version of the application and add features that will enable the user to collaborate with others, was developed as a result of inspiration from the application's developers. DORA v4's purpose is to provide disaster warnings, enable user communication, and provide support assistance to affected areas. The Iterative Waterfall model was employed by the researchers. Potential errors are discovered using this technique during the application's development and testing phases. The objectives and non-functional requirements were all met by the developers. The DORA v4 has successfully achieved the stated goals while staying within the scope and limitations of the project itself, according to the results of the test cases and user acceptance tests. The developers were able to carry out both the project's functional and non-functional requirements. The Quezon City DRRMO staff member and users who tested the application made recommendations to the

developers.

AE0038 (10:45-11:00)

The Assessment of the State of Automated Testing in Blockchain-based Systems: A Review

NADIAH ARSAT, **NORMI SHAM AWANG ABU BAKAR** and NORZARIYAH YAHYA
International Islamic University Malaysia, Malaysia

Abstract - Blockchain technology has recently gained popularity and has been used in numerous fields, including financial services, insurance, government systems, healthcare, and the Internet of Things (IoT). As blockchain technology advances, the list continues to grow. Several issues have emerged due to the diverse implementations of blockchain technology, including blockchain adoption issues, transactional privacy concerns, and Smart Contract issues. Previous research had developed a testing framework for the blockchain- based application, but their focus is on unit testing and does not include the test automation component or validation of the framework. Thus, this paper aims to examine the existing testing practices and techniques in blockchain-based systems. The findings of the paper review will be used as a guideline to create a framework for automated testing for Blockchain-based systems.

AE0013 (11:00-11:15)

TeluKids: An Educational Mobile Application Teaching Good Manners and Right Conduct Specifically for Kids (Ages 3-9)

Lopez, Reinhardt Heinz S., Mariñas, Andrea Jane B., Pascual, Myrwynne V., Quintero, C-sel Jan R. and **Domingo, Mylene J.**
University of Santo Tomas, Philippines

Abstract - As time goes by, technology has become more of a necessity rather than a luxury in people's everyday lives. Given the COVID-19 pandemic, children have been void of face-to-face interaction and are being subjected to attending online classes and are being exposed to technology now more than ever. As a result, children might not be able to develop the proper values and conduct and how to interact with others like they would be learning in an actual school setting. Because of this, the authors were inspired to develop a mobile application named TeluKids with the purpose of featuring lessons of good manners and right conduct (GMRC) for children through the means of technology that children have become more accustomed to using. The proponents believe that this project will greatly benefit the children and the parents/guardians affected by the pandemic. For the children, they will be able to gain basic knowledge of GMRC in a fun and interactive manner through TeluKids. For the parents, while their children are using TeluKids, they can be assured that their children's screen time is being utilized in an educative manner and are not being exposed to any malicious or inappropriate content.
The authors will use the SDLC-Hybrid Development Methodology as the process model for this proposed project since hybrid methodology provides concrete planning through design phases while allowing flexibility for the development and testing phases for the best possible output. The authors believe that hybrid methodology allows the most time-efficient methodology design for the project while also prioritizing the development and testing of the application in order to ensure the best possible version of Telukids is produced.

Lunch Time: 11:15-13:30

Online Session 5 (13:30-14:45)

Zoom link: https://us02web.zoom.us/j/82372603081

Zoom Room ID: 82372603081

Topic: Intelligent image analysis and artificial intelligence technology

Session Chair: Prof. Dickson Lukose, Tabcorp Holdings Limited, Victoria, Australia

AE5013 (13:30-13:45)

Clustering-Induced Generative Incomplete Image-Text Clustering (CIGIT-C)

Xiaoming Su[1], Dongjin Guo[1] and Rui Su[1,2]

1: Inner Mongolia University of Technology, China

2: Inner Mongolia Power (Group)Co,Ltd, China.

Abstract - The target of incomplete image-text clustering (IITC) is to find correct clusters by integrating complementary and consistent information of multi-modalities for these unpaired heterogeneous samples. Although a series of methods have been proposed to address this issue, the following problems still exist: 1) Most existing methods hardly consider the distinct gap between heterogeneous feature domains. 2) For missing data, the representations generated by existing methods are rarely guaranteed to suit clustering tasks. 3) Existing methods do not tap into the latent connections both inter and intra modalities. In this paper, we propose a Clustering-Induced Generative Incomplete Image-Text Clustering(CIGIT-C) network to address the challenges above. More specifically, we first use modality-specific encoders to map original features to more distinctive subspaces. The latent connections between intra and inter-modalities are thoroughly explored by using the adversarial generating network to produce one modality conditional on the other modality. Finally, we update the corresponding modality-specific encoders using two KL divergence losses. Experiment results on public image-text datasets demonstrated that the suggested method outperforms the state-of-the-art baseline methods on 2 benchmark datasets with missing rate of 50% and 70%.

AE5017 (13:45-14:00)

Few-shot Industrial Defect Image Classification Based on Lightweight Model with Attention Mechanism

Meiqi Tu[1], Zhixiao Qi[1], Libin Yu[2] and Linxuan Zhang[1]

1: Tsinghua University, China

2: Urumqi Power Supply Section, Urumqi Railway Bureau, China

Abstract - This study investigates the application of deep learning methods in industrial defect image classification, particularly when training samples are limited. A metric-based approach is proposed, which utilizes a pre-trained deep convolutional neural network for feature extraction. This approach achieves effective category discrimination by computing the cosine similarity between query images and support images, without the need for additional adjustments for new defect categories. To enhance feature extraction,

a DenseNet with an attention mechanism is employed, providing a more lightweight model compared to ResNet12. The inclusion of a hybrid domain attention mechanism improves performance and alleviates potential performance degradation that may arise from parameter reduction. Extensive evaluations are conducted on both general datasets and industrial defect datasets, demonstrating the effectiveness of the proposed model in real-world scenarios. This approach only requires a small number of defect samples, and the attention mechanism-enhanced DenseNet feature extraction network utilizes only one-fourth of the parameters of ResNet12, achieving comparable or better detection results. An ablation experiment confirms the superiority of the DenseNet with an attention mechanism. In summary, this research contributes to the field of few-shot learning in industrial defect image classification by proposing a low-cost and efficient solution.

AE0044 (14:00-14:15)

Effectiveness of the Improvement Recommendations Model for Addressing the Syntactic Ambiguity in Malay Requirements Specifications

MOHD FIRDAUS ZAHRIN[1], MOHD HAFEEZ OSMAN[1] and SA'ADAH HASSAN[1], AZLENA HARON[2]
1: Universiti Putra Malaysia, Malaysia
2: Ministry of Education, Malaysia

Abstract - Malaysian government agencies have developed various citizen-service platforms and applications. However, unresolved Malay requirements specification (RS) ambiguities might disrupt the software development project's completion. Most prior research has focused on English RS but not Malay. Therefore, devising a model to recommend improvements for addressing the ambiguous Malay requirements specifications is challenging. This paper investigates the state-of-the-art approaches for establishing and validating the effectiveness of an improvement recommendations model for addressing syntactical ambiguity in Malay RS. We devised an improvement recommendations model using natural language processing (NLP), rule-based, part-of-speech (POS), subject-verb-object (SVO) patterns, and Malay boilerplate. Thirteen experts from various Malaysian public sector agencies validated the model's effectiveness based on improved Malay RS enhanced by disambiguating syntactic ambiguity terms. We surveyed the experts' opinions on the model's effectiveness and work experience through semi-structured interviews. This study revealed that 76.9% of the experts agreed and 23.1% strongly agreed that the improvement recommendations model effectively improved Malay RS by handling ambiguity. Experts with at least six years of experience in requirements engineering can comprehensively validate the improved Malay RS. The experts recognised the necessity for a model/ tool to aid requirements engineers in validating and enhancing the Malay RS by addressing ambiguity and recommending improved Malay RS structure based on Malay boilerplate syntax.

AE5004 (14:15-14:30)

Exploration of the Effectiveness and Characteristics of ChatGPT in Steganalysis Tasks

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2: Haikou Lab, Institute of Acoustics, Chinese Academy of Sciences, China

Abstract - Text steganography is a method of covert communication that aims to conceal the existence of secret information. Steganography has a long history of development and is widely used. However, its misuse poses a serious threat to information security, such as hiding malicious code to bypass security checks or

hiding criminal evidence in network environments. In response to the potential threat of steganographic text, steganalysis techniques have received urgent demand from practical applications and extensive attention from researchers. Currently, steganalysis models for text are mainly based on statistical features of steganographic text to identify such text, and these models require a large amount of training data consisting of steganographic and normal text to achieve good classification performance. The emergence of the large-scale conversational model ChatGPT in November last year has attracted widespread attention. Considering the powerful understanding ability of ChatGPT for text, we expect that ChatGPT can achieve good performance in the task of steganalysis or obtain inspiration about steganographic text features from its results. To evaluate the effectiveness of ChatGPT, we conduct experiments on 2 datasets and 3 encoding methods. The experiments show that compared with normal steganalisis method, ChatGPT can achieve similar results with only 32 samples, even without any training or fine-tuning.

AE5024 (14:30-14:45)

ContraPonzi: Smart Ponzi Scheme Detection for Ethereum via Contrastive Learning

Jiajing Wu[1], Jieli Liu[1], **Jinze Chen[1]**, Ting Chen[2], Jingwei Li[2], Shuwei Song[2] and Jiahao He[2]
1: Sun Yat-sen University, China
2: University of Electronic Science and Technology of China, China

Abstract - In recent years, blockchain technology has witnessed rapid development and received considerable attention. However, its decentralized and pseudonymous nature has also attracted many criminal activities. Among them, Ponzi schemes, a classic form of financial fraud, also hide their true face in smart contracts, causing huge losses to blockchain users. Although numerous methods have been proposed to detect Ponzi contracts, these methods still have limitations in terms of generalization and feature learning. To address this issue, we conduct research on Ethereum, the currently largest blockchain platform enabling smart contracts, and propose a novel contrastive learning-based smart Ponzi scheme detection method named ContraPonzi. This method first extracts control flow graph information from bytecodes and models it as attribute graphs that preserve both semantic and structural information. Next, by augmenting the bytecode data of multi-version compilers and maximizing the graph representation similarity of multi-version bytecodes of the same contract, a pre-training graph encoder is obtained and then can be used in Ponzi contract detection. Experimental results on real- world data demonstrate that ContraPonzi is significantly superior to the state-of-the-art in Ethereum Ponzi scheme detection.

Break Time: 14:45-15:00

Online Session 6 (15:00-16:30)

Zoom link: https://us02web.zoom.us/j/82372603081

Zoom Room ID: 82372603081

Topic: Network based digital communication and mobile platform construction

Session Chair: Dr. Rohan Singh Rajput, Headspace, USA

AE5009 (15:00-15:15)

Collaborative Structure Learning Framework from Wikipedia Based on Heterogeneous Graph Attention Network

Kui Xiao[1], **Wei Dai[1]**, Hongyan Li[2] and **Yamin Li[1]**
1: Hubei University, China
2: Hubei University of Economics, China

Abstract - The development of internet technology has brought great opportunities to online education. The vast learning resources and complex relationships between these concepts on the internet have brought great difficulties to learners. The prerequisite relation between these concepts has great guiding significance for learners' learning order. Hence, automatic prerequisite relation learning has become a hot research topic. The rise of graph neural networks has driven the entire artificial intelligence field and also brought development to prerequisite relation learning. Therefore, this paper proposes a weak supervised learning method collaborative structured learning framework. This framework takes the advantage of a graph attention neural network and node2vec to learn a heterogeneous graph composed of concepts and learning objects and a concept graph based on Wikipedia. Then, it obtains the prerequisite relation between concepts through a classification network. Our experiments on the W-ML dataset of MOOC and the University Course dataset show that the proposed collaborative structured learning framework has better performance than the current baseline models.

AE5018 (15:15-15:30)

The Mobile Payment Application Acceptance Model of China: on the Basis of S-O-R Theory

Shulan Chen, Singha Chaveesuk, Arga Ramadhana and Wornchanok Chaiyasoonthorn
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Abstract - With the rapid increase in the scale of mobile terminal equipment, the continuous expansion of mobile data traffic and the growth of Chinese residents' consumer demand, these factors have promoted the development of China's mobile e-commerce. Payment methods are a key component of mobile e-commerce, while traditional paper money transactions show increasingly prominent shortcomings in mobile electronic payments. In such a context, mobile payment emerged naturally. Mobile payment is convenient, fast and cashless. Mobile payment has changed the payment habits of Chinese paper currency transactions. Especially

during the period from 2020 to 2022, the outbreak of the COVID-19 has promoted cashless mobile payment to become the preferred payment method of the Chinese people. Among the Chinese mobile payment market, there are many kinds of mobile payment apps. For example, the People's Bank of China is testing a digital RMB application. In April 2022, Huawei Pay officially started operation. In addition, China has introduced a highly standardized system for mobile payments. With the increasing number of mobile payment applications and the introduction of a high standardization system for mobile payment, the competition in China's mobile payment market is increasingly fierce. Under the premise of complying with China's mobile payment standardization system, how can China's mobile payment operators retain and expand users in the fierce payment market? How do China's mobile payment operators survive and develop in the fiercely competitive environment? These are the issues that China's mobile payment operators focus on. Therefore, it is a very meaningful topic to study the influencing factors of China's mobile payment APP users' willingness to use.

AE0015 (15:30-15:45)

Wireless Network Infrastructure and Security Enhancement for St. Joseph School

Zyrus Kyle T. Alcazar, Ryan Patrick V. Martin, Vonn Eric M. Tulabot, Charles Anrei Z. Valerio, **Maricel A. Balais**

University of Santo Tomas, Philippines

Abstract - There is no doubt that the COVID-19 pandemic exacerbated the problems with education in the Philippines [8]. In the long run of being in a pandemic, they couldn't just let the students stop their schooling so they had to create ways to adapt. With the continued efforts in implementing distance learning until 2022, the HyFlex learning setup was finally introduced as a new strategy toward the new normal in Philippine education [3]. St. Joseph School is one of the schools that intended to implement a hyflex learning setup. However, since they opened their gates for face-to-face classes as a part of the hybrid learning mode, they anticipated an increase in the volume of users utilizing the existing network, hence, a need for enhancement. Therefore, this project enhanced the wireless network infrastructure and security of St. Joseph School. Specifically, the researchers installed access points across the whole campus, implemented pfSense as a firewall for the network, converted the HS Building Topology into a star topology, implemented servers, and configured network devices.

AE0039 (15:45-16:00)

Geo-Intelligent Architecture for Smart Grid Evolution: Addressing Contemporary Challenges through Spatial AI and Knowledge Integration

SHREYASH N. KAWALKAR

Independent Researcher, India

Abstract - This research explores the challenges of contemporary Smart Grid (SG) technology products and proposes a novel methodology to address them. Through a comprehensive survey, we identified common hurdles SG technologies face, especially with the rapid evolution of technology and the expansion of energy sector assets. Central to our methodology is the development of a conceptual architecture that is adaptive, scalable, and optimized for complex data management. Key features of this architecture include a Modular Architecture with Micro-Services, Serverless 2.0 for Scalability, and the integration of Knowledge Graphs for enhanced data-driven decision-making. At the heart of these solutions lies the synthesis of geospatial

intelligence via Geo-Spatial AI and the use of cognitive mapping to bridge micro-services with energy assets, to ensure the grid's responsive adjustment to dynamic energy landscapes. By synthesizing advanced AI technologies and geospatial mapping techniques, our approach promises a leap in efficiency, adaptability, and accuracy for future Smart Grid platforms.

AE0017 (16:00-16:15)

Network Infrastructure and Free Wifi Connectivity for Residents of Barangay Sto. Rosario – Kanluran

Ian Francis Belga, Isaac Michris A. Castillo, Joshua Audrei R. Esteva, Jaybel G. Logronio, Jr, **Maricel A. Balais**

University of Santo Tomas, Philippines

Abstract - This document presents the implementation of a network infrastructure study aimed at providing free WiFi connectivity to the residents of Barangay Sto. Rosario -Kanluran in Pateros. The study aims to enhance digital connectivity and accessibility within the community. The document discusses the planning, execution, and equipment, including access points, cables, and software tools. Emphasis on user-friendly interfaces, like portals, and implemented security measures. This study aims to create a secure and reliable network infrastructure and free-wifi connectivity. Barangay Sto. Rosario - Kanluran Researchers and barangay officials collaborate in acquiring equipment and configuring the network, highlighting their joint efforts. The researchers conducted the simulation, testing, and implementation of this study. using the Network Development Life Cycle methodology. The researchers proposed an enhanced network topology to create a new one since Barangay Sto. Rosario - Kanluran does not have an existing one. They utilize the TP-Link Omada application for access point management. The study's benefits include free WiFi access within range, requiring voucher codes from barangay officials. The document emphasizes the potential positive impact on connectivity, information access, and digital opportunities. Following the free wifi connectivity across zone 1 to zone 3, and simulations, the researchers have successfully implemented on-site. The researchers successfully configured the access points, switches, and the Omada Controller to provide network connectivity across Barangay Sto. Rosario - Kanluran. The end devices of the barangay were spread across Zone 1 and Zone 3, including locations outside the barangay, such as M.R. Flores St. The researchers implemented a captive portal to ensure security and restrict unauthorized access to the network. Additionally, they configured the firewall using the Omada Controller to enhance network protection.

AE0019 (16:15-16:30)

A Decentralized Blockchain Powered Social Network for Secure and Transparent Online Interactions

RASHMI P. SARODE, YUTAKA WATANOBE and SUBHASH BHALLA

University of Aizu, Japan

Abstract - The dominance of social media platforms has raised concerns regarding privacy, censorship, and the misuse of user data. To address these issues, the utilization of blockchain technology for decentralized social networks has gained considerable attention. In this study, we propose a novel social network built on blockchain, offering a secure and transparent environment for online interactions. The blockchain ensures the integrity of transactions and content through an immutable record, preventing unauthorized modifications. Smart contracts govern the system’s behavior, enforcing rules, facilitating transactions, and rewarding participants. We discuss the advantages of our proposed system and compare it with existing social networks. We highlight its potential to create a more secure and transparent online environment for social interactions.

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