

2024 6th International Conference on Big-data Service and Intelligent Computation (BDSIC 2024)

Hong Kong

May 29-31, 2024

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Welcome Message

We are very honored to invite you to attend our international conference - 2024 6th International Conference on Big-data Service and Intelligent Computation (BDSIC 2024). This event will provide a unique opportunity for editors and authors to get together and share their latest research findings and results in Big-data Service and Intelligent Computation.

We believe that you'll get the theoretical grounding, practical knowledge, and personal contacts that will help you build long-term, profitable and sustainable communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in Big-data Service and Intelligent Computation during the conference.

On behalf of all the conference committees, we would like to appreciate not only the authors but also the technical program committee members and reviewers. Their high competence, their enthusiasm, their time and expertise knowledge, enabled us to prepare the high-quality final program more successfully.

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

Organizing Committee
May, 2024

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Keynote Speakers Introductions

Keynote Speaker I



Prof. Cheng-Zhong XU (IEEE Fellow)
University of Macau, China

Dr. Cheng-Zhong Xu is a Chair Professor of Computer Science and the Dean of the Faculty of Science and Technology, University of Macau. He was also a Chief Scientist of key project on “Internet of Things for Smart City” of Ministry of Science and Technology of China and key project on “Intelligent Driving” of Macau SAR. He was the Director of Institute of Advanced Computing and Digital Engineering, Shenzhen Institutes of Advanced Technology (SIAT) of Chinese Academy of Sciences. Prior to these, he was in the faculty of Wayne State University, USA. Dr. Xu's research interest is mainly in the areas of parallel and distributed systems, cloud and edge computing, and data-driven intelligent applications. He has published over 400 peer-reviewed papers on these topics and awarded more than 120 patents. Dr. Xu was the Chair of IEEE Technical Committee of Distributed Processing. He received his B.S. and M.S. degrees in Computer Science from Nanjing University and his Ph.D. from the University of Hong Kong in 1993. He is an IEEE fellow.

Keynote Speaker II



Prof. Yiu-ming Cheung (IEEE Fellow)
Hong Kong Baptist University

Yiu-ming Cheung is currently a Chair Professor (Artificial Intelligence) of the Department of Computer Science, Dean of Institute for Research and Continuing Education (IRACE), and Associate Director of Institute of Computational and Theoretical Studies in Hong Kong Baptist University (HKBU). He received PhD degree from Department of Computer Science and Engineering at The Chinese University of Hong Kong in 2000, and then joined the Department of Computer Science at HKBU in 2001. He is an IEEE Fellow, AAAS Fellow, IET Fellow, AAIA Fellow, and British Computer Society (BCS) Fellow. He is the Awardee of RGC Senior Research Fellow with receiving a fellowship grant of HK\$7.8 million over a period of 60 months. Since 2019, he has been ranked the World's Top 1% Most-cited Scientists in the field of Artificial Intelligence and Image Processing by Stanford University for five consecutive years. He was elected as a Distinguished Lecturer of IEEE Computational Intelligence Society in 2020, and named a Chair Professor of Changjiang Scholars Program by the Ministry of Education of the People's Republic of China for the dedication and exceptional achievements in his academic career. Also, he is the Editor-in-Chief of IEEE Transactions on Emerging Topics in Computational Intelligence.

His research interests include machine learning and visual computing, as well as their applications in data science, pattern recognition, multi-objective optimization, and information security. He has published over 250 articles in the high-quality conferences and journals, including TPAMI, TNNLS, TIFS, TIP, TMM, TKDE, TCYB, CVPR, IJCAI, AAAI, and so on. His four co-authored papers have been selected as ESI Highly Cited Papers (i.e. listed in Top 1% globally in the corresponding discipline). Moreover, he has been granted one Chinese patent and two US patents. Subsequently, the underlying technique of his eye-gaze tracking patent has been successfully applied to develop the first mobile app for fatigue driving detection. It turns out that, selected from 1000 new inventions and products of 700+ competition teams from 40 countries, he was awarded two most prestigious prizes: (1) the

Gold Medal with Distinction (i.e. the highest grade in Gold Medals) and (2) Swiss Automobile Club Prize, in the 45th International Exhibition of Invention, Geneva, Switzerland, on March 29-April 2, 2017, in recognition of his innovative work. Also, he was the Gold Award Winner of Hong Kong Innovative Invention Award in the Seventh Hong Kong Innovative Technologies Achievement Award 2017. In addition, he won the Gold Medal with Congratulations of Jury (i.e. the highest grade in Gold Medals) and the Award of Excellence from Romania, respectively, at the 46th International Exhibition of Inventions of Geneva 2018 with his invention “Lip-password: Double Security System for Identity Authentication”. He was the recipient of: (1) 2023-2024 President’s Award for Outstanding Performance in Scholarly Work at HKBU, (2) 2023 APNNS Outstanding Achievement Award, (3) Best Research Award of Department of Computer Science at HKBU in 2011 and 2021, respectively, (4) 2022-23 Faculty Research Excellence Paper Award in HKBU, (5) Best in Theoretical Paper Award in WI-IAT’2020, (6) Best Paper Awards in SEAL’2017, ISICA’2017, ICNC- FSKD’2014, and IEEE IWDVT’2005, respectively, and (7) Best Student Paper Award in ISMIS’2018.

He is the Founding Chairman of IEEE (Hong Kong) Computational Intelligence Chapter and the Chair of Technical Community on Intelligent Informatics (TCII) of IEEE Computer Society. He has served in various capacities (e.g., Organizing Committee Chair, Program Committee Chair, Program Committee Area Chair, and Financial Chair) at several top-tier international conferences, including IJCAI’2021, ICPR’2020, ICDM’2017 & 2018, WCCI’2016, WI-IAT’2012, ICDM’2006 & WI-IAT’2006, to name a few. He is an Associate Editor of several prestigious journals, including IEEE Transactions on Cybernetics, IEEE Transactions on Emerging Topics in Computational Intelligence, IEEE Transactions on Cognitive and Developmental Systems, IEEE Transactions on Neural Networks and Learning Systems (2014-2020), Pattern Recognition, Pattern Recognition Letters, Knowledge and Information Systems (KAIS), and Neurocomputing, as well as the Guest Editor in several international journals. Currently, he is an Engineering Panel member of Research Grants Council, Hong Kong, a member of assessment panel of Enterprise Support Scheme (ESS) under the Innovation and Technology Fund (ITF), and a Fellow Evaluation Committee member of IEEE Computational Intelligence Society and IEEE Computer Society, respectively.

Keynote Speaker III



Prof. Witold Pedrycz (IEEE Fellow)
University of Alberta, Canada

Dr. Witold Pedrycz (IEEE Fellow, 1998) is Professor and Canada Research Chair (CRC) in Computational Intelligence in the Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Canada. He is also with the Systems Research Institute of the Polish Academy of Sciences, Warsaw, Poland. In 2009 Dr. Pedrycz was elected a foreign member of the Polish Academy of Sciences. In 2012 he was elected a Fellow of the Royal Society of Canada. In 2007 he received a prestigious Norbert Wiener award from the IEEE Systems, Man, and Cybernetics Society. He is a recipient of the IEEE Canada Computer Engineering Medal, a Cajastur Prize for Soft Computing from the European Centre for Soft Computing, a Killam Prize, a Fuzzy Pioneer Award from the IEEE Computational Intelligence Society, and 2019 Meritorious Service Award from the IEEE Systems Man and Cybernetics Society. His main research directions involve Computational Intelligence, fuzzy modeling and Granular Computing, knowledge discovery and data science, pattern recognition, data science, knowledge-based neural networks, and control engineering. He has published papers in these areas. He is also an author of 21 research monographs and edited volumes covering various aspects of Computational Intelligence, data mining, and Software Engineering. Dr. Pedrycz is vigorously involved in editorial activities. He is an Editor-in-Chief of Information Sciences, Editor-in-Chief of WIREs Data Mining and Knowledge Discovery (Wiley), and Co-editor-in-Chief of Int. J. of Granular Computing (Springer) and J. of Data Information and Management (Springer). He serves on an Advisory Board of IEEE Transactions on Fuzzy Systems and is a member of a number of editorial boards of international journals.

Keynote Speaker IV



Prof. Xudong Jiang (IEEE Fellow)
Nanyang Technological University, Singapore

Dr. Xudong Jiang received the B.Eng. and M.Eng. from the University of Electronic Science and Technology of China (UESTC), and the Ph.D. degree from Helmut Schmidt University, Hamburg, Germany. From 1986 to 1993, he was a Lecturer with UESTC, where he received two Science and Technology Awards from the Ministry for Electronic Industry of China. From 1998 to 2004, he was with the Institute for Infocomm Research, A-Star, Singapore, as a Lead Scientist and the Head of the Biometrics Laboratory, where he developed a system that achieved the most efficiency and the second most accuracy at the International Fingerprint Verification Competition in 2000. He joined Nanyang Technological University (NTU), Singapore, as a Faculty Member, in 2004, and served as the Director of the Centre for Information Security from 2005 to 2011. Currently, he is a professor in NTU. Dr Jiang holds 7 patents and has authored over 150 papers with over 40 papers in the IEEE journals, including 11 papers in IEEE T-IP and 6 papers in IEEE T-PAMI. Three of his papers have been listed as the top 1% highly cited papers in the academic field of Engineering by Essential Science Indicators. He served as IFS TC Member of the IEEE Signal Processing Society from 2015 to 2017, Associate Editor for IEEE SPL from 2014 to 2018, Associate Editor for IEEE T-IP from 2016 to 2020 and the founding editorial board member for IET Biometrics from 2012 to 2019. Dr Jiang is currently an IEEE Fellow and serves as Senior Area Editor for IEEE T-IP and Editor-in-Chief for IET Biometrics. His current research interests include image processing, pattern recognition, computer vision, machine learning, and biometrics.

Invited Speakers Introductions

Invited Speaker I



Dr. Chen Zhang
Hang Seng University of Hong Kong

Dr. Chen Zhang is an assistant professor in the department of computer science, the Hang Seng University of Hong Kong. She received her PhD degree in Computer Science from City University of Hong Kong. Her research interests include data privacy and security in cloud computing, IoT security, and mobile edge computing. She has contributed a series of publications in renowned conferences and journals such as IEEE INFOCOM, IEEE TPDS, IEEE TIFS, IEEE TC, IEEE TSC, IEEE TCC, etc.

Invited Speaker II



Assoc. Prof. Pengfei Chen
Sun Yat-sen University, China

Pengfei Chen is an associate professor at the School of Computer Science, Sun Yat-sen University, Doctoral Supervisor, recipient of the Guangdong Provincial Outstanding Youth Fund, and Yat-sen Scholar. He received the first Excellent Doctoral Dissertation of the Shaanxi Computer Society in 2020, and the only Best Paper at the IEEE ISSRE 2022 conference. The main directions are: cloud computing, operating systems, intelligent operations and maintenance (AIOps), software reliability, software defined networks, etc. In recent years, he has published over 80 papers in international conferences such as FSE, ICSE, ASE, WWW, ICPP, IEEE INFOCOM, IEEE DSN, IEEE ISSRE, and journals such as IEEE TNNLS, IEEE TDSC, IEEE TSC, IEEE TCC, etc. He has also served as a reviewer for multiple international journals and conferences. He undertaken over 20 projects, including national key research and development projects, big data center projects, National Natural Science Foundation of China general and youth projects, as well as science and technology projects in Guangdong Province and Guangzhou City. In addition, he has also carried out school enterprise cooperation projects with companies such as Alibaba, Huawei, Tencent, and WeChat, and have implemented some of the research results in these companies.

Invited Speaker III



Prof. Chinthaka Premachandra
Shibaura Institute of Technology, Japan

Chinthaka Premachandra (Senior Member, IEEE) was born in Sri Lanka. He received the B.Sc. and M.Sc. degrees from Mie University, Tsu, Japan, in 2006 and 2008, respectively, and the Ph.D. degree from Nagoya University, Nagoya, Japan, in 2011. From 2012 to 2015, he was an Assistant Professor with the Department of Electrical Engineering, Faculty of Engineering, Tokyo University of Science, Tokyo, Japan. From 2016 to 2017, he was an Assistant Professor with the Department of Electronic Engineering, School of Engineering, Shibaura Institute of Technology, Tokyo, where he was an Associate Professor, from 2018 to 2022. In 2022, he was promoted to a Professor with the Department of Electronic Engineering, Graduate School of Engineering, Shibaura Institute of Technology, where he is currently the Manager of the Image Processing and Robotic Laboratory. His research interests include AI, UAV, image processing, audio processing, intelligent transport systems (ITS), and mobile robotics.

He is a member of IEEE, IEICE, Japan; SICE, Japan; RSJ, Japan; and SOFT, Japan. He received the IEEE SENSORS LETTERS Best Paper Award from the IEEE Sensors Council in 2022 and the IEEE Japan Medal from the IEEE Tokyo Section in 2022. He also received the FIT Best Paper Award and the FIT Young Researchers Award from IEICE and IPSJ, Japan, in 2009 and 2010, respectively. He has served as a steering committee member and an editor for many international conferences and journals. He is the Founding Chair of the International Conference on Image Processing and Robotics (ICIPRoB), which is technically co-sponsored by IEEE. He is currently serving as an Associate Editor for IEEE Robotics and Automation Letters (R-AL) and IEICE Transactions on Information and Systems.

Invited Speaker IV



Prof. Yudong Zhang
University of Leicester, UK

Prof. Yudong Zhang works at University of Leicester. His research interests include deep learning and medical image analysis. He is the Fellow of IET, Fellow of EAI, and Fellow of BCS. He is the Senior Member of IEEE and ACM. He is the Distinguished Speaker of ACM. He was 2019-2023 recipient of Clarivate Highly Cited Researcher. He has (co)authored over 400 peer-reviewed articles. There are more than 60 ESI Highly Cited Papers and 6 ESI Hot Papers in his (co)authored publications. His citation reached 29604 in Google Scholar (h-index 97). He is the editor of Neural Networks, IEEE TITS, IEEE TCSVT, IEEE JBHI, etc. He has conducted many successful industrial projects and academic grants from NIH, Royal Society, British Council, GCRF, EPSRC, MRC, BBSRC, Hope, and NSFC. He has served as (Co-)Chair for more than 60 international conferences (including more than 20 IEEE or ACM conferences). More than 70 news presses have reported his research outputs, such as Reuters, BBC, Telegraph, Mirror, Physics World, UK Today News, etc.

Invited Speaker V



Prof. Abhijit Sen
Kwantlen Polytechnic University, Canada

Dr. Abhijit Sen is a Professor of Computing Science and Information Technology at Kwantlen Polytechnic University in BC, Canada. Holding a Ph.D. from McMaster University in Hamilton, Ontario, Canada, a Master of Science degree from the University of California, Berkeley, USA, and a B.Tech in Electrical Engineering from the Indian Institute of Technology, Kharagpur, India, Dr. Sen brings a wealth of academic and industry expertise to his role.

With over 30 years of experience, Dr. Sen has made significant contributions in both academia and industry. He has held key roles in organizations such as Canadian Aviation Electronics, Montreal, Canada, and Microtel Pacific Research, Burnaby, Canada. His consulting experience includes notable projects with Canada Post, Montreal, and InfoElectronics, Montréal, Canada.

Dr. Sen's international impact extends beyond Canada. He has served as a visiting professor at prestigious institutions including Waikato University, Hamilton, New Zealand, University of Applied Sciences, Munich, Germany, Centre for Development of Advanced Computing (CDAC), India, North China Institute of Aerospace Engineering, China, and Technical University of Applied Sciences, Regensburg, Germany.

Throughout his career, Dr. Sen has been a keynote speaker at various international conferences, demonstrating his thought leadership in the field. He has also contributed significantly to the academic community by serving as a reviewer and technical committee member for numerous international conferences, and notably, he has served on the editorial boards for a number of conference proceedings publications. Additionally, he has acted as an external examiner for Ph.D. theses at several universities.

His current research interests span diverse domains, including Wireless Networking and Security, Radio Frequency Identification (RFID), Computing Education and Teaching

Methodologies, Distributed Systems and Databases, System Developments, DevOps, and Artificial Intelligence.

Dr. Sen's dedication to education is underscored by his receipt of the Distinguished Teaching Award from Kwantlen Polytechnic University, BC, Canada. He is a Life Member of the Institute of Electrical and Electronics Engineers (IEEE) and has actively served in the Executive Committee of IEEE, Vancouver Chapter. His contributions have been recognized by the IEEE, Vancouver chapter, highlighting his unwavering commitment and individual contributions to the organization.

Invited Speaker VI



Assoc. Prof. Maizatul Akmar Ismail
University of Malaya, Malaysia

Dr. Maizatul Akmar Ismail is an Associate Professor at the Department of Information Systems, Faculty of Computer Science and Information Technology, University of Malaya (UM), Malaysia. Her academic qualifications were obtained from Universiti Malaya (UM) for her Bachelor's and Ph.D. degree, and the University of Putra Malaysia for her master's. At present, she has more than twenty years of teaching experience since she started her career as a lecturer at the Universiti Malaya. Maizatul was involved in various research, leading to the publication of several academic papers in the areas of Information Systems specifically on Educational Technology, Recommender Systems, and Data Mining. She has been actively publishing more than 70 conference papers at renowned local and international conferences. A number of her works were also published in reputable international journals. Maizatul has participated in many competitions and exhibitions to promote her research works. She has been appointed as Competition Judges for several innovation competitions. To date, she has successfully supervised 10 Ph.D. and 23 Masters's students to completion. She hopes to extend her research beyond Information Systems in her quest to elevate the quality of teaching and learning.

General Information

Paper Publication

Papers will be published in the following proceeding:

International Conference Proceedings Series by ACM(ISBN:979-8-4007-1806-9), which will be archived in the ACM Digital Library, and indexed by Ei Compendex, Scopus.

Instructions for Oral Presentations

Materials Provided by the Presenters:

PowerPoint or PDF Files

Duration of each Presentation:

Regular Oral Presentation: about **15 Minutes** including Presentation and **2-3**

Minutes of Question and Answer.

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

➤ Equipment Needed:

(a) A computer with an internet connection (wired connection recommended). (b) USB plug-in headset with a microphone (recommended for optimal audio quality). (c) Webcam (optional): built-in or USB plug-in. (d) Please set up your laptop time in advance.

➤ Download the ZOOM:

<https://zoom.us/download>;

<https://www.zoom.com.cn/download>.

➤ Learn the ZOOM skills:

<https://support.zoom.us/hc/en-us/articles/201362033-Getting-Started-on-Windows-and-Mac>

➤ How to use ZOOM:

(a) Set the language. (b) Test computer or device audio. (c) Join a meeting: Join the meeting

with the

"meeting ID" provided in the program, tap the name as "paper ID+name", eg.: "SA4001-Kira", then click "Join". (d) Get familiar with the basic functions: Rename, Chat, Raise Hands, Start Video, Share Computer Sound and Share Screen, etc.

➤ Environment Requirement:

(a) Quiet Location. (b) Stable Internet Connection. (c) Proper Lighting.

➤ Test Session:

On May 29, there are test sessions. On that day, all the above functions will be taught including how to use ZOOM. If you don't know how to use, please do not worry. However, please do download ZOOM and log in the meeting room in advance, then, you can join the conference.

➤ Voice Control Rules during the Presentation:

(a) The host will mute all participants while entering the meeting. (b) The host will unmute the speakers' microphone when it is turn for his or her presentation. (c) Q&A goes after each speaker, the participant can raise hand for questions, the host will unmute the questioner. (d) After Q&A, the host will mute all participants and welcome next speaker.

➤ Conference Material:

All presented papers will be issued with soft copy of conference materials: Receipt/Invoice, Participation and presentation certificate, etc.

➤ Notes:

(a) Log in the meeting room 15 minutes ahead of the session. (b) Learn the zoom skills. (c) Your punctual arrival and active involvement in each session will be highly appreciated. (d) The conference will be recorded; we will appreciate your proper behavior.

Best Presentation Award

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

Conference Venue

Hong Kong Chu Hai College-Lecture Hall 2

Address: 80 Castle Peak Road, Castle Peak Bay, Tuen Mun, N.T. Hong Kong



Hong Kong Chu Hai College traces its origins back to 1947, Hong Kong Chu Hai College has provided 76 years of quality education to the Hong Kong community and remains committed to enhancing the educational opportunities for young generations in Hong Kong.

The College is established and registered as an Approved Post Secondary College under the Post Secondary Colleges Ordinance (Cap 320). In the same year, it obtained approval from the Chief Executive of the Hong Kong Special Administrative Region and the Executive Council to offer bachelor's degree programmes through accreditation and grant degrees and successfully obtained Programme Area Accreditations for nine programme areas.

Note: The registration fee does not cover the accommodation. It is suggested that an early reservation be done because of peak season.

For Arrival Registration & Conference Material Collection on the registration day May 29 in front of the Lecture Hall 2 (Ground Floor) all day.

For onsite presenting on May 30 in Lecture Hall 2(Ground Floor) all day.

Schedule Simple Version

Registration Guide (Onsite) May 29

GMT+8

Time: 10:00-16:00

Venue: Hong Kong Chu Hai College

Address: 80 Castle Peak Road, Castle Peak Bay, Tuen Mun, N.T.

Hong Kong

Lecture Hall 2 (Ground Floor)

Registration Steps

1. Arrive at the **Lecture Hall 2 of Hong Kong Chu Hai College**;
2. Inform the conference staff of your paper ID;
3. Sign your name on the Participants list;
4. Sign your name on Lunch & Dinner requirement list;
5. Check your conference kits: (1 conference program, 1 lunch coupon, 1 dinner coupon, 1 receipt, 1 name card, 1 flash disk (papers collection), 1 laptop bag);
6. Finish registration.

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

Note:

- (1) One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session during May 30-31.**
- (2) One regular registration can cover one participant.**
- (3) The organizers cannot accept liability for personal injuries, or for loss or damage of property belonging to meeting participants, either during, or as a result of the meeting. Please take care of all your belongings.**
- (4) Along with your registration, you will receive your name badge, which must be worn when attending all official conference sessions and activities. Participants without a badge will not be allowed to enter the venue building. Please don't lend your name badge to others.**

Zoom Test (Online) May 29

GMT+8

*Online test is for testing the Internet connection and helping participants get familiar with software Zoom. Please make sure that you will attend online test.

Zoom link: <https://us02web.zoom.us/j/82512150219>

Zoom Room ID: **82512150219**

9:30-9:40	Keynote speaker	Prof. Witold Pedrycz
9:40-9:50	Keynote speaker	Prof. Xudong Jiang
9:50-10:00	Invited speaker	Prof. Chinthaka Premachandra
10:00-10:10	Invited speaker	Prof. Abhijit Sen
10:10-10:20	Invited speaker	Prof. Yudong Zhang
10:20-10:30	Invited speaker	Assoc. Prof. Maizatul Akmar Ismail
10:30-11:00	Session 3 (Online)	DC0004, DC0014, DC0016, DC0017, DC4003, DC0020
11:00-11:25	Session 4 (Online)	SA0001, SA0007, SA0014, SA0015, SA0005

* If you want to do online zoom test after 11:25, please contact your conference secretary.

May 30 - Keynote Speeches, Invited Speeches and Sessions

Tips: The time in the schedule is according to Hong Kong Standard Time (GMT+8)

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

Zoom link: <https://us02web.zoom.us/j/82512150219>

Zoom Room ID: **82512150219**

Time	Each talk includes Q&A time	Presenter
9:00-9:05	Opening Remark	Prof. Wai Lun LO Hong Kong Chu Hai College, Hong Kong
9:05- 9:45	Keynote Speech 1 Cloud-Edge Computing Framework and Algorithms for Large Foundation Models	Prof. Cheng-Zhong XU (IEEE Fellow) University of Macau, China
9:45-10:25	Keynote Speech 2 Imbalanced Data Learning: From Class Imbalance to Long-tailed Data Classification	Prof. Yiu-ming Cheung (IEEE Fellow) Hong Kong Baptist University
10:25-10:40	Coffee Break and Group Photo	
10:40-11:20	Keynote Speech 3 New Horizons of Machine Learning: Pursuing a Unified Data - Knowledge Environment	Prof. Witold Pedrycz (IEEE Fellow) University of Alberta, Canada
11:20-12:00	Keynote Speech 4 Image Recognition Based on Sparse Coding	Prof. Xudong Jiang (IEEE Fellow) Nanyang Technological University, Singapore
12:00-13:30	Lunch on the First Floor	
13:30-13:55	Invited Speech 1 Secure and Compressed Key-Value Store for Outsourced Data in Cloud	Dr. Chen Zhang Hang Seng University of Hong Kong

	Computing	
13:55-14:20	Invited Speech 2 Data Driven Reliability Methods for Cloud Native Systems	Assoc. Prof. Pengfei Chen Sun Yat-sen University, China
14:20-14:45	Invited Speech 3 Hyperspectral Image Generation and Analysis	Prof. Chinthaka Premachandra Shibaura Institute of Technology, Japan
14:45-15:10	Invited Speech 4 Improved ViT Models for Medical Image Analysis	Prof. Yudong Zhang University of Leicester, UK
15:10-15:30	Coffee Break	
15:30-16:45	Session 1 Software and Intelligent Programming Design Session Chair: Assoc. Prof. Jun Shan, Hong Kong Chu Hai College, Hong Kong	SA0002, SA0003, SA0013, SA0016, SA0017
16:45-18:00	Session 2 Computing Models, Data Security and Management in Computers and Information Systems Session Chair: Assoc. Prof. Richard Tai-Chiu Hsung, Hong Kong Chu Hai College, Hong Kong	DC0009, DC0010, DC0011, DC0013-A, DC0006-A, DC0015
18:00-20:00	Dinner on the First Floor	

May 31, 2024 – Online Invited Speeches and Online Sessions

Tips: The time in the schedule is according to Hong Kong Standard Time (GMT+8)

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

Zoom link: <https://us02web.zoom.us/j/82512150219>

Zoom Room ID: **82512150219**

Time	Each talk includes Q&A time	Presenter
9:00-9:25	Invited Speech 5 Role of Generative AI for DevSecOps	Prof. Abhijit Sen Kwantlen Polytechnic University, Canada
9:25-10:55	Session 3 Visual based information system design and management Session Chair: Prof. Abhijit Sen, Kwantlen Polytechnic University, Canada	DC0004, DC0014, DC4003, DC0016, DC0017, DC0020
10:55-14:00	Lunch Time	
14:00-14:25	Invited Speech 6 Ethical Concerns on the Usage of Generative AI Tools in Education	Assoc. Prof. Maizatul Akmar Ismail University of Malaya, Malaysia
14:25-15:40	Session 4 Software testing and development Session Chair: Assoc. Prof. Maizatul Akmar Ismail, University of Malaya, Malaysia	SA0001, SA0007, SA0014, SA0015, SA0005

Schedule Detailed Version

May 30, 2024 Morning Keynote Speeches

Zoom link: <https://us02web.zoom.us/j/82512150219>

Zoom Room ID: **82512150219**

Opening Remark (9:00-9:05 GMT+8)

Addressed by Conference Program Chair Prof. Wai Lun LO, Hong Kong
Chu Hai College, Hong Kong

Keynote Speech 1(9:05-9:45 GMT+8)

**By Prof. Cheng-Zhong XU (IEEE Fellow), University of Macau,
China**

**Title: Cloud-Edge Computing Framework and Algorithms for Large
Foundation Models**

Abstract—With the emergence of large foundation models and generative AI technology, model pre-training and real-time inference pose unprecedented challenges in computing power. The cloud-edge computing framework caters to the development needs of machine learning technology and can achieve a better compromise balance in model training and inference. This talk will discuss issues such as resource management and related model compression of cloud native data centers for large models. Our recent research results along the line will be presented in support of large models and AI applications. We will also share our thoughts on the future direction of large model operating systems.

Keynote Speech 2 (9:45-10:25 GMT+8)

By Prof. Yiu-ming Cheung (IEEE Fellow), Hong Kong Baptist University

Title: Imbalanced Data Learning: From Class Imbalance to Long-tailed Data Classification

Abstract—In many practical problems, the number of data forming difference classes can be quite imbalanced, which could make the performance of the most machine learning methods become deteriorate to a certain degree. In general, the problem of learning from imbalanced data is nontrivial and challenging in the field of data engineering and machine learning, which has attracted growing attentions in recent years. In this talk, we will introduce the imbalanced data learning and its related techniques, as well as its applications.

Break Time & Group Photo 10:25-10:40

Keynote Speech 3 (10:40-11:20 GMT+8)

**By Prof. Witold Pedrycz (IEEE Fellow), University of Alberta,
Canada**

**Title: New Horizons of Machine Learning: Pursuing a Unified Data -
Knowledge Environment**

Abstract—Over the recent years, we have been witnessing truly remarkable progress in Machine Learning (ML) with highly visible accomplishments encountered, in particular, in natural language processing and computer vision impacting numerous areas of human endeavours. Driven inherently by the technologically advanced learning and architectural developments, ML constructs are highly impactful coming with far reaching consequences; just to mention autonomous vehicles, control, health care imaging, decision-making in critical areas, among others.

Data are central and of paramount relevance to the design methodology and algorithms of ML. While they are behind successes of ML, there are also far-reaching challenges that require urgent attention especially with the growing importance of requirements of interpretability, transparency, credibility, stability, and explainability. As a new direction, data-knowledge ML concerns a prudent and orchestrated involvement of data and domain knowledge used holistically to realize learning mechanisms and support the formation of the models.

The objective of this talk is to identify the challenges and develop a unique and comprehensive setting of data-knowledge environment in the realization of the development of ML models. We review some existing directions including concepts arising under the name of physics informed ML.

We investigate the representative topologies of ML models identifying data and knowledge functional modules and interactions among them. We also elaborate on the central role of information granularity in this area.

Keynote Speech 4 (11:20-12:00 GMT+8)

By Prof. Xudong Jiang (IEEE Fellow), Nanyang Technological University, Singapore

Title: Image Recognition Based on Sparse Coding

Abstract—High data dimensionality and lack of human knowledge about the effective features to classify the data are two challenging problems in computer vision and pattern recognition. The sparse coding-based classifier (SRC) significantly differentiates itself from the other classifiers in three aspects. One is the utilization of training samples of all classes collaboratively to represent the query images and another is the sparse coding coinciding with the classification target. The last is the L1-norm minimization of the representation error that enables SRC to recognize query images heavily corrupted by outlier pixels and occlusions. These three merits of SRC lead to some encouraging and impressive image recognition results, which attract great interest in further research on SRC. Many extensions of SRC are proposed in recent years. In this talk, we first help audience understanding the underline principles of SRC and the key advantages of this approach. The deep understanding to the SCR is necessary to analyze and find the problems and limitations of the SRC. These analyses and findings pave the way for us to investigate how the recent developments solve these problems and overcome the limitations of SRC, which bring the sparse coding-based image classification to a significantly higher level.

Lunch Time 12:00-13:30

On the First Floor

May 30, 2024 Afternoon Sessions

Zoom link: <https://us02web.zoom.us/j/82512150219>

Zoom Room ID: **82512150219**

Invited Speech 1 (13:30-13:55 GMT+8)

By Dr. Chen Zhang, Hang Seng University of Hong Kong

Title: Secure and Compressed Key-Value Store for Outsourced Data in Cloud Computing

Abstract—Key-value store is adopted by many applications due to its high performance in processing big data workloads. For data security and privacy, data is encrypted before being outsourced to the cloud. As the data size is ever increasing, it is also important to compress the data stored in the cloud. However, it is a challenging task to combine data encryption with compression. This talk is about developing secure and compressed key-value stores for outsourced data in cloud computing.

We first discuss a mathematical model for the analysis of storage cost and bandwidth cost in encrypted and compressed key-value stores. Then we propose an optimal pack size computation algorithm to achieve the best trade-off between storage and bandwidth costs. As an encrypted and compressed key-value store should achieve frequency-security and length-security efficiently, we also propose a secure packing scheme, which achieves length security and frequency security of packs with bounded storage overhead and low bandwidth overhead.

Invited Speech 2 (13:55-14:20 GMT+8)

By Assoc. Prof. Pengfei Chen, Sun Yat-sen University, China

Title: Data Driven Reliability Methods for Cloud Native Systems

Abstract—In recent years, cloud native systems have received widespread attention and research due to their rapid development, iteration, and flexible scalability. However, cloud native systems may experience performance degradation, downtime, and even failures at runtime due to internal/external factors. Timely detection and recovery of faults has always been a key issue to ensure the reliability of cloud native systems. However, due to the complexity of cloud native systems, the diversity of faults, the sparsity of fault data, and the dynamic nature of the operating environment, traditional monitoring and reliability assurance methods are difficult to achieve satisfactory results. In response to this issue, this report mainly involves the research on several reliability methods such as observability of kernel level cloud native systems, fault detection, fault localization, and fault recovery based on large models, ultimately achieving the reliability guarantee of data-driven cloud native systems.

Invited Speech 3 (14:20-14:45 GMT+8)

**By Prof. Chinthaka Premachandra, Shibaura Institute of Technology,
Japan**

Title: Hyperspectral Image Generation and Analysis

Abstract—Compared to conventional imaging that uses the Red, Green, and Blue (RGB) spectrum, hyperspectral imaging utilizes a broader array of spectral bands—often more than 50. As a result, hyperspectral imaging generates a significantly larger volume of image data than standard RGB imaging. This extensive data set captures intricate internal information about the target objects, providing deeper insights into their characteristics. This invited talk will explore methods to effectively compress and process these large datasets.

Invited Speech 4 (14:45-15:10 GMT+8)

By Prof. Yudong Zhang, University of Leicester, UK

Title: Improved ViT Models for Medical Image Analysis

Abstract—Vision Transformer (ViT) models and architectures help achieve unprecedented accuracy and efficiency in the interpretation of medical images. This innovative approach harnesses the power of transformer-based models to capture intricate patterns and subtle details within medical imagery, thereby improving diagnostic precision and accelerating the decision-making process for healthcare professionals. The integration of ViT models marks a transformative advancement, paving the way for more reliable and robust medical image analysis techniques with the potential to revolutionize patient care.

Break Time 15:10-15:30

Session 1 (15:30-16:45)

Software and Intelligent Programming Design

Session Chair: Assoc. Prof. Jun Shan, Hong Kong

Chu Hai College, Hong Kong

SA0002(15:30-15:45 GMT+8)

Developing Automated Photographic Detection of Gum Diseases Using Deep Neural Networks for Mobile Devices

Andrew Chi-Chung Cheng¹, Tai Chiu Hsung¹, Guan-Hua Li², In Meei Tew³, Wai-Lun Lo¹ and Walter Yu-Hang Lam²

1: Hong Kong Chu Hai College

2: The University of Hong Kong

3: The National University of Malaysia, Malaysia

Abstract-Gum disease is a very prevalent dental disease, estimated to affect more than half of the world's population. It causes massive public health burdens and lost productivity worldwide every year. Recently, we developed an automatic inflammation detection system based on the deep semantic segmentation framework DeepLabV3+. Our recent validation study shows the system for diagnosing gum diseases from intraoral photographs has reached an accuracy of over 0.9. The model size is 46MB, implemented on systems with multiple GPUs. On a server with two Nvidia A6000s, the processing time for each photo measuring approximately 6k x 4k was around a second. Through intra-oral photos, people can monitor their dental health at any time. Considering ease of use and privacy, automated gum disease detection on mobile devices is highly desirable. This article describes the implementation of the system with model optimization and the corresponding performance of the automatic detection system on Android devices.

SA0003(15:45-16:00 GMT+8)

Software Development Methodology for Virtual Reality Teaching System

Patrick Man Pan Tung¹, Wai Lun Lo¹, Eugene Yin Cheung Wong², Richard Tai Chiu Hsung¹ and Ken Chung Hok Kay¹

1: Hong Kong Chu Hai College

2: The Hang Seng University of Hong Kong

Abstract-Virtual Reality is one of the popular research topics in the area of computer science. There have been many research in the area of virtual reality to explore the applications of VR in teaching system. In this paper, we summarize the Software Development Methodology, System design and implementation of the VR Teaching System at the Hong Kong Chu Hai College.

SA0013(16:00-16:15 GMT+8)

Smart Glucometer for Personalised Health Management of Diabetes Care

Amit Mahesh Joshi and Paras Kor

Malaviya National Institute of Technology, India

Abstract-Diabetes, a leading chronic disease in the 21st century, is caused by high blood glucose levels. High blood glucose levels are mostly caused by the pancreas' inability to produce insulin. Diabetes patients need continuous glucose monitoring to track their glycemic profile for proper health management. Traditional glucose measurement methods typically use blood or body fluids. This research presents a non-invasive optical detecting approach for personalized health management for diabetes care. The paper presents a noninvasive glucose monitoring device known as a smart glucometer. Smart Glucometer uses the optical detection methodology with Near Infra-Red spectroscopy. Blood glucose levels are measured by analysing the intensity of NIR light from a photodetector after passing through the finger or earlobe. The proposed device is calibrated and validated against the FDA-approved Self-Monitoring Device Accucheck for 350 subjects of healthy, prediabetic and diabetes people. The proposed smart glucometer has an excellent performance in terms of R^2 value of 0.85, mARD is 4.56, and AVGE is 7.61. The proposed smart glucometer is also compared with previous related work that suggests our proposed glucose measurement device has the best performance in the range of 85 mg/dl to 400 mg/dl.

SA0016(16:15-16:30 GMT+8)

Software Attribute Comprehensive Trust Measurement Model

Yihang Luo and **Pengxuan Sun**

Beijing University of Technology, Beijing, China

Abstract-With the rapid development of the information age, software security has become a crucial component. In the realm of security, quantifying the trustworthiness of software has become a focal point, yielding a series of research outcomes. While much of this work focuses on studying the trustworthy attributes of software from a static perspective, there are also efforts in designing dynamic assessment models. However, a comprehensive consideration of the holistic security attributes of software and the complexity of evaluating software security has not been adequately addressed. To address these challenges, this paper proposes a comprehensive trust evaluation model tailored for software attribute security. In the computation of the direct trust model, time factor and reward-penalty factors are introduced to enhance the accuracy of the trust model. The recommended trust model measures the evaluative disparity among software entities to derive recommended trustworthiness. The comprehensive trust model combines direct trust and recommended trust, introducing a dynamic weight allocation function to enhance adaptability. Finally, through simulation experiments comparing various trust models, the effectiveness of this approach is validated.

SA0017(16:30-16:45 GMT+8)

TPAM: Timed-Permission based Access Control Analysis and Modeling Method for Android Apps

Xinwen Hu

Hunan Normal University, China

Abstract-Managing access control for Android applications (apps) in the early stage of development can reduce testing and maintenance costs in the code stage. Following the guidelines of current international access management standards to implement secure access control during the modeling phase of Android apps. We propose an Android app access management method, which includes two parts: access context construction and access control management analysis. We extend UML-MARTE and propose a Timed-Permission based access control Analysis and Modeling (TPAM) package to construct semi-formal access contexts that include time-related attributes.

On this basis, we extend the Z expression to add formal semantics to the TPAM-based access context to form the TPAMZ specification (TPAM-based Z specification), which includes the *TPAMZContext* formal model and the *TPAMZACM* formal algorithm. The *TPAMZACM* algorithm analyzes the access behavior of the *TPAMZContext* model based on the standard access control management activities of ISO/IEC 29146:2016. We summarize the proposed method in a Timed-Permission Access Management framework for Android apps (TiPAMA), and implement a prototype of the framework, Tipama. Finally, its effectiveness is illustrated by a case study. The proposed methodology not only allows accurate access context modeling of Android apps based on time-related attributes at their modeling stage, but also accurately analyzes Android app security contexts based on the main activities of the ISO/IEC 29146:2016 access management standard.

Session 2 (16:45-18:00)

Computing Models, Data Security and Management in Computers and Information Systems

**Session Chair: Assoc. Prof. Richard Tai-Chiu Hsung, Hong
Kong Chu Hai College, Hong Kong**

DC0009(16:45-17:00 GMT+8)

Multi-receiver Conditional Anonymous Signcryption Mechanism based on Multi-dimensional Decision Attributes for IoV

Jiangjiang Zhang and Yihang Luo

Faculty of Information Technology, Beijing University of Technology, China

Abstract-The Internet of Vehicles (IoV) is a wireless network composed of intelligent driving vehicles and roadside units that collaborate to improve transportation services. On the one hand, this revolutionary mode of transportation optimizes traffic efficiency, reducing congestion and accidents. On the other hand, it raises security and privacy concerns. Therefore, the design of a method adopting anonymous techniques and secure data processing procedures becomes particularly urgent. To address this issue, this paper combines attribute-based credentials with multi-receiver encryption and proposes a Multi-Receiver Conditional Anonymous Signcryption based on Multi-Dimensional Decision Attributes (MRCAS-MDDA) scheme for secure challenges for trustworthy data transmission in IoV. Specifically, it achieves conditional anonymous authentication with selective attribute disclosure, allowing data owners to self-disclose certain attributes, anonymously authenticate their attribute qualifications, and achieve traceability of malicious behavior. Simultaneously, through data signature encryption and non-signature encryption, it enables secure one-to-many data sharing, preventing the leakage of sensitive IoV data and alleviating the waste of limited computational resources. In addition, rigorous security analysis indicates that the MRCAS-MDDA scheme achieves the expected properties of confidentiality, anonymity, fine-grained identity verification, traceability, and non-repudiation.

Experimental results further demonstrate the computational effectiveness of MRCAS-MDDA.

DC0010(17:00-17:15 GMT+8)

eGBox: A Secure Shell Runtime based on Ebpf

Yuan Zhong¹, Pengfei Chen¹ and Huxing Zhang²

1: Sun Yat-Sen University, Guangzhou, China

2: Alibaba Group, Hangzhou, China

Abstract-Cloud systems that offer remote data and computational access through networks face significant security challenges. Secure Shell Session (SSH) is a popular access method, but its login information leakage presents a substantial security threat, allowing attackers to exploit identities and disrupt systems. Hence, security is paramount in cloud-system operations. Access control, a vital security mechanism in operating systems, is increasingly challenging owing to the complexity of control mechanisms and difficulty in developing precise Access Control Lists (ACLs). Traditional ACLs require extensive resources for each user or role, falters in complex scenarios, and risk system vulnerability by granting excessive privileges. To mitigate these issues, we introduce eBPF-based self-Generated Box (eGBox), a novel solution that combines a lightweight system call restriction system with machine learning. eGBox utilizes rule learning through itemset mining to analyze user behavior and generate system call control lists, thereby significantly reducing system vulnerability. By employing extended Berkeley Packet Filter (eBPF) program hooks, eGBox effectively audits and restricts remote user behavior at the system call level. Our results show that eGBox's rule-mining algorithm achieves over 99% accuracy in generating access control policies, using only 40% of the log entries for mining. Additionally, eGBox presents a lower overhead compared to established tools, such as AppArmor, enhancing the overall operating system security.

DC0011(17:15-17:30 GMT+8)

SLIPP: A Space-Efficient Learned Index for String Keys

Weihong Zhou and Shiyu Yang

Guangzhou University, China

Abstract-Efficient indexing structures are crucial for high-performance data access in

in-memory data management systems. Traditional indexing methods, while effective in specific scenarios, often struggle with variable-length string keys and range queries. This paper presents the String Learned Index with Precise Positions (SLIPP), an enhancement of the Learned Index with Precise Positions (LIPP) that incorporates trie-based methodologies. By integrating trie characteristics with the predictive capabilities of a simple univariate linear regression model, SLIPP aims to optimize the handling of string keys, significantly reducing memory usage and improving lookup speeds. Our evaluation, utilizing the TLI experimental framework, demonstrates SLIPP's effectiveness in rapid lookups and highlights its adaptability to datasets featuring long common prefixes. Although SLIPP encounters challenges with intricate data distributions, its approach to string key indexing, building on the foundation of LIPP and incorporating trie features, offers a promising avenue for enhancing database systems to manage large datasets more efficiently and with lower space requirements.

DC0013-A(17:30-17:45 GMT+8)

Advancing Depression Diagnosis and Treatment: Integrating Machine Learning with Social Media Data

Xingwei Yang

Toronto Metropolitan University, Canada

Abstract-This study aims to tackle the global challenge of diagnosing and treating depression, affecting over 350 million individuals worldwide. Conventional depression diagnostic methods, relying on self-reported data, face obstacles due to patient reluctance. This research adopts a machine learning approach to analyze social network data for early and accurate depression identification. Integrating concepts from Psychology and Communication Studies, the study incorporates emotions, social influence, and language patterns to identify depression indicators within user groups. The research explores the interactions of digital health, social media, and machine learning that potentially lead to the development of ML-based decision support systems that can continuously monitor behavioral patterns, assess risks, and facilitate prompt treatment, offering cost-effective alternatives to traditional methods and provide clinicians with actionable insights for intervention, diagnosis, and treatment planning.

DC0006-A(17:45-18:00 GMT+8)

A distribution-free change-point monitoring scheme in high-dimensional settings with application to industrial image surveillance

Niladri Chakraborty¹, Chun Fai Lui² and Ahmed Maged²

1: University of the Free State, South Africa

2: City University of Hong Kong, Hong Kong, China

Abstract-Existing monitoring tools for multivariate data are often asymptotically distribution-free, computationally intensive, or require a large stretch of stable data. Many of these methods are not applicable to ‘high-dimension, low sample size’ scenarios. With rapid technological advancement, high-dimensional data has become omnipresent in industrial applications. We propose a distribution-free change-point monitoring method applicable to high-dimensional data. Through an extensive simulation study, performance comparison has been done for different parameter values, under different multivariate distributions with complex dependence structures. The proposed method is robust and efficient in detecting change points under a wide range of shifts in the process distribution. A real-life application is illustrated with the help of a high-dimensional image surveillance dataset.

DC0015(posters)

DBDDL: Double-Branch Deep Dictionary Learning for Multi-Label Image Classification

Wenke Zhang and **Mengmeng Liao**

Shanghai University, China

Abstract-With the rapid development of information technology, image classification technology plays a crucial role in the field of computer vision. This study aims to address the problem of existing methods failing to effectively utilize semantic detail combination information in multi-label image classification tasks, proposing a novel approach called Double-Branch Deep Dictionary Learning (DBDDL). This method combines deep learning and dictionary learning to construct a double-branch deep learning framework, integrating semantic information and detail information of images, thereby improving the performance and robustness of multi-label image classification. Additionally, we designed a dynamic classification module to better focus on the correlation between labels. Experimental results demonstrate that the DBDDL method outperforms existing methods on benchmark datasets such as

PASCAL VOC 2007 and MS-COCO, validating the effectiveness and practicality of our proposed method, providing new insights and methods for addressing multi-label image classification problems.

Dinner on the First Floor

May 31, 2024 Morning Sessions

Zoom link: <https://us02web.zoom.us/j/82512150219>

Zoom Room ID: **82512150219**

Invited Speech 5 (9:00-9:25 GMT+8)

By Prof. Abhijit Sen, Kwantlen Polytechnic University, Canada

Title: Role of Generative AI for DevSecOps

Abstract—This presentation is tailored for both technical enthusiasts and professionals from diverse backgrounds. We will delve into the unique role of Generative AI within the DevSecOps landscape, exploring the opportunities it offers and the challenges it poses. From its transformative impact on creativity and content generation to its crucial applications in enhancing security practices, this session aims to demystify Generative AI and its impact on DevOps Security. Whether you are already familiar with the technical aspects or approaching Generative AI for the first time, join us to gain insights into its specific applications in DevSecOps. The presentation will conclude with a Q&A session, providing an opportunity to address your inquiries about the opportunities and challenges that lie ahead.

Online Session 3 (9:25-10:55 GMT+8)

Visual based information system design and management

Session Chair: Prof. Abhijit Sen, Kwantlen Polytechnic University, Canada

DC0004(9:25-9:40 GMT+8)

Intelligent Predictive Algorithm Models of Refuting Information Forwarding Behaviors Considering Users' Personal Characteristics

Zongmin Li and Zhixuan, Li

Business School, Sichuan University, Chengdu, China

Abstract-The massive spread of misinformation on social media platforms not only leads to the generation of irrational behaviors of users, but also threatens the social order. Users occupy an important position in the governance process of misinformation. In this study, users' willingness to forward refuting information is taken as an important indicator to measure the effectiveness of misinformation governance. The neutralization technique and norm activation model are applied to misinformation governance. Psychological mechanism, normative ethics, demographic informatics characteristics, and misinformation refuting methods are all considered as indicators for predicting users' forwarding behaviors. Based on support vector machine, XGBoost, random forest and artificial neural network algorithms, four prediction models are constructed respectively. The results show that all four categories of predictive indicators have good predictability. Three types of indicators related to users' personal characteristics are more important than refuting methods. XGBoost and random forest algorithms are more suitable for constructing the prediction models in this paper. Finally, specific suggestions are proposed for the government department's misinformation governance.

DC0014(9:40-9:55 GMT+8)

DvaDRP: a dual variational autoencoder based on big data for drug response prediction

Xin Liao¹ and Bin Yu^{1 2}

1: Qingdao University of Science and Technology, China

2: University of Science and Technology of China, Qingdao 266061, China

Abstract-Precision medicine represents the direction of cancer treatment in the era of big data. Developing effective drug response prediction (DRP) models is crucial for achieving precision medicine. Although some DRP models have been proposed, their generalization performance on external datasets is generally mediocre due to insufficient extraction of drug features. To provide valuable references for clinical treatment, it is necessary for models to learn deeper feature representations from big data. Unlike traditional matrix factorization DRP methods, we propose a dual-variational autoencoder DRP model based on multi-omics. The dual-variational autoencoder obtains deeper latent feature vectors from big data for DRP. The proposed method is validated on GDSC and CCLE datasets. Compared to state-of-the-art prediction methods, the proposed method achieves the best performance in both regression and classification predictions.

DC0016(9:55-10:10 GMT+8)

TrustworthyAI: Adversarial Attacks and Defensive Strategies in Self-Driving Systems using Computer Vision and Artificial Intelligence

Ethan Sun¹ and Ang Li²

1: The Bishop's School, United States

2: California State University, Long Beach, United States

Abstract-This paper discusses the importance of Trustworthy AI in self-driving vehicles, emphasizing the need for reliable, ethical, and transparent artificial intelligence systems [1]. The focus is on computer vision technology to enhance safety, reliability, and potential road hazards [2]. Specifically, the focus of this paper is to recognize stop signs and cyber attacks using computer vision technology. We explore various methodologies while creating multiple model versions to determine what it takes to create trust worthy AI. Model Version 6, an implementation of YOLOv8, emerges as the most successful achieving a 95% confidence level in identifying a normal stop sign while at the same time distinguishing from a cyber-attack with 85%

accuracy [3]. The study establishes a 95% confidence threshold for normal stop signs and observes lower confidence levels as susceptible to cyber-attacks [4]. These results pave the way for further advancements in Trustworthy AI, providing valuable insights for ongoing development of ethical and reliable AI systems in real-world applications [5].

DC0017(10:10-10:25 GMT+8)

Enhancing Cognitive Recall in Dementia Patients: Integrating Generative AI with Virtual Reality for Behavioral and Memory Rehabilitation

Yubo Wang¹, Yujia Zhang²

1: St. Margaret's Episcopal School, United States

2: Physical Science Department, University of California, Irvine, United States

Abstract-In this Project, we developed a cognitive rehabilitation program for dementia patients, leveraging generative AI and virtual reality (VR) to evoke personal memories [4]. Integrating Open AI, DreamStudio, and Unity, our system allows patients to input descriptions, generating visual memories in a VR environment [5]. In trials, 85% of AI-generated images matched patients' expectations, although some inaccuracies arose from AI generalizations. Further validation with dementia patients is needed to assess memory recovery impacts. This novel approach modernizes Cognitive Stimulation Therapy (CST), traditionally reliant on non-visual exercises, by incorporating AI and VR to enhance memory recall and visual-spatial skills. While the world is developing more and more into Artificial Intelligence (AI) and Virtual Reality (VR), our program successfully coordinates them to help stimulate dementia patients' brains and perform the memory recall and visual spatial aspects of CST.

DC4003(10:25-10:40 GMT+8)

Exploring Event Misalignment Bias and Segment Focus Bias for Weakly-Supervised Audio-Visual Video Parsing

Mingchi Li, Songrui Han and Xiaobing Yuan

Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China

Abstract-This paper focuses on the audio-visual video parsing (AVVP) task, which aims to predict the classes of audio, visual and audio-visual events and the temporal

boundaries of multiple events in a given video. In contrast to fully supervised video understanding tasks, the AVVP task is more difficult since it relies only on video-level labels during training, without any temporal boundaries or modal annotations. Prior works typically focus on jointly modeling audio and video data and extracting information from cross-modal segment-level features simultaneously. Despite their initial success, we argue that there are still two inherent challenges to be solved: 1) Cross-modal event misalignment bias: the occurrence of cross-modal events may be asynchronous, which can hinder the model's ability to correctly utilize segment-level information; 2) Lack of segment-level focus bias: rich event information is found in only a few segments of a video, which would impede the model's ability to fully utilize segment-level information if it assigns equal focus to all segments. To this end, we propose a generic framework named Cross-Modal Re-calibrating Network (CMRN), which consists of two parts: 1) A cross-modal event alignment module to eliminate cross-modal misalignment bias and thus improve the consistency of event representations of segments; 2) An information-aware segment focus module is proposed to inject bias into the model, enabling selectively focus on segments with rich event information. Extensive quantitative and qualitative experimental results demonstrate that our proposed framework significantly improves the previous state-of-the-art methods on the AVVP task.

DC0020(10:40-10:55 GMT+8)

Academic Data Privacy-Preserving using Centralized and Distributed Systems: A Comparative Study

Hanane Lamaazi¹, Aysha Alneyadi¹ and Mohammed Adel Serhani²

1: UAE University, UAE

2: Sharjah University, UAE

Abstract-Data privacy has become a critical concern in a set of domains, including healthcare, education, traffic monitoring, etc., due to technology's high deployment and massive data collection. In education, academic institutions have started taking several precautions to prevent the misuse of data, especially students' information, unauthorized access to the institution's databases, and any security breaches that can negatively affect the institutions' activities and objectives and students' lives. Protecting student information has become a priority, especially with the emergence of online learning, to create a safe environment, foster trust, and comply with relevant laws. Existing data privacy techniques are mostly deployed in centralized platforms,

which can increase the data processing complexity and response time. However, the emergence of distributed systems helped to improve the infrastructure's security and users' privacy. Also, it reduced the processing and transmission time while providing high-quality services. The aim of this paper is to propose a comparative study of deploying distributed and centralized platforms while preserving education data privacy. The distributed system is developed using k-means clustering, while data privacy is ensured by applying the k-anonymity technique using both generalization and suppression. As a result, the centralized system outperforms the distributed one in terms of β -likeness, t-closeness, and δ -disclosure, with less suppression. Also, centralized platforms require less execution time and higher memory allocation than distributed ones.

Lunch Time (10:55-14:00)

May 31, 2024 Afternoon Sessions

Zoom link: <https://us02web.zoom.us/j/82512150219>

Zoom Room ID: **82512150219**

Invited Speech 6 (14:00-14:25 GMT+8)

By Assoc. Prof. Maizatul Akmar Ismail, University of Malaya, Malaysia

Title: Ethical Concerns on the Usage of Generative AI Tools in Education

Abstract—Due to the swift progress of artificial intelligence, Generative AI technologies have become increasingly popular in assisting instructors and pupils. Nevertheless, their utilization gives rise to substantial ethical apprehensions pertaining to genuineness, intellectual theft, bias, and privacy. This talk explores the ethical difficulties arising from using AI-generated material in education. It highlights the importance of clear standards, responsible implementation, and continuous communication to address these complicated concerns properly.

Online Session 4 (14:25-15:40 GMT+8)

Software testing and development

Session Chair: Assoc. Prof. Maizatul Akmar Ismail,
University of Malaya, Malaysia

SA0001(14:25-14:40 GMT+8)

Program Dependence Net Reduction for LTL Model Checking

Li'ao Zheng, Shuo Li and Zhijun Ding

Tongji University, China

Abstract-The Net Reduction technique reduces a large model into a smaller model through structural reduction. In model checking, a smaller net means smaller state sizes and explored path lengths. There are many effective reduction rules on low-level net, but on PDNet, some rules may break net information. We have improved the reduction rules traditionally applied to low-level net and proposed implicit place rule and local reduction rules that are more suitable for PDNet to avoid breaking information and the net. And we improve the efficiency of some rules based on the characteristics of PDNet.

SA0007(14:40-14:55 GMT+8)

Software Security and Quantum Communication: A Long-distance Free-space Implementation Plan of QSDC Without Quantum Memory

Yew Kee Wong¹, **Yifan Zhou**², Zi Yan Li², Yan Shing Liang² and Xinlin Zhou²

1: Hong Kong Chu Hai College, China

2: BASIS International School Guangzhou, China

Abstract-Software security is crucial to ensuring the confidentiality, integrity, and availability of software systems and applications. However, conventional cryptographic methods based on mathematical assumptions are vulnerable to various

attacks, especially in the era of quantum computing. Therefore, there is a need for a new paradigm of software security that can resist quantum threats. This paper proposes a novel approach to using Long-Distance Free-Space Quantum Secure Direct Communication (LF QSDC) to enhance software security. LF QSDC is a quantum communication protocol that enables two parties to exchange secret messages directly without relying on a pre-shared key or quantum error correction. Our research delves into integrating LF QSDC into software security, emphasizing its practicality for long-distance communication through the use of memory DL04 protocol, Machine Learning Enhanced JEEC, and PAT Technologies. By adopting this approach, we reinforce security for global software security and ensure their sustainability in an era where both quantum and advanced classical threats coexist side by side. Thus, LF QSDC emerges as a future-proof security mechanism highly applicable to software security systems.

SA0014(14:55-15:10 GMT+8)

Model Checking Based Test Adaptation in Changing Business Software

Hicham H. Hallal and Alisha Faizan

American University of Sharjah, United Arab Emirates

Abstract-Testing large software applications poses a major challenge, especially in the presence of changes that are usually introduced after the initial deployment of said applications. This makes it rather difficult to anticipate the impact of the introduced changes throughout the initial development lifecycle. Any existing test suite that was used to validate the application before the changes needs to be modified accordingly to cover the updated or new functionality. Test adaptation techniques can be used to alleviate this issue, and to offer tools allowing the automated adaptation of the test suite to the changes. In this paper, we explore the problem of test adaptation in the case of changing business applications, where we focus on changes introduced at the level of the business logic. We propose a model checking based approach to test adaptation that uses behavioral models inferred from execution traces of application under test (AUT). Models of different versions of the changing application are compared to detect the introduced changes, to evaluate the validity of existing test cases, and to adapt the ones invalidated by the changes. We illustrate the applicability of the approach using the example of a travel management business process.

SA0015(15:10-15:25 GMT+8)

AutoAviary: Innovating Sun Conure Care with Intelligent Cage Automation and Connectivity

William Penaflor Rey and Kieth Wilhelm Jan Rey

Mapua University, Philippines

Abstract-This study introduces the "Auto Aviary," an innovative system designed to enhance the care of Sun Conures through intelligent cage automation and connectivity. Leveraging IoT technology, the Auto Aviary provides real-time monitoring, remote control, and data-driven insights into the avian habitat. Through a mixed-methods approach combining quantitative evaluation via the PSSUQ and qualitative insights from in-depth interviews, the study assesses user satisfaction and usability. Results indicate highly favorable perceptions of the system's utility, interface, and overall satisfaction. The qualitative evaluation highlights user appreciation for the intuitive design and functionality while suggesting enhancements for further refinement. Overall, the Auto Aviary represents a significant advancement in avian care technology, promising to revolutionize the well-being of Sun Conures and other avian companions.

SA0005(15:25-15:40 GMT+8)

Assuring Correctness, Testing, and Verification of X-Compiler by Integrating Communicating Stream X-Machine

Bashir Adewale Sanusi¹, Emmanuel K Ogunshile¹, Mehmet Aydin¹, and Stephen O. Olabiyisi²

1: University of the West of England, United Kingdom

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Abstract-Compiler design plays an important role in ensuring that the translation of the programs written in high-level language into executable code is correct. However, in today's safety-critical environments, security gaps, visible and hidden defects in compiler models are liability factors that need to be addressed in the process of examining that a system meets specifications and requirements of its intended objectives. Nevertheless, defects in this model are errors in coding which bring about incorrect or unexpected results from a compiler design that does not meet the actual

requirements. Hence, this paper developed a novel approach by integrating the computational power of Communicating Stream X-Machine (CSXM) to address the problem associated with compiler correctness. In addition, this paper outlines the development of a novel compiler design called X-compiler, emphasizing its important role in software development. CSXM technique was implemented in Visual Studio (2022) to develop the X-compiler. The X-compiler utilize state-of-the-art techniques to translate program source code written in high-level programming language which is the blend of C# and Python programming language into executable code. The development process includes the lexical analysis, syntax parsing, semantic analysis, and code generation ensuring the correctness of the X-compiler. The results of the compiled code were run to produce output in command Windows environment for user interactions. Also, highlights the potential for enhanced language interoperability and the development of efficient compiler that leverage the strengths of multiple programming paradigms. Overall, the study on CSXM contributed to a deeper understanding of concurrent systems, while the design and implementation of the compiler showcased the feasibility of creating a synergistic blend of C# and Python programming languages.

