

Conference Abstract

**2024 the 4th International Conference on
Information Communication and Software
Engineering**

ICICSE 2024

with workshop

**2024 9th International Conference on Mathematics and
Artificial Intelligence (ICMAI 2024)**

Beijing, China | May 10-12, 2024

Sponsored by



Technical Sponsor



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Yumin He, Beihang University, China

Zhongyang Yu, Henan University of Engineering, China

WELCOME MESSAGE

On behalf of the Conference Committee, we are very glad to bring you to 2024 the 4th International Conference on Information Communication and Software Engineering (ICICSE 2024) and its workshop 2024 9th International Conference on Mathematics and Artificial Intelligence (ICMAI 2024), held from May 10-12, 2024, in Beijing, China. It is sponsored by Beijing University of Technology, China.

ICICSE 2024 welcomes author submission of papers from any branch of the Communication and Software Engineering, and their applications or other topic areas. The areas covered by the include, but not limited to: Computer Information Science, Software development and design, Communication and Information Engineering, etc.

This year ICICSE received many submissions from members of universities, research institutes and industries. All papers were subject to peer-review by conference committee members and international experts. The acceptance of the papers is based on their quality and relevance to the conference. We hope that this conference proceedings will serve as a valuable reference for researchers, educators and developers.

This year, we are very grateful to have excellent speakers, they are:

- Prof. Shaozhang Niu, Beijing University of Posts and Telecommunications, China
- Prof. Hamid Jafarkhani, IEEE Fellow, AAAS Fellow, University of California Irvine, USA
- Prof. Rajkumar Buyya, IEEE Fellow, Director, Cloud Computing and Distributed Systems (CLOUDS) Lab, The University of Melbourne, Australia
- Assoc. Prof. Shahida Sulaiman, Universiti Teknologi Malaysia, Malaysia
- Dr. Paul Craig, Xi'an Jiaotong-Liverpool University, China
- Dr. Loc Nguyen, Loc Nguyen's Academic Network, Vietnam

The ICICSE 2024 conference has been planned so that experts from industries and academia, students of universities, will share their knowledge and experiences. The field is enriched during keynotes and presentation sessions, as well as in informal conversations among colleagues from around the world.

On behalf of the conference committee, we would like to express our gratitude to all the authors, the reviewers, and the attendees for their contributions and participations in ICICSE 2024. Their dedication and expertise enable us to prepare this high-quality program and make the conference successful. Finally, we would like to wish all the presenters and participants having a productive and enjoyable conference.

Conference Committee

May, 2024

USEFUL INFORMATION

Conference Venue



工大建国饭店 Grand Gongda Jianguo Hotel

地址: 北京市朝阳区平乐园 100 号 (北京工业大学南门西侧)
Address: 100 Pingleyuan Street, Chaoyang District, Beijing, China

Reservation Contact 联系人: 邓经理
Tel 联系电话: 18911996008, 600 元/间 含早餐

Temperature

Average Temperature in May in Beijing

15°C - 29°C

Bank and Foreign Exchange

The Currency is RMB here. You can exchange foreign currency 24 hours at the airport, or exchange at the bank, Money exchanger.

Attention Please

- ♣ It is suggested to wear face mask to attend conference. For health consideration, please wash hands before meals and please use serving chopsticks and serving spoon during meals.
- ♣ Please take care of your belongings in public area. For your personal and property safety, delegates are suggested to wear representative card during conference and not to lend it to those unconcerned to enter event rooms. Conference does not assume any responsibility for loss of personal belongings of participants.
- ♣ Don't stay too late in the city, don't be alone in the remote area. Be aware of the strangers who offer you service, signature of charity, etc., at scenic spots. You can search more Tourist Information and Security tips online.

Emergency

Ambulance: 120 Police: 110

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Follow us on we-chat, Remark "ICICSE 2024-Paper ID"

USEFUL INFORMATION

Online Conference Information

Date	Arrangement	Online Link
May 10	Online Presentation Test Keynote Speakers, Invited Speakers, Session Chairs & Authors	Online Zoom ID: 829 3863 7625 Password: 051012 Link: https://us02web.zoom.us/j/82938637625
May 11	Opening Ceremony Keynote Speeches Invited Speeches	
May 12	Online Session 1	
	Online Session 2	
	Online Session 3	

Password for all rooms: 051012



Note:

Conference rooms will be open 30 mins before scheduled time.
Pls join the online room 10-15 mins before your session start and be prepared.

**For general users, Zoom Download: <https://zoom.us/>
For authors in China, Zoom Download: <https://zoom.com.cn/download>**

Tips:

- Please unmute audio and start video while your presentation.
- It's suggested to use headset with microphone or earphone with microphone.
- Duration of each Presentation: about 12 Minutes of Presentation and 3 Minutes of Q&A.
- E-certificate will be sent to presenters after conference by email.
- An excellent presentation will be selected from each session and announced on the website after conference. An excellent presentation certificate will be sent after conference by email.
- Only one password for all online room. Password: **051012**
- It's Beijing Time (UTC/GMT +8)for the whole schedule.

Rename your screen name before entering the room	Example
Authors: Paper ID-Name	T0001-San Zhang
Listener: Listener Number-Name	Listener- San Zhang
Keynote Speaker: Keynote-Name	Keynote- San Zhang
Invited Speaker: Invited -Name	Invited- San Zhang
Committee Member: Position-Name	Committee- San Zhang



USEFUL INFORMATION

Devices Provided by the Conference Organizer

- ✧ Laptops (with MS-Office & Adobe Reader)
- ✧ Projectors & Screen

Materials Prepared by the Presenters

- ✧ Oral Presentation:
 - Onsite Presentation: PowerPoint or PDF files. Please copy your slides to the desktop 20 mins before your session start and test it ahead.
 - Online Presentation: PowerPoint or PDF files. Please install Tencent Meeting in advance and join our online session on time.

Duration of Each Presentation

- ✧ Keynote Speech: 40 Minutes of Presentation including Q&A.
- ✧ Invited Speech: 20 Minutes of Presentation including Q&A.
- ✧ Regular Oral Presentation: 15 Minutes of Presentation including Q&A.
(Duration of each Author Presentation: about 12 Minutes of Presentation and 3 Minutes of Q&A.)

Dress Code

- ✧ All participants are required to dress formally. Casual wear is unacceptable.
- ✧ National formal dress is acceptable.

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.

Online Pre-test Timetable and online sign-in (May 10, 2024)

*Please enter the room 10 minutes before the test session start

Test Time (Beijing Time)	Online Zoom ID: 829 3863 7625 Password: 051012 Link: https://us02web.zoom.us/j/82938637625
11:00-12:00	Test time for Keynote Speakers & Invited Speakers & Session Chairs
Test for authors	
14:00-15:30	C6M025, C2M004, C3M025, C3M035, C4M043, C4M048, C4M059, C4M062, C3M036, C3M037 C2M016, C2M006, C2M011, C2M014, C6M001, C4M056, C4M060, C3M032 C01, C03, C4M057, C6M010, C6M011, C6M022, C6M039, C6M020, C6M041, C6M021, C6M005

DAILY SCHEDULE

Day 1, May 10, 2024

13:00 -16:00 Sign in **工大建国饭店 Grand Gongda Jianguo Hotel**

Day 2, May 11, 2024

Main Program.....**工大建国饭店 2楼 求是厅 (2nd Floor, Qiushi Hall)**

Online Zoom.....ID: 829 3863 7625 (Password: 051012)

Link: <https://us02web.zoom.us/j/82938637625>

Morning Host: Assoc. Prof. Shanshan Tu, Beijing University of Technology, China

09:00-09:05	Welcome Message Prof. Wei Ma, Beijing University of Technology, China
09:05-09:10	Opening Remarks Assoc. Prof. Shanshan Tu, Beijing University of Technology, China
09:10-09:50	Keynote Speaker I (Onsite Talk) Prof. Shaozhang Niu, Beijing University of Posts and Telecommunications, China Speech Title: Research on Digital Images Content Security by AI
09:50-10:30	Keynote Speaker II (Online Talk) Prof. Hamid Jafarkhani, University of California Irvine, USA Speech Title: Heterogeneous Wireless Sensor and UAV Networks: Deployment and Trajectory Optimization
10:30-10:50	<i>Group Photo & Coffee Break</i>
10:50-11:30	Keynote Speaker III (Online Talk) Prof. Rajkumar Buyya, The University of Melbourne, Australia Speech Title: Neoteric Frontiers in Cloud, Edge, and Quantum Computing
11:30-11:50	Invited Speaker I (Online Talk) Assoc. Prof. Shahida Sulaiman, Universiti Teknologi Malaysia, Malaysia Speech Title: Software Engineering Research and Practice: Case Study of a Rural Community Project
11:50 -13:30	<i>Lunch Time</i>
13:30-16:15	Onsite Session A Topic: Modern Computer Science and Communication Systems Session Chair: Assoc. Prof. Zhaoying Liu, Beijing University of Technology, China C3M034, C4M042, C1M002, C3M026, C3M027, C3M028, C3M029, C4M047, C4M054, C6M007, C6M026
16:15-16:30	<i>Coffee Break</i>
16:30-19:00	Onsite Session B Topic: System models, data management, and information security in advanced information systems

DAILY SCHEDULE

Session Chair: Dr. Ying Bai, Johnson C. Smith University, USA

C3M021, C2M003, C2M013, C6M002, C2M018-A, C6M006, C6M008, C6M015, C6M027, C6M029

From 19:00

Dinner Time

Day 3, May 12, 2024

Online Zoom ID: 829 3863 7625 (Password: 051012)

Link: <https://us02web.zoom.us/j/82938637625>

<p>09:00-09:20</p>	<p>Invited Speaker II (Online Talk) Dr. Paul Craig, Xi'an Jiaotong-Liverpool University, China Speech Title: Interactive Animated Mobile Information Visualisation</p>
<p>09:20-09:40</p>	<p>Invited Speaker III (Online Talk) Dr. Loc Nguyen, Loc Nguyen's Academic Network, Vietnam Speech Title: Adversarial Variational Autoencoders to extend and improve generative model</p>
<p>09:40-10:00</p>	<p><i>Break Time</i></p>
<p>10:00-12:30</p>	<p>Online Session 1 Topic: Software and Data Analysis Session Chair: Prof. Xibin Jia, Beijing University of Technology, China C6M025, C2M004, C3M025, C3M035, C4M043, C4M048, C4M059, C4M062, C3M036, C3M037</p>
<p>12:30 -13:30</p>	<p><i>Break Time</i></p>
<p>13:30-15:30</p>	<p>Online Session 2 Topic: Information security and optimization algorithms in data communication Session Chair: Assoc. Prof. Yin Liang, Beijing University of Technology, China C2M016, C2M006, C2M011, C2M014, C6M001, C4M056, C4M060, C3M032</p>
<p>15:30-15:45</p>	<p><i>Break Time</i></p>
<p>15:45-18:30</p>	<p>Online Session 3 Topic: Machine Learning Models and Intelligent Computing in Modern Integrated Information Systems Session Chair: Prof. Yi Zhengyao, Dalian University of Technology, China C01, C03, C4M057, C6M010, C6M011, C6M022, C6M039, C6M020, C6M041, C6M021, C6M005</p>

KEYNOTE SPEAKERS



Prof. Shaozhang Niu

**Beijing University of Posts and Telecommunications,
China**

Dr. Shaozhang Niu, Professor of Computer Science, Director of Computer Software and Theory Center, the School of Computer Science, Beijing University of Posts and Telecommunications (BUPT), Beijing, China. He received the B.S. and M.S. degree from Beijing Normal University, Beijing, China, in 1985 and 1988 respectively, both in mathematics, and the Ph. D. degree from Beijing University of Posts and Telecommunications, Beijing, China, in 2004, in computer science and technology. His main academic part-time jobs include Chairman of the Beijing Information Industry Association and Chairman of the Computer Education Research Branch of the Beijing Higher Education Association. Professor Niu also is a senior member of the China Electronics Society, director of the Digital Imaging Expert Committee of the China News Photography Society, deputy secretary-general of the Big Data Industry Branch of the China Information Industry Association, deputy director of the Intelligent Manufacturing Industry Promotion Center of the China High tech Industry Research Association. His research interests include network information security, mobile big data application and security, industrial internet security, mobile communication security, intelligent information processing, digital watermarking and digital forensics, and cloud security.

As the project leader, Professor Niu has undertaken research work on National 863 Key Projects, National Natural Science Foundation Projects, National Cryptography Fund Projects, National Information Security Special Projects, and key research projects of the Ministry of Industry and Information Technology. He has completed multiple enterprise projects on mobile big data applications and industrial internet, and established a school enterprise joint laboratory. Professor Niu has published over 200 research papers and 8 works, including "Mobile Internet Security", "Network Attacks and Prevention", "Wireless Communication Security", "Introduction to Information Security", and "Digital Image Authenticity Identification Technology" and etc. In the past five years, He has published more than ten papers in important international journals such as ACM Transactions, Fractal Fractal, Applied Intelligence, as well as CCF A-class conferences such as SIGIR, IJCAI and WWW.

Speech Title: Research on Digital Images Content Security by AI

Abstract: With the rise of deep learning, AI technology has been widely applied, and many advanced editing software and LLM generated tampered images are becoming more and more "realistic". Convenient and fast tampering software not only improves image editing technology, but also reduces the threshold for image editing, which has completely changed the situation of "there are pictures and there are truth". Tampered images are increasingly being used to create fake news, academic fraud, and other criminal activities. Faced with the current era of artificial intelligence, it is necessary to research region localization technology based on deep learning, realize the region localization of multiple deep learning repaired images, solve the problem of traditional detection algorithms being ineffective in artificial intelligence tampering with images, and maintain the security of digital image content in information communication in the era of artificial intelligence.

KEYNOTE SPEAKERS



Prof. Hamid Jafarkhani

**IEEE Fellow, AAAS Fellow
University of California Irvine, USA**

Hamid Jafarkhani is a Chancellor's Professor at the Department of Electrical Engineering and Computer Science, University of California, Irvine, where he is also the Director of Center for Pervasive Communications and Computing, the former Director of Networked Systems Program, and the Conexant-Broadcom Endowed Chair. He is the 2020-2022 elected Faculty Chair of the UCI School of Engineering. He was a Visiting Scholar at Harvard University in 2015 and a Visiting Professor at California Institute of Technology in 2018. Among his awards are the NSF Career Award, the UCI Distinguished Mid-Career Faculty Award for Research, the School of Engineering Excellence in Research Senior Career Award, the IEEE Marconi Prize Paper Award in Wireless Communications, the IEEE Communications Society Award for Advances in Communication, the IEEE Wireless Communications Technical Committee Recognition Award, the IEEE Signal Processing and Computing for Communications Technical Recognition Award, and the IEEE Eric E. Sumner Award. Dr. Jafarkhani is listed as an ISI highly cited researcher. According to the Thomson Scientific, he is one of the top 10 most-cited researchers in the field of "computer science" during 1997-2007. He is the 2017 Innovation Hall of Fame Inductee at the University of Maryland's School of Engineering. He is a Fellow of AAAS, an IEEE Fellow, a Distinguished Fellow of IETI, and the author of the book "Space-Time Coding: Theory and Practice."

Speech Title: Heterogeneous Wireless Sensor and UAV Networks: Deployment and Trajectory Optimization

Abstract: Wireless networks of the future are envisioned to be highly heterogeneous. They will include flying nodes like UAVs as base stations, relays, and sensors. We will discuss the characteristics of the heterogeneous networks and the role of UAVs in future wireless networks. We consider the deployment and trajectory optimization of these networks and adapt quantization theory to address the corresponding challenges. We will also discuss the optimization of the existing cellular networks for supporting legacy ground users and UAV corridors. In addition, we argue that new network structures, like cell-free networks, are more suitable for many UAV networks. We discuss fundamental design challenges like the best spatial deployment of nodes to minimize the energy consumption or maximize the sensing accuracy while guaranteeing network connectivity.

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KEYNOTE SPEAKERS



Prof. Rajkumar Buyya, IEEE Fellow

**Director, Cloud Computing and Distributed Systems (CLOUDS) Lab,
The University of Melbourne, Australia
CEO, Manjrasoft Pvt Ltd, Melbourne, Australia**

Dr. Rajkumar Buyya is a Redmond Barry Distinguished Professor and Director of the Cloud Computing and Distributed Systems (CLOUDS) Laboratory at the University of Melbourne, Australia. He is also serving as the founding CEO of Manjrasoft, a spin-off company of the University, commercializing its innovations in Cloud Computing. He has authored over

850 publications and seven textbooks including "Mastering Cloud Computing" published by McGraw Hill, China Machine Press, and Morgan Kaufmann for Indian, Chinese and international markets respectively. Dr. Buyya is one of the highly cited authors in computer science and software engineering worldwide (h-index=167 g-index=365, and 147,500+ citations). He has been recognised as a "Web of Science Highly Cited Researcher" for seven times since 2016, "Best of the World" twice for research fields (in Computing Systems in 2019 and Software Systems in 2021/2022/2023) as well as "Lifetime Achiever" and "Superstar of Research" in "Engineering and Computer Science" discipline twice (2019 and 2021) by the Australian Research Review.

Software technologies for Grid, Cloud, and Fog computing developed under Dr. Buyya's leadership have gained rapid acceptance and are in use at several academic institutions and commercial enterprises in 50+ countries around the world. Manjrasoft's Aneka Cloud technology developed under his leadership has received "Frost New Product Innovation Award". He served as founding Editor-in-Chief of the IEEE Transactions on Cloud Computing. He is currently serving as Editor-in-Chief of Software: Practice and Experience, a long-standing journal in the field established 50+ years ago. He has presented over 700 invited talks (keynotes, tutorials, and seminars) on his vision on IT Futures, Advanced Computing technologies, and Spiritual Science at international conferences and institutions in Asia, Australia, Europe, North America, and South America. He has recently been recognized as a Fellow of the Academy of Europe. For further information on Dr. Buyya, please visit his cyberhome: www.buyya.com

Speech Title: Neoteric Frontiers in Cloud, Edge, and Quantum Computing

Abstract: Computing is being transformed to a model consisting of services that are delivered in a manner similar to utilities such as water, electricity, gas, and telephony. In such a model, users access services based on their requirements without regard to where the services are hosted or how they are delivered. Cloud computing paradigm has turned this vision of "computing utilities" into a reality. It offers infrastructure, platform, and software as services, which are made available to consumers as subscription-oriented services. Cloud application platforms need to offer (1) APIs and tools for rapid creation of elastic applications and (2) a runtime system for deployment of applications on geographically distributed Data Centre infrastructures (with Quantum computing nodes) in a seamless manner.

The Internet of Things (IoT) paradigm enables seamless integration of cyber-and-physical worlds and opening opportunities for creating new class of applications for domains such as smart cities, smart robotics, and smart healthcare. The emerging Fog/Edge computing paradigms support latency sensitive/real-time IoT applications with a seamless integration of network-wide resources all the way from edge to the Cloud.

This keynote presentation will cover (a) 21st century vision of computing and identifies various IT paradigms promising to deliver the vision of computing utilities; (b) innovative architecture

for creating elastic Clouds integrating edge resources and managed Clouds, (c) Aneka 5G, a Cloud Application Platform, for rapid development of Cloud/Big Data/AI applications and their deployment on private/public Clouds with resource provisioning driven by SLAs, (d) a novel FogBus software framework with Blockchain-based data-integrity management for facilitating end-to-end IoT-Fog/Edge-Cloud integration for execution of sensitive IoT applications, (e) experimental results on deploying Cloud and Big Data/ IoT applications in engineering, and health care (e.g., COVID-19), deep learning/Artificial intelligence (AI), satellite image processing, and natural language processing (mining COVID-19 research for new insights) on elastic Clouds, (f) QFaaS: A Serverless Function-as-a-Service Framework for Quantum Computing, and (g) directions for delivering our 21st century vision along with new directions for future research in Cloud, Edge, and Quantum computing.

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INVITED SPEAKERS



Assoc. Prof. Shahida Sulaiman

Universiti Teknologi Malaysia, Malaysia

Shahida Sulaiman (IEEE Senior Member) is an associate professor at Faculty of Computing, Universiti Teknologi Malaysia (UTM) since 2011. Formerly, she had served at Universiti Sains Malaysia (USM) for seven years. She holds a Ph.D. degree in Computer Science and M.Sc. degree in Computer Science – Real Time Software Engineering. Her main research interests include software design, knowledge management, and education informatics. She has published and co-authored numerous technical papers mainly in software engineering area, has been the editors for a number of journals, book chapters and conference proceedings, besides serving as reviewers and technical committee members. She has a good linkage with the software industry that made her receive the Industry Involvement Award 2015 at Citra Karisma, UTM. With the strong support from fellow researchers at USM and UTM, she founded Malaysian Software Engineering Interest Group (MySEIG) in 2005 that organised the 1st Malaysian Software Engineering Conference (MySEC 2005) and its series, organised the 16th Asia-Pacific Software Engineering Conference (APSEC 2009) for the first time in Malaysia and the 1st Software Engineering Postgraduates Workshop (SEPoW 2009). She was the Organising Chair of the 26th APSEC 2019 that was hosted for the second time in Malaysia. For the recognition of her community work in education informatics, she received the IEEE Malaysia Communications Society and Vehicular Technology Society Joint Chapter Award: Best Social Activity 2016 on the effort to expose mobile learning among rural learners under the Centre for Advancement in Rural Education Informatics (iCARE) in collaboration with a rural agency. She received the Outstanding Service Award 2020 for the second time of her service with UTM and Community Service Award 2021, also recognised by UTM. Based on her efforts in the community service related to science and technology, she was selected as an IEEE STEM Champion for 2022/2023. Recently, she has received the IEEE Computer Society Diversity and Inclusion (D&I) grant 2023 to promote Computer Science among rural learners.

Speech Title: Software Engineering Research and Practice: Case Study of a Rural Community Project

Abstract: Software engineering research focuses on improving the processes in software development. The practice for improvement could directly impact software developers and software engineers, while some could indirectly impact to those targeted communities such as the underserved group. Hence, it is beneficial when software engineering researchers innovate solutions for the community to measure its indirect impact. In this speech, an example of how a software engineering research outcome could be applied and extended for the benefit of a rural community will be elaborated through a case study in the educational domain. The case study is a rural community project recognised as Centre for Advancement in Rural Education Informatics (iCARE) that has more than a decade of strategic partnership between Universiti Teknologi Malaysia (UTM) as a public university and Southeast Johor Development Authority or KEJORA, one of rural agencies in Malaysia. It concludes that the research and practice in the case study could deliver positive impact to various stakeholders in the Quadruple Helix that include government authorities, academia, industry, and citizens.

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INVITED SPEAKERS



Dr. Paul Craig

Xi'an Jiaotong-Liverpool University, China

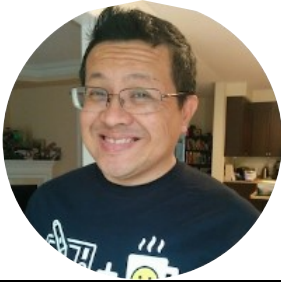
Dr. Paul Craig has been a researcher working in the area of Information visualization and bioinformatics for over 15 years. He completed his PhD, studying the use of Animated Information Visualization for the Exploratory analysis of microarray time-course data, with Professor Jessie Kennedy at Edinburgh Napier University, and has since worked on research projects for the US National Science Foundation, Scottish enterprise, the European Community, the Mexican Conacyt and the Suzhou Local Government in the areas of taxonomy, bioinformatics and intelligent user interfaces. He is currently working on a various projects in the areas of information visualisation including multi-device interfaces, IV for drone navigation and mobile interfaces for antibiotic pollution detection.

Speech Title: Interactive Animated Mobile Information Visualisation

Abstract: While the potential of mobile information visualization is widely recognized, there is still relatively little research in this area and few practical guidelines for the design of mobile information visualization interfaces. Indeed, there is still a general consensus in the interface design community that mobile visualization should be limited to simple operations on smaller datasets. Information visualization research has concentrated thus-far on desktop PCs and larger displays while smaller mobile device interfaces have been largely neglected. This is in spite of their increasing popularity and widespread use for other types of application. In this talk we explore these issues describing how some of the challenges of mobile information visualisation can be overcome. We describe how we have developed a number of prototypes for interactive information visualization on mobile devices, and outline a new methodology for mobile visualization interaction design using a novel mixed-fidelity prototyping approach. It is hoped that this research can inspire a better application of information visualisation on mobile devices.

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INVITED SPEAKERS



Dr. Loc Nguyen

Loc Nguyen's Academic Network, Vietnam

Loc Nguyen is an independent scholar from 2017. He holds Master degree in Computer Science from University of Science, Vietnam in 2005. He holds PhD degree in Computer Science and Education at Ho Chi Minh University of Science in 2009. His PhD dissertation was honored by World Engineering Education Forum (WEEF) and awarded by Standard Scientific Research and Essays as excellent PhD dissertation in 2014. He holds Postdoctoral degree in Computer Science from 2013, certified by Institute for Systems and Technologies of Information, Control and Communication (INSTICC) by 2015. Now he is interested in poetry, computer science, statistics, mathematics, education, and medicine. He serves as reviewer, editor, and speaker in a wide range of international journals and conferences from 2014. He is volunteer of Statistics Without Borders from 2015. He was granted as Mathematician by London Mathematical Society for Postdoctoral research in Mathematics from 2016. He is awarded as Professor by Scientific Advances and Science Publishing Group from 2016. He was awarded Doctorate of Statistical Medicine by Ho Chi Minh City Society for Reproductive Medicine (HOSREM) from 2016. He was awarded and glorified as contributive scientist by International Cross-cultural Exchange and Professional Development-Thailand (ICEPD-Thailand) from 2021 and by Eudoxia Research University USA (ERU) and Eudoxia Research Centre India (ERC) from 2022. He has published 92 papers and preprints in journals, books and conference proceedings. He is author of 5 scientific books. He is author and creator of 9 scientific and technological products.

Speech Title: Adversarial Variational Autoencoders to extend and improve generative model

Abstract: Generative artificial intelligence (GenAI) has been developing with many incredible achievements like ChatGPT and Bard. Deep generative model (DGM) is a branch of GenAI, which is preeminent in generating raster data such as image and sound due to strong points of deep neural network (DNN) in inference and recognition. The built-in inference mechanism of DNN, which simulates and aims to synaptic plasticity of human neuron network, fosters generation ability of DGM which produces surprised results with support of statistical flexibility. Two popular approaches in DGM are Variational Autoencoders (VAE) and Generative Adversarial Network (GAN). Both VAE and GAN have their own strong points although they share and imply underline theory of statistics as well as incredible complex via hidden layers of DNN when DNN becomes effective encoding/decoding functions without concrete specifications. In this research, VAE and GAN is unified into a consistent and consolidated model called Adversarial Variational Autoencoders (AVA) in which VAE and GAN complement each other, for instance, VAE is a good data generator by encoding data via excellent ideology of Kullback-Leibler divergence and GAN is a significantly important method to assess reliability of data which is realistic or fake. In other words, AVA aims to improve accuracy of generative models, besides AVA extends function of simple generative models. In methodology this research focuses on combination of applied mathematical concepts and skillful techniques of computer programming in order to implement and solve complicated problems as simply as possible.

Online ID: 829 3863 7625 (Password: 051012)

Onsite Session A

-  **Topic: Modern Computer Science and Communication Systems**
-  **Time: 13:00-16:15, Beijing Time, GMT+8, May 11, 2024**
-  **Location: 工大建国饭店 2 楼 求是厅 (2nd Floor, Qiushi Hall)**
-  **Session Chair: Assoc. Prof. Zhaoying Liu, Beijing University of Technology, China**
-  **C3M034, C4M042, C1M002, C3M026, C3M027, C3M028, C3M029, C4M047, C4M054, C6M007, C6M026**

C3M034 13:30-13:45	<p>The adoption of machine learning algorithm for rust classification in steel structure. Author(s): Nitsawara Srikaew, Korb Srinavin*, Tanayut Chaitongrat, Preenithi Aksorn, Kittiwet Kuntiyawichai, and Theerapat Pukird. Presenter: Nitsawara Srikaew, Khon Kaen University Khon Kaen, Thailand</p> <p>Abstract: Corrosion is significant factor for steel structure. Many steel structure, rust is the most common corrosion. In order to classify rust to the standard, such as ASTM, a visual inspection has been used. However, this method may include some bias. This study was set to determine whether machine learning might be used to classify rust with ASTM standard. 1155 images were prepared for model development. A convolutional neural network (CNN) was used in order to develop the model. 80 percent of the data were used to train the model and 20 percent were used for model verification. Finally, the model has an accuracy 79.48 percent.</p>
C4M042 13:45-14:00	<p>Identifying Fraudulent Credit Card Transactions Using AI Author(s): Hastika Cheddy and Roopesh Kevin Sungkur Presenter: Roopesh Kevin Sungkur, University of Mauritius, Mauritius</p> <p>Abstract: Credit card fraud is a major problem that costs businesses and consumers billions of dollars each year. Machine learning techniques can be used to detect fraudulent transactions, but they often struggle with imbalanced datasets, where there are far more legitimate transactions than fraudulent ones. This research aims to develop a machine-learning model which will automatically detect credit card fraud. The performance of four machine learning algorithms for credit card fraud detection: K-nearest neighbour (KNN), decision tree, random forest, and XGBoost have been evaluated. The algorithms were trained using four different methods to ensure a comprehensive evaluation. The performance of each algorithm was evaluated using accuracy, precision, F1-score, roc value and recall. The results of the study show that XGBoost and Decision Tree achieved the highest accuracy and recall among the four algorithms for the synthetic dataset. Both models were also able to achieve a high precision, which means that it was able to identify a high percentage of fraudulent transactions while minimizing the number of false positives. Overall, the findings suggest that XGBoost and Decision Tree are promising machine learning algorithms for credit card fraud detection. However, it is important to validate their performance on diverse datasets to assess their generalizability and robustness.</p>
C1M002 14:00-14:15	<p>Proof of cloud data integrity based on blockchain Author(s): Mingliang Yu, Gang Wang, Zengzhi Liu, Jinsong Li, Yingtong Wang, Zhen Peng, Gang Zhou Presenter: Zengzhi Liu, TravelSky Technology Limited, China</p> <p>Abstract: With the development of cloud storage technology, the advantages of cloud storage technology such as easy expansion, fast computing and controllable resources are favored by users. More and more users choose to store data in the cloud, but at the same time, they also lose the control over the data. Many schemes implement data integrity verification by introducing third-party auditors (TPA), but TPA is not completely trusted. There may be collusion with CSPS to steal user data or damage data. Traditional table structure can not solve the problem of dynamic update of remote data block, while Merkle hash tree data structure can solve the problem of dynamic update, but the efficiency is not optimal. Therefore, this paper proposes a cloud data integrity audit scheme based on blockchain, which introduces blockchain, realizes data integrity verification through its decentralization, immutable and other characteristics, and proposes a set of credit-based consensus strategy based on the license chain to ensure the security of the system. In addition, a multi-branch path tree (LP-MBT) based on local priority is proposed. LP-MBT enables users to quickly locate data blocks to be updated and optimizes the dynamic update scheme. Finally, the safety analysis shows that the scheme is provably safe, and the performance evaluation shows the</p>

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	effectiveness of the scheme.
C3M026 14:15-14:30	<p>Rapid jamming recognition based on Q-learning sampling under resource constraints Author(s): Kejie Gao, Yonggang Zhu, Youbao Wang, Rong Ge, Hao Wang Presenter: Kejie Gao, Nanjing University of Information Science and Technology, China</p> <p>Abstract: In the context of limited resources, jamming sampling poses a bottleneck in improving jamming cognition performance. Existing approaches to jamming cognition predominantly focus on jamming identification methods, overlooking the crucial prelude of jamming data collection. This paper formulates the problem of resource-constrained jamming cognition as a sampling resource allocation issue and introduces a Q-learning-based adaptive jamming sampling method. The process of selecting sampling sub-bands under resource constraints is modeled as a Markov Decision Process (MDP), and a reward function is designed to incorporate the jamming recognition results obtained through a deep convolutional neural network into the sampling loop. Simulation results demonstrate that, compared to existing periodic sampling methods, the proposed algorithm significantly enhances the efficiency of effective sampling, achieving rapid cognition of jamming, whether the jamming sub-bands are fixed or variable.</p>
C3M027 14:30-14:45	<p>Design and Implementation of Demodulator for High-Data-Rate Meteorological Satellites Author(s): Jian Tang, Yi Qiu, Kairui Wang Presenter: Kairui Wang, Department of Electronic Engineering Tsinghua University Beijing, China</p> <p>Abstract: With the continuous development of meteorological satellite technology, more and more observation needs are considered in practical applications, and the amount of transmitted data is also increasing. This paper proposes a design suitable for high-speed demodulation process of 2.4Gb/s data rate and 2.4GHz IF input with 8PSK modulation, which fits the modulation scheme of experimental weather satellite. Considering that high-speed meteorological satellites may require the receiver to have high anti-interference and polarization processing capabilities, this digital demodulation scheme adopts several core technologies such as carrier recovery, timing recovery, cross-polarization interference cancellation (XPIC), low-density parity-check code (LDPC) decoding, etc., and some of the implementation methods are analyzed in this paper. The VHDL language is used to implement the all-digital demodulation design, and the error performance in the noisy situation is about 1.0dB away from the theoretical value. This design scheme can provide reference and support for future high-data-rate meteorological satellite demodulation technology.</p>
C3M028 14:45-15:00	<p>Cooperative Positioning Based on UWB and MDS Author(s): Che Zhang Presenter: Che Zhang, NorthEastern University, China</p> <p>Abstract: In GNSS-denied environments, swarm drones struggle to obtain accurate location information, thus limiting their applications. Cooperative positioning involves utilizing wireless ranging among drones to determine their relative positions. This article assumes each drone is equipped with ultra-wideband (UWB) nodes, and the swarm drones generates a distance-squared matrix through bidirectional ranging. Then, the multidimensional scaling (MDS) algorithm is employed to compute the relative coordinates of the swarm drones using the generated distance-squared matrix. Simulation results demonstrate the effectiveness of cooperative positioning in both two-dimensional and three-dimensional scenarios and provide insights into the positioning errors under various ranging noise influences. The simulation results validate the feasibility of this UWB and MDS-based cooperative positioning approach.</p>
C3M029 15:00-15:15	<p>Efficient Frame Optimization Scheme For PSAM Assisted Transmission Over Rician Fading Channel Author(s): Yuqian Yan, Zhongyang Yu, Mengmeng Xu, Hengzhou Xu, Hai Zhu, Chunhua Zhu Presenter: Yuqian Yan, Henan University of Engineering & Henan University of Technology, China</p> <p>Abstract: In this paper, we discuss the commonly used pilot-symbol-assisted-modulation (PSAM) assisted transmission and its corresponding frame optimization problem over Rician</p>






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	<p>fading channel. Specifically, we design a generalized PSAM (G-PSAM) format based on the standard PSAM (S-PSAM) format and derive its approximate joint data-aided&non-data-aided Cram'er-Rao bound (DA&NDA CRB) when the pilot-aided channel estimation is considered. Then, with the approximate DA&NDA CRB and the classical control-variate method (CVM), an efficient optimization scheme of the G-PSAM format is proposed, which is asymptotically optimal in terms of the mean-square error (MSE) estimation performance. Simulation results reveal the superiority of the optimized G-PSAM (OG-PSAM) format over the S-PSAM format for both short-packet and long-packet transmissions. Also, a practical example of the joint DA&NDA aided carrier synchronization is provided.</p>
<p>C4M047 15:15-15:30</p>	<p>Expanded Nested MIMO radar for DOD and DOA estimation based on tensor model Author(s): Chenghong Zhan, Jing Yang, Guoping Hu, Yule Zhang, Shuhan Guo, Hao Zhou Presenter: Chenghong Zhan, Graduate College, Air Force Engineering University, Xi'an China</p> <p>Abstract: This paper employed a bistatic expanded nested array MIMO radar to enhance the estimation performance of target Direction of Departure (DOD) and Direction of Arrival (DOA). Firstly, we configure the expanded nested array into a bistatic MIMO radar mode to achieve matched reception of target signals. Next, a Toeplitz matrix double iteration reconstruction method is proposed to address the high complexity of reconstructing the virtual covariance matrix. Subsequently, leveraging the virtual covariance matrix with a Toeplitz matrix structure, we construct a third-order tensor model to improve the utilization of structural information in the target received signals, thereby enhancing the accuracy of DOD and DOA. Finally, the COMFAC algorithm is introduced to the third-order tensor model, and the least squares method is employed to obtain estimates of the target's transmit and receive angles. Several simulation experiments demonstrate the superiority of the proposed algorithm in this paper</p>
<p>C4M054 15:30-15:45</p>	<p>Formal Analysis of Key Exchange Protocol in a Blockchain-based Trustworthy Transmission System Author(s): Dongyao Wang Presenter: Dongyao Wang, Jiangsu Automation Research Institute, China</p> <p>Abstract: This paper discusses the challenges of integrating blockchain with service systems, particularly the need for secure data exchange and the complexities that arise from system redesign. To address these issues, I propose a blockchain-based trustworthy transmission system that utilizes IP deep detection to record specific transaction events, eliminating the need for modifications to the service system. Furthermore, I introduce the blockchain-based DH (Diffie- Hellman) Protocol, which is a feasible protocol that incorporates the trustworthy property of blockchain, ensuring a robust key exchange for secure transmission of data. I used the Tamarin-prover formal analysis tool to verify that the proposed protocol can satisfy two secrecy properties, i.e. secrecy and perfect forward secrecy (PFS), which the traditional DH protocol is lack of.</p>
<p>C6M007 15:45-16:00</p>	<p>IoT and AI Applied in Engineering Education Author(s): Jason Liu, Wei Shi, ADDISON DAUNER Presenter: WEI SHI, University of Wisconsin-Stout, USA</p> <p>Abstract: Though the interest in learning IoT and AI involved in industry 4.0 is dramatically increasing in recent years, many universities have not integrated those up-to-date technologies and applications in engineering education. In this research, many aspects of IoT and AI applied in industry 4.0 are introduced in engineering curriculum development. The redesigned curriculum with innovative technology is developed for students to learn IoT, AI, machine learning, and smart sensors; and prepare engineering students in the demanding field of IoT, AI, and Industry 4.0 using new technologies, coupled with industry-based and problem-based hands-on learning. This work could have great impact on activating student interest and enthusiasm for learning engineering in comprehensive application and creativity.</p>
<p>C6M026 16:00-16:15</p>	<p>An Ensemble Model for 2D-data Classification based on Classical & Deep Learning Classifier Author(s): Chen Tu, Xin Wang, Zi Meng Zhang Presenter: Chen Tu, Navigation College, Dalian Maritime University, Liaoning</p> <p>Abstract: Ensemble learning is one of the most studied topics in classification domain, it is proven that ensemble learning is effective for classification tasks with multiple labels.</p>

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	<p>Nevertheless, achieving accurate predictions for data with varying dimensions and characteristics remains a formidable task. Enhancing the generalization capabilities of ensemble classifiers poses a significant challenge in the field of ensemble learning. To address this issue and improve accuracy, we propose a novel ensemble method. In our method, a combination of deep learning classifier (i.e., CNN, Bi-LSTM) and classical classifiers (e.g., KNN, SVM, Naive Bayes, Dtree) is constructed and then the optimal weighting parameters for the base classifier are assigned. We enhance the model's robustness by employing lasso regularization to reduce data dimensions. The results on 10 folds show that our method can significantly enhance the model's generalization performance and precision in classification tasks. Our model consistently outperforms traditional and existing ensemble methods across 18 publicly available datasets, as evidenced by accuracy and the Friedman test.</p>
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Onsite Session B

-  **Topic: System models, data management, and information security in advanced information systems**
-  **Time: 16:30-19:15, Beijing Time, GMT+8, May 11, 2024**
-  **Location: 工大建国饭店 2 楼求是厅 (2nd Floor, Qiushi Hall)**
-  **Session Chair: Dr. Ying Bai, Johnson C. Smith University, USA**
-  **C3M021, C2M003, C2M013, C6M002, C2M018-A, C6M006, C6M008, C6M015, C6M027, C6M029**

C3M021 16:30-16:45	<p>Estimate and Predict the Foreign Currency Exchanging Rates by Using Adaptive Neuro Fuzzy Inference System and Deep Learning Algorithms Author(s): Ying Bai, Dali Wang Presenter: Ying Bai, Johnson C. Smith University, USA</p> <p>Abstract: To correctly and accurately predict and estimate the exchanging rates among various currencies to get the maximum profit is a challenging task, and it is critical important to all financial institutions under the current fluctuation situation. In this study, we try to use different AI methods and algorithms, such as Adaptive Neuro Fuzzy Inference System (ANFIS) and Deep Learning (DL), to easily and correctly predict and estimate the current currency exchanging rate. Combining with some appropriate pre-data-processing techniques, the current currency exchanging rates could be accurately and quickly estimated via those models. In this research, both algorithms are designed and built to help decision makers working in the financial institutions to easily and conveniently predict the current exchanging rates. The minimum training and checking RMSE values for ANFIS model can be 0.0009828 and 0.001713. The minimum MSE value for DL model is 0.0000047 with a regression value of 0.9958.</p>
C2M003 16:45-17:00	<p>The feasibility study of the application of Big Data to predict delay situations in construction projects with daily report data Author(s): Korb srinavin, Wuttipong Kusonkhum, Kittiwet Kuntiyawichai, Natchaya Hunchaisree Presenter: Wuttipong Kusonkhum, Khon Kaen University Khon Kaen, Thailand</p> <p>Abstract: Several studies aim to study the application of big data technology in construction management by Thai governments. Nowadays, technology has inevitably played a role in daily life. As a result, the government agencies in Thailand must adjust their management strategies to keep up with the rapidly changing world. The delays in construction projects are still a problem and could be solved with machine learning technology, such as modeling, to predict issues or factors that cause delays. There is an effort to adapt machine learning technology from big data to use old data in daily reports in construction projects in Thailand, contributing to the way forecast delays are handled in construction projects. We collected data from 63,103 reports and used k-nearest neighbors (KNNs) to model the process. Finally, the developed model for delay issue prediction using a machine learning algorithm could be done with 92.79 percent accuracy.</p>
C2M013 17:00-17:15	<p>A Feature-Reconstruction Based Multi-task Learning Model for Sleep Staging Author(s): Chengyu Zhang, Lijuan Duan, Bian Ma, Zhi Gong Presenter: Bian Ma, Beijing University of Technology, China</p> <p>Abstract: Sleep staging plays a significant role in diagnosing sleep-related diseases and assessing sleep quality. Recent years have witnessed a remarkable advancement in deep learning for automatic sleep staging. However, the classification accuracy for certain stages remains unsatisfactory due to imbalanced sleep data. Moreover, the sleep stages are easily confused with each other, further leading to low classification accuracy. To address the issues, we propose a multi-task-based feature-reconstruction sleep staging method, comprising a feature extraction module and a multi-task module. In the multi-task module, specifically, the main task branch encodes the features extracted by the feature extraction module for sleep staging, while the auxiliary task branch randomly masks the features before performing the same encoding. Subsequently, based on the classification results of the main task, a dimensional reconstruction is employed to reconstruct the original features from the encoded features for confused sleep stages. The overall loss, formed by combining the</p>






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	<p>classification loss and the reconstruction loss, is utilized to constrain the model. We evaluate the performance of our proposed model using three public datasets, and the results demonstrate the effectiveness of the method in solving the problem of low accuracy in confused sleep stages classification.</p>
<p>C6M002 17:15-17:30</p>	<p>A New Transformation Approach for Uplift Modeling with Binary Outcome Author(s): Kun Li, Liangshu Zhu Presenter: Kun Li, Everbright Technology Co. LTD, China</p> <p>Abstract: Uplift modeling has been used effectively in fields such as marketing and customer retention, to target those customers who are more likely to respond due to the campaign or treatment. Essentially, it is a machine learning technique that predicts the gain from performing some action with respect to not taking it. A popular class of uplift models is the transformation approach that redefines the target variable with the original treatment indicator. These transformation approaches only need to train and predict the difference in outcomes directly. The main drawback of these approaches is that in general it does not use the information in the treatment indicator beyond the construction of the transformed outcome and usually is not efficient. In this paper, we design a novel transformed outcome for the case of the binary target variable and unlock the full value of the samples with zero outcome. From a practical perspective, our new approach is flexible and easy to use. Experimental results on synthetic and real-world datasets obviously show that our new approach outperforms the traditional one. At present, our new approach has already been applied to precision marketing in a China nation-wide financial holdings group.</p>
<p>C2M018-A 17:30-17:45</p>	<p>Design a Multi-User Virtual Reality Science Laboratory to Improve Student Collaboration Author(s): Hao Tang Presenter: Hao Tang, City University of New York</p> <p>Abstract: Online courses traditionally do not permit students to engage in laboratory experiments. While existing web-based applications attempt to replicate science lab experiences, they are often limited to simplistic 2D interfaces that fail to accurately represent three-dimensional lab environments, potentially hindering learning effectiveness. This paper introduces the development of a Virtual Reality (VR) physics lab application, designed to simulate a 3D virtual lab for undergraduate online physics courses. It enables students to perform physics experiments, either individually or collaboratively, thereby enhancing their educational experience. Additionally, the application incorporates accessibility features to accommodate students with vision impairments, allowing them to fully engage in the VR lab.</p>
<p>C6M006 17:45-18:00</p>	<p>Predicting Mitral Valve mTEER Surgery Outcomes Using Machine Learning and Deep Learning Techniques Author(s): Tejas Vyas, Mohsena Chowdhury, Xiaojiao Xiao, Mathias Claeys, Géraldine Ong, Guanghui Wang Presenter: Guanghui Wang, Toronto Metropolitan University, Canada</p> <p>Abstract: Mitral Transcatheter Edge-to-Edge Repair (mTEER) is a medical procedure utilized for the treatment of mitral valve disorders. However, predicting the outcome of the procedure poses a significant challenge. This paper makes the first attempt to harness classical machine learning (ML) and deep learning (DL) techniques for predicting mitral valve mTEER surgery outcomes. To achieve this, we compiled a dataset from 467 patients, encompassing labeled echocardiogram videos and patient reports containing Transesophageal Echocardiography (TEE) measurements detailing Mitral Valve Repair (MVR) treatment outcomes. Leveraging this dataset, we conducted a benchmark evaluation of six ML algorithms and two DL models. The results underscore the potential of ML and DL in predicting mTEER surgery outcomes, providing insight for future investigation and advancements in this domain.</p>
<p>C6M008 18:00-18:15</p>	<p>Split Iteration Technique to Determine Hopf Bifurcation Points Author(s): Chunlei Liu, Yi Han Presenter: Chunlei Liu, Valdosta State University, USA</p> <p>Abstract: Determining Hopf bifurcation points is an important task in the study of nonlinear dynamic systems, but existing methods require a large amount of computation and have low ratios of success. In this study, we present a numerical method to determine Hopf bifurcation points: the Split Iteration Technique and prove its convergence. Compared with existing</p>

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	<p>methods, this method results in much less computation and a much higher ratio of success.</p>
<p>C6M015 18:15-18:30</p>	<p>Research on the clustering competition coevolution optimization framework under the parallel lion swarm optimization algorithm Author(s): Keqin Jiang, Mingyan Jiang, Zongxin Han, Feng Wang, Ze Zhao Presenter: Keqin Jiang, Shandong university, China</p> <p>Abstract: This study introduces a framework for clustering competition coevolution optimization algorithm based on the parallel Lion Swarm Optimization Algorithm (LSO). This framework combines clustering and competitive coevolution concepts under existing parallel computing paradigms. Initially, clustering categorizes particles of the total population, followed by parallel computing principles where particles within each classified subpopulation undergo local optimization using distinct optimization mechanisms. After a certain number of iterations, these subpopulations coevolve through an island-based topology. Experimental results demonstrate significant advantages of the proposed algorithm over traditional methods in both CEC2013 benchmark functions and feature selection problems, affirming its potential and effectiveness in practical applications. This framework introduces a novel approach and method for addressing complex problems, offering broad prospects for application.</p>
<p>C6M027 18:30-18:45</p>	<p>Mathematical Model of SARS-CoV-2 infection with Andrographolide Therapy Author(s): Panittavee Yarnvitayalert, Teerapol Saleewong Presenter: Panittavee Yarnvitayalert, King Mongkut's University of Technology Thonburi, Bangkok</p> <p>Abstract: Andrographis paniculate extract (APE) has been utilized as a traditional Thai medicine due to the contains andrographolide, which is effective for virus clearance and disease progression prevention. APE has been used to treat a several of viral diseases, including SARS-CoV-2. The recommended dosage in Thailand is 180 milligrams, three times per day. We developed a mathematical viral dynamic model of the SARS-CoV-2 model that incorporated the pharmacokinetic/pharmacodynamic (PK/PD) of andrographolide therapy. The viral dynamics of 5 patients infected with COVID-19 were estimated parameters and predicted the SARS-CoV-2 infection on viral load dynamics. Furthermore, APE enhanced the effectiveness of COVID-19 treatment.</p>
<p>C6M029 18:45-19:00</p>	<p>A Hybrid LSTM and Rule-Based Algorithm For Real-Time Prediction of River Water Level and Flood Risk Status:Case study of Tempasuk River, Sabah, Malaysia with real-time monitoring by S.A.I.F.O.N@Belud Author(s): MUHAMMAD AMIR ASYRAF FAZLI, WOUI-NEE TAN, YI-FEI TAN, MING-TAO GAN, ASRUL NORUL BASHAH, SHAMSUL ARIFFIN SURAJI, MOHD TAWFIK ABDUL RAHMAN Presenter: WOUI-NEE TAN, Multimedia University, Malaysia</p> <p>Abstract: This project proposes an operational predictive solution that assists in predicting the flood occurrence at Kota Belud in Sabah, particularly in estimating and predicting the water level, and affected area. It is motivated by the work under the Security And Integrated Flood Operation Network at Kota Belud (S.A.I.F.O.N@Belud). To anticipate the likelihood of a flood, this solution uses machine learning. The suggested method needs input from the S.A.I.F.O.N@Belud system's current sensors. The created solution can assist in determining forecast lead times that enable the authorities to issue prior notice in order to tackle the impending flood catastrophe. The algorithm consists of a Long Short-Term Memory (LSTM) neural network model that can predict the water level of the Tempasuk River in Sabah for the next 30 minutes. The predicted value is then fed into a rule-based flood risk model to predict the flood risk status in the next 30 minutes. The LSTM prediction model developed using data from S.A.I.F.O.N@Belud dataset yields an average of root mean squared error and the mean absolute error of 0.08 and 0.03 respectively. Whereas, the rule-based flood risk model achieves an overall accuracy of 98.18%. The proposed model lays the foundation in expanding the S.A.I.F.O.N@Belud to prediction phase beyond the real time monitoring.</p>

Online Session 1

-  **Topic: Software and Data Analysis**
-  **Time: 10:00-12:30, Beijing Time, GMT+8, May 12, 2024**
-  **Zoom Link: <https://us02web.zoom.us/j/82938637625> (password: 051012)**
-  **Session Chair: Prof. Xibin Jia, Beijing University of Technology, China**
-  **C6M025, C2M004, C3M025, C3M035, C4M043, C4M048, C4M059, C4M062, C3M036, C3M037**

C6M025 10:00-10:15	<p>Ordered Inference in Sequent Calculi for Applied Logics Author(s): Alexander Sakharov Presenter: Alexander Sakharov, Synstretch, USA</p> <p>Abstract: Sequent calculi for applied logics have nonstandard logical inference rules and various axioms, cut is essential in them. The following constraints on derivations in these calculi do not compromise completeness. Contraction rules follow cut and logical rules. Weakening rules precede logical rules. Consecutive cut rules are ordered so that larger formulas are cut first. Consecutive standard logical rules are ordered so that their principal formulas are in an increasing order.</p>
C2M004 10:15-10:30	<p>An Efficient and Security Federated Learning for Data Heterogeneity Author(s): Junchen Gao, Zhenhu Ning, Meili Cui, Shuaikun Xing Presenter: Junchen Gao, Beijing University of Technology, China</p> <p>Abstract: The statistical heterogeneity problem in federated learning significantly constrains its performance. Current research predominantly focuses on personalizing local models. However, excessive emphasis on local data compromises the effective utilization of global information, leading to optimal performance only in highly heterogeneous local datasets. To address this limitation, this paper proposes a novel approach called Federated Learning with Local Intermit Initiation (FedLII). FedLII alternates between personalization and "client distribution" periodically. The "client distribution" facilitates cross-client data-level optimization by disseminating local models to other clients for training. Consequently, this method enhances overall model quality while maintaining personalization, ensuring exceptional robustness and security across varying degrees of heterogeneity. The paper provides a theoretical analysis of FedLII's advantages and compares it with several exemplary models, such as FedProx and APPLE, using three benchmark datasets: Cifar10/100 and AG news. Experimental results demonstrate that FedLII exhibits broader applicability and superior performance across datasets with varying degrees of heterogeneity.</p>
C3M025 10:30-10:45	<p>A Software Requirement Prioritization Method for Online Education Software Development Author(s): Chen Chen, Yumin He, Shengling Bai Presenter: Yumin He, Beihang University, P. R. China</p> <p>Abstract: Online education software development faces great challenge because of rapid growth and fierce competition on the Internet markets. A software requirement prioritization method for quick and accurate decision-making is critical for online education software development. This paper proposes a software requirement prioritization method for online education software development in agile software development environments. The paper also provides an application case of an online adult vocational education company with performance improvement achieved by the proposed method.</p>
C3M035 10:45-11:00	<p>Enhancing MAFIS: A Study on the Usability and User Experience of the Mobile Automated Fingerprint Identification System Author(s): William P. Rey Presenter: William P. Rey, Mapua University, Philippines</p> <p>Abstract: This study focuses on the evaluation of the Mobile Automated Fingerprint Identification System (MAFIS) through a dual approach incorporating both quantitative and qualitative methodologies. Utilizing the System Usability Scale (SUS) for gauging usability and the User Experience Questionnaire (UEQ) for assessing user experience, the research gathers data from a diverse participant pool. MAFIS exhibits exemplary usability, as reflected in an outstanding average SUS score of 87.475, corresponding to an "Excellent" grade. The User Experience Questionnaire (UEQ) unveils nuanced dimensions, emphasizing Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. The discussion synthesizes</p>

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	<p>findings from SUS and UEQ, identifying convergences and divergences to present a comprehensive view of MAFIS performance. Commonalities and disparities between usability and user experience provide valuable insights, offering targeted improvement areas. The study's implications extend to practical enhancements in MAFIS, ensuring user satisfaction and positive overall experiences. In conclusion, this research contributes to advancing fingerprint identification systems by emphasizing the integration of usability and user experience considerations in system development.</p>
<p>C4M043 11:00-11:15</p>	<p>Research on security protection mechanism of Android APP Author(s): Shu-han Zhao, Yong-zhen LI, Zhen-zhen WANG, Zhe-xue JIN Presenter: ZhaoShuhan, YanBian University, China</p> <p>Abstract: Based on the idea of a digital signature, an Android program protection scheme is proposed. First, check whether there is a security file when the program starts, download it from the server if there is no security file, and perform subsequent verification if there is; Secondly, the gatekeeper mechanism is used to determine whether the installation address of the software is from the specified server by asking, and if it is, the subsequent verification is made, and if it is not, the program is directly exited; Then, the signature authentication is performed based on the server, and the hash value in the security file is compared with the decrypted hash value. If the hash value is consistent, the file is not tampered with; Finally, the integrity of the file is verified, and the installation is allowed if every value in the security file is verified. The application protection method can identify the installation files from unknown sources and prevent the installation. The whole process adopts the method of JNI call, the application core code is placed in the Java layer, the digital signature mechanism and integrity verification are placed in the Native layer, and the Java layer is packaged into the.so library, the Java layer calls the .so library through the JNI, which can effectively prevent decompilation.</p>
<p>C4M048 11:15-11:30</p>	<p>A Iterative Method to Analyze Misbehavior in Blockchain by Transaction Graph Matrix Author(s): Jian Liu, Shaohua Zhang, Lai Wei, Ruoting Xiong, Wei Ren Presenter: Wei Ren, China University of Geosciences, China</p> <p>Abstract: Blockchain provides an publicly accessed and accepted ledger without centralized control among open participators. The anonymity in payments and transactions may results in possible misbehaviors, e.g., money laundry. Fortunately, the transaction data is open and can be analyzed. In this paper, we propose The major challenges are the data volume is large and the global view of transactions in terms of hops and time sequences. In this paper, we address the transactions with multiple intermediators, and graph dynamics with time-spans. The analyzing models and computing algorithms are proposed. The extensive and formal analysis justifies the soundness of our proposed methods.</p>
<p>C4M059 11:30-11:45</p>	<p>Detection of Unused Native Methods code smells in Multi-Language Systems Author(s): MD. SHAHRUKH ANSARI, Salman Abdul Moiz Presenter: Md Shahrukh Ansari, University of Hyderabad, India</p> <p>Abstract: It is common practice in software development to use multiple programming languages within a single project, known as multilingual development. While leveraging multiple programming languages in the development of complex systems offers substantial advantages like legacy integration and performance optimization, integrating code from various languages can introduce code smells that adversely affect the overall readability, maintainability, and performance of these systems. These code smells are called multi-language code smells. Unused Native Method declaration and Unused Native Method Implementation are two of the multi-language code smells that are related to unused code. These code smells unnecessarily increase the volume of the codebase, which leads to difficulties in understanding and maintaining the code. Since these smells negatively impact the non-functional requirement of a software system, they must be detected and refactored. The detection approach proposed in the literature had many limitations, which is why the results presented in the literature about the prevalence of these two smells were incorrect. This paper addresses the identified limitations and assesses the existence of these two smells in open-source projects. Our results show that 9.34% of JNI files are affected by Unused Native Method Declaration code smell, and 46.18% of JNI files are affected by Unused Native Method Implementation code smell, which confirms the existence of these two code smells in open-source multi-language systems.</p>

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<p>C4M062 11:45-12:00</p>	<p>Extending the Principlist Approach to Software Engineering Ethics Author(s): Kassem Saleh Presenter: Kassem Saleh, Kuwait University, Kuwait</p> <p>Abstract: The reliance on software systems to support our daily activities, and to facilitate decision making processes in the workplace is becoming a fact of life spanning a wide range of application domains including healthcare, security, banking and finance, education, transportation, and social networking. Many of these software systems are safety-critical and real-time systems that affect the physical safety and well-being of humans. Developing ethical and trustworthy software systems is a complex and challenging process. To avoid many of the ethical concerns and pitfalls, it is of utmost importance that the developers and maintainers of such systems understand and adhere to some ethical principles that these systems must conform to in order to increase the various stakeholders' trust in such systems and avoid potential future legal consequences. In this paper, we first explain how the four ethical principles of autonomy and respect, beneficence, non-maleficence and justice that were introduced by Beauchamp and Childress can apply when developing and maintaining ethical software systems. We then define the people, process and product viewpoints with requirements for ethical software engineering. The strict consideration of these requirements is shown to map to the four ethical principles and hence contribute to the conformance to these principles. Finally, we present and discuss cases using the principlism approach and the three viewpoints.</p>
<p>C3M036 12:00-12:15</p>	<p>MotoAid Express Mobile App: Empowering Motorcycle Riders in the Philippines through Seamless On-Demand Roadside Assistance Author(s): William Penaflor Rey Presenter: William P. Rey, Mapua University, Philippines</p> <p>Abstract: This study introduces MotoAid Express, a mobile app designed to enhance the motorcycle commuting experience in the Philippines. Focused on on-demand roadside assistance, the app addresses challenges faced by motorcycle riders, offering timely help and a secure mobile commerce platform. The study outlines app development, usability testing, and user feedback. Immediate system improvements include enhanced search, in-app tutorials, real-time mechanic availability, and in-app payments. Recommendations for future studies include social media integration, gamification, enhanced personalization, advanced payment security, and collaboration with service stations. The study concludes that MotoAid Express is a valuable solution with ongoing potential for user-centric enhancements and expanded functionalities.</p>
<p>C3M037 12:15-12:30</p>	<p>Improving Urban Accessibility Data Collection through Enhanced User Experience in a Crowdsourcing Web Application Author(s): Tyler Ortiz, Victor Tang Presenter: Tyler Ortiz, City College of New York, NYC, USA</p> <p>Abstract: To support people's independent travel and reduce their stress in travel planning, DoorFront.org was developed to collect large-scale accessibility data of (NYC) storefronts using crowdsourcing, Google Street View (GSV), and artificial intelligence (AI). The collected data includes useful visual knowledge, such as bounding boxes of various storefront objects in GSV images and their corresponding geographical locations. With this data, the development of assistive apps for orientation and mobility training or real-time navigation becomes possible, which greatly facilitates independent travel for people with visual impairment. However, collecting a high-quality large-scale urban accessibility dataset requires numerous volunteers to participate. In this paper, we aim to engage more volunteers and improve their user experience by designing and developing gamification functionalities and user interfaces that showcase volunteer contributions.</p>

Online Session 2

Topic: Information security and optimization algorithms in data communication

Time: 13:30-15:30, Beijing Time, GMT+8, May 12, 2024

Zoom Link: <https://us02web.zoom.us/j/82938637625> (password: 051012)

Session Chair: Assoc. Prof. Yin Liang, Beijing University of Technology, China

C2M016, C2M006, C2M011, C2M014, C6M001, C4M056, C4M060, C3M032

<p>C2M016 13:30-13:45</p>	<p>Behind The TCP-newCWV Implementation To Improve Bursty Application Performance Author(s): Ziaul Hossain Presenter: ZIAUL HOSSAIN, University of the Fraser Valley, Canada</p> <p>Abstract: Web browsing and Web video streaming (e.g. YouTube/Netflix) are examples of popular applications that use Transmission Control Protocol (TCP) and constitute almost three-fourths of the whole Internet traffic. Interestingly, these applications generate traffic that varies its transmission rate and seem to be rather bursty in nature. Some previous works have already addressed issues generated from the interaction between the traffic pattern and the TCP congestion control algorithm. Congestion Window Validation (CWV), TCP-JAGO aimed to constrain the TCP behavior appropriately, but these were shown to have drawbacks. Consequently, newCWV was proposed. However, there was no guidance on how to implement this new method. This paper presents a practical implementation mechanism for accurate proper path capacity estimation using pipeACK and defines relevant congestion control behavior. This was implemented and tested to find that newCWV in fact improves the burst transmission times for variable rate applications like browsing and video streaming.</p>
<p>C2M006 13:45-14:00</p>	<p>Security key management protocol for cross-domain authentication of Internet of Vehicles Author(s): Meili Cui, Zhenhu Ning, Junchen Gao, Jin Peng Presenter: Meili Cui, Beijing University of Technology, China</p> <p>Abstract: The Internet of Vehicles is a multi-trust domain autonomous network designed to provide real-time and reliable message services for vehicles, including road conditions, path planning, etc. However, due to factors such as the rapid movement of vehicle nodes, frequent network access, and uneven distribution of vehicle nodes, rapid cross-domain message authentication has become an important challenge. In order to enhance the security of cross-domain authentication in the Internet of Vehicles, this paper proposes a secure authentication key management protocol. In this protocol, the current domain's edge server comprehensively evaluates the vehicle by combining the real-time information of the vehicle and the information of the domains it has passed before. Once the assessment is qualified, the vehicle, with the assistance of TA, completes the establishment of session keys to achieve secure communication. This article uses BAN logic to formally prove the security of the protocol and analyzes its performance through network simulation tools. Experimental results demonstrate that the proposed scheme significantly improves security and performs well in terms of network performance.</p>
<p>C2M011 14:00-14:15</p>	<p>Indoor localization algorithm based on SRD and adaptive Kalman filter Author(s): YiPin Gao, Songlin Liu, Yunzhu Lv, Jianglong Li, Shengbo Sun Presenter: Yipin Gao, Qufu Normal University, China</p> <p>Abstract: Ultra-wideband (UWB), as an emerging technology in recent years, has the characteristics of high-precision distance measurement capability, resistance to multi-path fading and multi-base station positioning, and has become the mainstream in the field of industrial positioning. However, due to the complexity of the environment and the presence of noise, a single positioning algorithm often produces large errors. Therefore, this paper proposes an ultra-wideband indoor hybrid positioning algorithm based on the squared difference (SRD) algorithm and adaptive Kalman filtering. Using the position estimate obtained by the SRD algorithm, the non-line-of-sight error (NLOS) is identified by comparing the set threshold with the residual size of the TDOA measurement obtained by the ultra-wideband module. The Kalman filter parameters are dynamically adjusted based on the identification results to improve the automatic It adapts to the Kalman filter iterative process, resists noise interference and reduces the influence of abnormal measurements. Finally, the motion trajectory and its residual value are obtained through experiments. The results show that the algorithm in this paper can significantly improve the accuracy of positioning, and the maximum positioning error is reduced from 1.22m. to 0.42m, the root mean square error of</p>






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	<p>the positioning result is 0.11m.</p>
<p>C2M014 14:15-14:30</p>	<p>Enhancing SAR ATR Model Generalization through Cycle-GAN Augmented Multi-Angle Training Author(s): Yu Sun, Ziwei Chen, Yajing Shi, Kaining Jia, Wenqian Wu, Yanfeng Li Presenter: Yu Sun, Beijing Jiaotong University, China</p> <p>Abstract: This paper discusses the difficulties encountered by Synthetic Aperture Radar Automatic Target Recognition (SAR ATR) models when dealing with significant variations in pitch angles between the training and test data. The study presents the implementation of a Cycle-GAN network to enhance the ability of angle generalization and assesses its influence on three convolutional neural network models. Experiments conducted on the MSTAR dataset demonstrate that the utilization of the Cycle-GAN network, along with an equal combination of 17° and 45° training data, improves the accuracy of the model when dealing with different pitch angles. This indicates that the model has enhanced adaptability to the distribution of multi-angle SAR data.</p>
<p>C6M001 14:30-14:45</p>	<p>COVIDTran: an automated COVID-19 diagnosis system via Context Transfer Transformer Author(s): Zhiwei Zhang*, Boli Fang*, Zeping Zhang, Miao Jiang Presenter: Miao Jiang, U-NEXT, Japan</p> <p>Abstract: In this paper we present COVIDTran, an automated COVID diagnostic system that takes symptomatic cough audios as input and identifies potential cases of COVID19. Adopting principles from Transfer Learning, we implement neural network based on Vision Transformer that processes the spectrographic maps of the cough audio signals, and promote the robustness of our model by integrating contextual information from similar flu symptomatic datasets via transfer learning. Experimental results involving crowdsourced COVID coughing and speech datasets suggest that our strategy outperforms other current methods as measured by different metrics, thereby providing new insights on automated COVID19 diagnosis on top of existing methods.</p>
<p>C4M056 14:45-15:00</p>	<p>Research on end-to-end forwarding path selection method for CFN Author(s): Bo Yuan, Hongtao Li, Haisheng Yu Presenter: Bo Yuan, Southeast University, China</p> <p>Abstract: With the rapid development of AI technology, computational resource-centered network becomes one of the main evolutionary directions of SDN network. Compute-first network (CFN) takes compute resources as the primary reference basis for network forwarding path selection, so how to make path selection based on the demand of compute resources required by customer services is one of the main research problems of CFN. In this paper, based on the network architecture of CFN, we analyze the selection and decision-making process of traffic forwarding paths from edge networks to computing centers in CFN according to the actual enterprise business deployment requirements, and combine the technologies of SD-WAN, SRv6, etc., to realize an end-to-end forwarding path selection model in compute-prioritized NICs, and put forward an end-to-end forwarding path quality detection method. This paper solves the problem that the end-to-end forwarding paths do not meet the actual service computing resource requirements because of the inconsistency of the forwarding path selection process of different sub-networks in CFNs. The experimental results prove that the end-to-end network forwarding paths selected according to the method in this paper better meet the customer's application service requirements.</p>
<p>C4M060 15:00-15:15</p>	<p>Sparse Adversarial Attack on Modulation Recognition with Adversarial Generative Networks Author(s): Kui Liang, Zhidong Liu, Xin Zhao, Cheng Zeng, Jun Cai Presenter: Kui Liang, Army Engineering University of PLA, China</p> <p>Abstract: Deep neural networks play an important role in modulation recognition because of their strong feature extraction and classification capabilities, but they are also susceptible to adversarial perturbations. Adversarial perturbations can change the output of deep neural networks, which will seriously threaten communication security. How to generate adversarial perturbations is still a challenging problem. In this paper, a sparse attack method based on adversarial generative network is proposed, which applies adversarial training to the discriminator to improve the attack performance and enhance the stability of adversarial</p>

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	generative network training. The experimental results show that the proposed method has great advantages in generation time and transferability.
C3M032 15:15-15:30	<p>Multi-secret threshold sharing scheme based on Chinese Remainder Theorem Author(s): Yinong Song, Zichen Li Presenter: Yinong Song, Beijing Institute of Graphic Communication, China</p> <p>Abstract: To address the limitations of traditional secret sharing schemes, this paper proposes a multi-secret threshold sharing scheme based on the Chinese Remainder Theorem. In this scheme, multiple secrets and their shares can be unordered as needed. The distributor can modify secrets according to actual requirements, including updating, adding, and subtracting. Each participant in this scheme holds their unique share, and the distributor can send different additional information to each participant based on these shares. Participants in this scheme can reuse their shares to store each new set of secrets without refreshing their shares. Through scheme analysis, this paper proves that the proposed scheme ensures correctness and security. Experimental results further validate that the scheme meets the requirements of efficiency while ensuring correctness and security.</p>

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-  **Topic: Machine Learning Models and Intelligent Computing in Modern Integrated Information Systems**
-  **Time: 15:45-18:30, Beijing Time, GMT+8, May 12, 2024**
-  **Zoom Link: <https://us02web.zoom.us/j/82938637625> (password: 051012)**
-  **Session Chair: Prof. Yi Zhengyao, Dalian University of Technology, China**
-  **C01, C03, C4M057, C6M010, C6M011, C6M022, C6M039, C6M020, C6M041, C6M021, C6M005**

C01 15:45-16:00	<p>Assessment of Agricultural Development Level based on Hierarchical Cluster Analysis and Principal Component Analysis: Evidence from China Author(s): Wenchao Fang Presenter: Wenchao Fang, Guangdong Polytechnic of Industry and Commerce, China</p> <p>Abstract: Agricultural development level is an important link of economic and social development. Guangdong Province is a large agricultural province in China, this paper takes the assessment of the agricultural development level of cities in Guangdong Province as the research object, which helps to understand the differences in the level of agricultural development in different places and puts forward corresponding policy suggestions, and has important research significance and application value. This paper uses the hierarchical cluster analysis and principal component analysis to study the agricultural development level in each prefecture-level city in Guangdong Province. First of all, the prefecture-level cities in Guangdong Province are divided into four categories by hierarchical cluster analysis. Then, four principal components are obtained by principal component analysis, and the prefecture-level cities in Guangdong Province are ranked. Combining the results of hierarchical cluster analysis and principal component analysis, the agricultural development level in Guangdong Province can be divided into three categories. The results show that, overall, most regions in western and northern Guangdong are ranked at the top, most regions in the Pearl River Delta are ranked in the middle, and eastern Guangdong is ranked at the bottom. Among them, under the circumstances of insufficient allocation of agricultural water resources, western Guangdong has achieved a high level of agricultural development by developing intensive agriculture and ecological agriculture, and so on. In addition, this paper puts forward corresponding policy suggestions around the above three types of regions.</p>
C03 16:00-16:15	<p>Research on stock selection strategies based on decision tree and multi-factor models Author(s): Chengzhao Zhang Presenter: Chengzhao Zhang, Chengdu Polytechnic, China</p> <p>Abstract: The paper focuses on investigating stock selection strategies based on decision tree and multi-factor models. The study explores the utilization of decision trees to incorporate multiple factors in the stock selection process, aiming to enhance the accuracy and effectiveness of investment decisions. The methodology involves collecting a comprehensive dataset of financial variables and factors that are known to influence stock returns. A decision tree algorithm is applied to construct a predictive model by recursively partitioning the dataset based on selected factors. The resulting decision tree provides a systematic framework for identifying key factors and making informed stock selection choices. Comparative analysis is performed against benchmark indices and traditional stock selection approaches to gauge its added value and potential for generating superior returns. Based on the relevant data of the constituent stocks of the CSI300 Index, significant and effective factors are selected to construct different classification decision tree models. Empirical evidence suggests that machine learning algorithms can effectively predict stock returns. Backtesting is conducted using stock return data from 2022 to 2023, and it is found that the decision tree and multi-factor stock selection model achieved the objective of generating excess returns compared to the CSI300 Index.</p>
C4M057 16:15-16:30	<p>Triangulation Method for Camera-Based Distance Measurement with Application for the Blind Author(s): Ivan Victor J. Lau, Adrian I. Sacil, Joseph Bryan G. Ibarra Presenter: Adrian Isidro Sacil, Mapua University, Philippines</p> <p>Abstract: Approximately 2.2 billion individuals globally grapple with distance or near vision impairment; alarmingly, nearly half of these cases could have been prevented. Such</p>

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	<p>impairment not only inhibits individuals from engaging in routine activities independently but also necessitates constant assistance from others. In this study, a camera-based system was proposed and designed to assist the visually impaired. The study aims to apply the triangulation method to a fully camera-based system to aid blind people. The specific objectives are (1) to apply the triangulation method for camera-based distance measurement, (2) to configure the system to detect objects, and (3) to test the system and measure its accuracy. The study's findings show that the system can approximate the distance of a specific object or person ahead, providing an audio output. The system presents an overall accuracy of 90.77% for object detection and achieves a weighted F1-score of 0.8976 for controlled environment testing. With the distances as a critical measure of safety and risk between the user, the system can measure the distance of a detected object ahead from 0.5 meters to 5 meters with a minimum error of 2.67% at 2 meters, which notifies the user about the oncoming object or obstacle.</p>
<p>C6M010 16:30-16:45</p>	<p>A Group Decision Making Approach with Z-numbers Based on Choquet Integral Author(s): Chengcheng Wang, Laquan Li, Dong Qiu Presenter: Chengcheng Wang, Chongqing University of Posts and Telecommunicacations, China</p> <p>Abstract: A group decision making approach considering the correlation of multiple evaluation attributes under information described by Z- numbers is proposed. The approach primarily consists of two parts: (1) obtaining the group preference matrix under information described by Z-numbers; (2) addressing the interactions among multiple evaluation attributes. To achieve this, firstly, a technique for ranking Z-numbers is proposed. The provided ranking technique better distinguishes Z-numbers. Additionally, the Choquet integral for Z-numbers ($ZN-CI\beta$) is introduced. The $ZN-CI\beta$ captures the interconnections among multiple evaluation attributes in an uncertain environment. Secondly, the weights of decision makers are determined through Shapley values, ensuring fairness in the decision making process. In addition, the comprehensive group decision matrix is formed by aggregating the matrices of individual decision makers, each represented by their respective Z-numbers. Finally, the efficacy of the approach presented in this paper is validated through a case of selecting B&Bs.</p>
<p>C6M011 16:45-17:00</p>	<p>A Novel Frequency Domain Watermarking of 2D Vector Graphics Author(s): WEI CHEN, HAO YAO, JINWEN QI, BOWEN JIANG Presenter: Wei Chen, Jiangnan University, China</p> <p>Abstract: Vector graphics has been employed in a wide variety of applications due to its scalability and editability. A drawing in a standard vector graphics file, such as SVG (Scalable Vector Graphics), is composed of numerous paths, and a path typically consists of a list of Bézier curves. Traditional vector graphics watermarking techniques, such as Fourier and wavelets, require the initial step of sampling the Bézier curve to obtain a large number of discrete points. However, these methods allow only one line to be selected for watermarking. In this paper, we introduce a novel watermarking of 2D vector graphics based on a new class of orthogonal function system(V-system). It can exactly represent all curves in a vector graphics by a global format directly, eliminating the need for sampled processing. Furthermore, multiple curves can be easily watermarked simultaneously by modifying the V descriptors. A watermark embedded using this method can be successfully extracted even under transformation attacks. Experimental results confirm the imperceptibility and robustness of the proposed method.</p>
<p>C6M022 17:00-17:15</p>	<p>Approximation for Stochastic Volterra Integral Equations with Constant Delay Author(s): Kutorzi Edwin Yao, Yuxue Zhang, Yufeng Shi, Gao Yuan Presenter: Edwin Yao Kutorzi, Shandong University, China</p> <p>Abstract: The study proposes a novel approach that uses block pulse functions (BPFs) with constant delays to approximate stochastic Volterra integral equations (SVIEs). The method simplifies the problem by converting delay-containing SVIEs into algebraic ones using operational matrices of BPFs. This approach is easily solvable and effective, as shown through numerical examples.</p>
<p>C6M039 17:15-17:30</p>	<p>A pruning-based word-centered context fragment extraction method for relation extraction Author(s): zhan'ao Yao, Hongxin Yang, Tinwei Chen Presenter: Zhan'ao Yao, Liaoning University, China</p>

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	<p>Abstract: Neural relationship extraction is an important task in natural language processing, aimed at extracting relationships between target entity pairs from a given text. In recent years, with the development of deep neural networks, various types of neural networks to extract sentence entity-level, fragment-level, and sentence-level features for relationship extraction have become a mainstream research direction. Most existing studies use the BERT model to embed sentences and then use CNN to manipulate all words in the entire sentence to obtain fragment-level features. This article proposes a new word-centered context fragment-level method based on pruning the shortest dependency path between entity pairs. We demonstrate that using a pruning method based on the shortest dependency path between entity pairs can effectively improve the ability of model fragments and information extraction. We evaluated our method on a public benchmark: SemEval 2010 Task 8. The experimental results show that our method outperforms the advanced model using BERT as the embedding.</p>
<p>C6M020 17:30-17:45</p>	<p>YOLOv7 Transfer Learning for Frontal-Viewed Face Mask Detection in Crowded Images Author(s): John Paul Tomas, Justin Jerald Co, Angel Emmanuel Cruz, Jerson Gabriel Dizon, Hans Matthew Gan Presenter: John Paul Tomas , Mapua University , Philippines</p> <p>Abstract: The recent rise in respiratory disease cases, such as JN.1 and influenza, highlighted face mask detection as a fundamental component of Computer Vision. Existing methods of face mask detection leveraged machine learning and deep learning algorithms, with a particular focus on YOLOv7. In this study, the researchers attempt to examine the model skill of a pre-trained YOLOv7 model, one that uses a trainable bag-of-freebies in learning the target object, in recognizing face masks from frontal-viewed faces in crowded scenes. The model was trained using an original dataset consisting of 601 indoor photos containing crowds. Using F1, Precision, Recall, and Precision-Recall as metrics, the examined YOLOv7 model attained a recall score of 0.75 and a precision of 1.0 at high confidence levels, suggesting “good” performance. The results also provide evidence of YOLOv7’s capacity to perform face mask detection.</p>
<p>C6M041 17:45-18:00</p>	<p>Automatic Song Genre Classification in Bengali Music: A Comparative Study of Machine Learning and Deep Learning Approaches Author(s): Atika Humayra, Md Maruf Kamran Sohag, Mohammed Anwer Presenter: Atika Humayra , Independent University, Bangladesh , Bangladesh</p> <p>Abstract: Music genre categorization primarily refers to the identification of type of any music. Genre categorization is useful to create and organize our personalized playlist including enhancing our musical experiences through music suggestions. Currently, for the purpose of categorize the genre of music, various machine learning and deep learning algorithms have been used but it has been noticed that there is a lack of research in the classification of Bangla Music genre. Despite having some works in this field, the performance of the proposed models are not very efficient. Therefore, in this paper we have used some leading-edge models of machine learning as well as deep learning to classify the genres of Bangla Music. Six different Bangla music genres are represented in the dataset we use. Also, the dataset consists of different important features of music such as spectral bandwidth, chroma frequency, spectral roll-off, zero crossing value, mfcc etc. We went through intense data preprocessing and with the assistance of a diverse range of metrics, the performance of our proposed models were assessed for multiclass classification. Moreover, it is worthy of consideration that our implemented deep neural network achieved an accuracy of about 83.65 percent.</p>
<p>C6M021 18:00-18:15</p>	<p>YOLOv8-Based Vehicle Type Detection: An In-Depth Exploration of Deep Learning Techniques for Robust Analysis of Dashcam Footage Author(s): John Paul Tomas, Arjay Aquino, Gener Ellis David, Raphaelo Del Ayre, Jan Kristoffer Alminiana Presenter: John Paul Tomas , Mapua University , Philippines</p> <p>Abstract: Investigating the application of deep learning methodologies, specifically focusing on the YOLOv8-based vehicle type detection, to extract pertinent information accurately from dashcam footage. YOLOv8 stands out for its swift and precise object recognition capabilities, serving as a foundational element for constructing a robust system capable of identifying various vehicle types across diverse environmental conditions and scenarios. The dataset,</p>

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	<p>derived from dashcam footage, encompasses varying types and amounts of vehicles captured in the evening and highway setting. Utilizing Roboflow, the dataset is prepared for training and testing, with vehicle types pre-determined for each frame. The YOLOv8 algorithm, renowned for its one-stage detection paradigm, is enhanced with advancements in accuracy and speed. Key components of YOLOv8, including the backbone network, Feature Pyramid Network (FPN), and anchor boxes, contribute to its proficiency in object detection. The YOLOv8 model demonstrates high accuracy rates for identifying vehicle types, with individual accuracies exceeding 90%. This study underscores the efficacy of YOLOv8 in vehicle-type detection and its potential for enhancing surveillance and traffic management systems.</p>
<p>C6M005 18:15-18:30</p>	<p>Machine Learning-Based Prediction of Binge Drinking among Adults in the United State: Analysis of the 2022 Health Information National Trends Survey Author(s): Xinya Huang, Zheng Dai, Keshen Wang, Xingguang Luo Presenter: Xinya Huang, Brunel University, The UK</p> <p>Abstract: Little is known about the association of social media and belief in alcohol and cancer with binge drinking. This study aimed to perform feature selection and develop machine learning (ML) tools to predict occurrence of binge drinking among adults in the United State. A total of 5,886 adults including 1,252 who ever experienced with binge drinking were selected from the 2022 Health Information National Trends Survey (HINTS 6). Feature selection of 69 variables was conducted using Boruta and the Least Absolute Shrinkage and Selection Operator (LASSO). The Random Over Sampling Example (ROSE) method was utilized to deal with the imbalance data. Seven machine learning (ML) tools including the Support Vector Machines (SVMs) algorithms, Logistic Regression, Naïve Bayes, Random Forest, K-Nearest Neighbor, Gradient Boosting Machine, and XGBoost were applied to develop ML models to predict binge drinking. The overall prevalence of binge drinking among U.S. adults is 21.3%. Both Boruta and LASSO selected 28 identical variables. SVM with Radial Basis Function revealed the best model with the highest accuracy of 0.903 and sensitivity of 0.961. The top risk factors of binge drinking were tobacco use (e-cigarette use and smoking status), belief in alcohol (alcohol decreases the risk of future health), belief in cancer (prevention is not possible, worry about getting cancer), and social media (social media visits and sharing health information). These findings underscore the need for multiple health behavior interventions to enhance education related to alcohol use and cancer and how to effectively employ social media to improve health outcomes.</p>

About Beijing

Governed as a municipality under the direct administration of the national government, Beijing is the destination of many international flights to China. Few cities in the world have served as long as the political and cultural center of an area as immense. Beijing is one of the Four Great Ancient Capitals of China. It has been the heart of China's history for centuries, and there is scarcely a major building of any age in Beijing that does not have at least some national historical significance. The city is renowned for its opulent palaces, temples, and huge stone walls and gates. Its art treasures and universities have long made it a center of culture and art in China.



Tiananmen Tower (天安门广场)

Located at the center of Beijing City and the midpoint of Chang'an Avenue is the remarkable Tiananmen Square, where you can visit the Tiananmen Tower, Monument to the People's Heroes, Great Hall of the People, Chairman Mao Zedong Memorial Hall and see the national flag raising ceremony. Thousands of people come to the Square every day. It is the must place to visit in Beijing City.

Beijing is the best destination to admire the Great Wall of China. Most famous Beijing Great Wall sections are located in its suburban areas, including the well-preserved Badaling and Mutianyu, the renovated Juyonguan, Jinshanling and Simatai, and wild Jiankou and Gubeikou. They are all not far from downtown Beijing, 1-2 hours' driving away.

In Chinese history, Beijing was not only one of the ancient capitals, but also one of the most strategic cities in the north. To defend their territory, many rulers have actively ordered to build Great Wall here.

The Great Wall of China in Beijing totals 573 kilometers (356 miles). Those from Ming Dynasty (1368-1644), the last dynasty engaged in Great Wall construction, amount to 526 kilometers (327 miles).



Beijing Great Wall (长城)



Beijing Hutong (北京胡同)

In the past, Beijing has hundreds of courtyards around the Forbidden City, and the lanes between courtyards stretched out in all four directions, connecting the different kinds of courtyards in the city. Originally formed in the Yuan Dynasty (1271 - 1368), Hutongs welcomed their heyday during the Ming and Qing Dynasties (1368 - 1911), when the number significantly increased to 2,076. It is said that by 1949 there were as many as 3,250 Hutongs. But with the passage of time, and the requirement for city construction, the number

of them has fallen dramatically. In 2003, only 1,500 were left, and now no more than 1,000 remain and a majority of the existing ones have been transformed into tourist attractions associated with street food, shopping, and bars. Thus, Hutong protection becomes an urgent issue for modern people.

