2026 8th Asia Pacific Information Technology Conference (APIT 2026)

2026 7th International Conference on Computer Vision and Computational Intelligence (CVCI 2026)

January 9-11, 2026

Hokkaido University, Sapporo, Japan

https:// www.apit.net ; https://www.cvci.net

Supported by

北海道大学
HOKKAIDO UNIVERSITY

Technically Supported by

Table of contents

Welcome Message 3

Conference Committees 4

Guideline for Onsite Attendance 7

Guideline for Virtual Attendance 8

Conference Venue 10

Conference Room 11

Simple Program 12

Detailed Program 17

Opening Remark 17

Keynote Speeches 18

Invited Speeches 26

Session 1 | Onsite 34

Session 2 | Onsite 38

Session 3 | Onsite 43

Posster Session | Onsite 47

Session 4 | Onsite 50

Session 5 | Onsite 54

Session 6 | Onsite 57

Session 7 | Online 61

Conference Recommendations 66

Note 67

Welcome Message

On behalf of the Organizing Committee, it is our immense pleasure to welcome all eminent delegates, keynote speakers, invited speakers, and industry delegates who have come from all over the world to join the 2026 8th Asia Pacific Information Technology Conference (APIT 2026) and the 2026 7th International Conference on Computer Vision and Computational Intelligence (CVCI 2026).

This event offers an exclusive platform for editors and authors to converge, exchange insights, and showcase their latest research findings and breakthroughs.

We are confident that the conference will equip you with solid theoretical foundations, practical expertise, and valuable connections----all to foster long-term, profitable, and sustainable collaboration among researchers and practitioners across diverse scientific fields, united by their shared interest in Information Technology, Computer Vision, and Computational Intelligence.

We received about 80 submissions from all over the world, such as Japan, Thailand, China, Republic of Korea, Philippines, Denmark, Malaysia and so on. During the conference, there are four Keynote Speakers, four Invited Speakers, six onsite sessions and one online session.

We would like to extend our sincere gratitude to all authors, technical program committee members, and reviewers. Their professional competence, unwavering enthusiasm, and invaluable time and expertise have enabled us to curate a high-quality final program and contributed to the resounding success of the conference.

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

APIT & CVCI 2026 Organizing Committee
January 2026

Conference Committees

| Conference Chair

Ling Xiao, Hokkaido University, Japan

| Conference Co-Chairs

Ainuddin Wahid Abdul Wahab, University of Malaya, Malaysia
Juha Röning, The University of Oulu, Finland (SPIE Fellow)

| Advisory Chair

Nikola Kasabov, Auckland University of Technology, New Zealand (IEEE Fellow)

| Program Co-Chairs

Gyu Myoung Lee, Liverpool John Moores University, UK
Chun-Yi Su, Concordia University, Canada
Andrew Robert Harvey, University of Glasgow, UK
Zhangjin Huang, University of Science and Technology of China, China
Ka-Chun Wong, City University of Hong Kong, China

| Steering Co-Chairs

Yohei Saika, National Institute of Technology, Gunma College, Japan
Tong Yang, Nankai University, China
Francesco Zirilli, Universita di Roma La Sapienza, Italy
Chi Man VONG, University of Macau, China
Grigorios N. Beligiannis, University of Patras, Greece

| Chapter Co-Chairs

Vincent CS Lee, Monash University, Australia
Grigorios N. Beligiannis, University of Patras – Agrinio Campus, Greece
Jionglong Su, Xi'an Jiaotong-Liverpool University, China
Dongrong XU, Columbia University, USA
Ahmad Lotfi, Nottingham Trent University, UK

| Publicity Chairs

Sarawut Ramjan, Thammasat University, Thailand
Man Fung Lo, The University of Hong Kong, Hong Kong, China
Flora Lau, Hong Kong Shue Yan University, Hong Kong, China
Radhakrishna Bhat, Manipal Institute of Technology, India
Lily Meng, University of Hertfordshire, UK
Mukesh Prasad, University of Technology Sydney, Australia
Liming Zhang, University of Macau, China
Yubing Tong, University of Pennsylvania, USA

| Technical Committee Chairs

Boris Andrievsky, St. Petersburg State University, Russia
George K. Adam, University of Thessaly, Greece
Md Liakat Ali, Rider University, USA
Yingying Zhu, Shenzhen University, China

| Technical Program Committee Members

Chin-Shiuh Shieh, National Kaohsiung University of Science and Technology
Gianluca Zaza, University of Bari, Italy
Xiaohao Cai, University of Southampton, UK
Dongrong XU, Columbia University, USA
Grigorios Beligiannis, University of Patras – Agrinio Campus, Greece
Radhakrishna Bhat, Manipal Academy of Higher Education (MAHE), India
Paulo Batista, University of Évora, Portugal
Yilun Shang, Northumbria University, UK
Patrick Siarry, Universite Paris-Est Creteil, France
Sarawut Ramjan, Thammasat University, Thailand
Nithinant Thammakoranonta, National Institute of Development Administration, Thailand
Junfeng Qu, Clayton State University, USA
Dariush Ebrahimi, Wilfrid Laurier University, Canada
Wei-Min Liu, CCU
Gyu Myoung Lee, Liverpool John Moores University, UK
Yu-Wang Chen, The University of Manchester, UK
Jianjun Yang, University of North Georgia, USA
Surapong Uttama, MFU, Thailand
Daehee Seo, Sangmyung University, South Korea
Flora Lau, Hong Kong Shue Yan University, Hong Kong
Jiang Lu, University of Houston Clear Lake, USA
JungHwan Oh, University of North Texas, USA
Ahmed Abu-Siada, Curtin University, Australia
Chin-Shiuh Shieh, NKUST
Ling Xu, University of Houston Downtown, USA
Xuechao Li, Auburn University, USA
Lu Leng, Nanchang Hangkong University, China
Poompat Saengudomlert, Bangkok University, Thailand
Chia Kim Seng, Universiti Tun Hussein Onn Malaysia, Malaysia
Lim Wei Hong, UCSI University, Malaysia
Mariani Stefano, Politecnico di Milano, Italy
Sheng-Shih Wang, Lunghwa University of Science and Technology
Rushit Dave, Minnesota State University, USA
Xin Lu, Leeds Trinity University, UK
Wangkunlun, East China Normal University, China
Tan Tse Guan, Universiti Malaysia Kelantan, Malaysia
BERTINI FLAVIO, University of Parma, Italy
Santichai Wicha, Mae Fah Luang University, Thailand
Songyuan Li, University of Exeter, UK
Thomas Lee, University of Illinois Chicago, USA
Shanq-Jang Ruan, National Taiwan University of Science and Technology
Wen-Tsai Sung, National Chin-Yi University of Technology
Luis Gómez Déniz, University of Las Palmas de Gran Canaria, Spain
Sathish Kumar Selvaperumal, Asia Pacific University of Technology & Innovation, Malaysia

Daniele Schicchi, The Institute for Educational Technology, Italy
Wan Azani Mustafa, University Malaysia Perlis, Malaysia
Sansanee Auephanwiriyakul, Chiang Mai University, Thailand
Hongjian SHI, Beijing Normal-Hong Kong Baptist University, China
Pasquale Cascarano, University of Bologna, Italy
Zhen Hua, Xi'an Jiaotong-Liverpool University, China
Deruo Cheng, Nanyang Technological University, Singapore
Khwunta Kirimasthong, Mae Fah Luang University, Thailand
Alessandro Bruno, Free University of Languages and Communication IULM, Italy
Abbas Khosravi, Deakin University, Australia
Manoj Kumar, University of Wollongong, Dubai, UAE
Mina Basirat, UCF, USA
Rawesak Tanawongsuwan, Mahidol University, Thailand
Jude Bulawan Rola, Visayas State University, Philippines
Zahid Akthar, State University of New York Polytechnic Institute, USA
Piyanuch Silapachote, Mahidol University, Thailand
Hwa-Jen YAP, Universiti Malaya, Malaysia
Yung-Yao Chen, National Taiwan University of Science and Technology
Rui Araújo , University of Coimbra, Portugal
Nianyin Zeng, Xiamen University, China
Wei-Chiang Hong, Harbin Engineering University, China
Waleed H. Abdulla, University of Auckland, New Zealand
Xing Liang, Kingston University London, UK
Pengfei Fan, Queen Mary University of London, UK
Dawei Zhang, Zhejiang Normal University, China
Wanwan Li, The University of Tulsa, USA
Sukanya Phongsuphap, Mahidol University, Thailand
Jianfeng Ren, University of Nottingham Ningbo China, China
Paul Craig, Xi'an Jiaotong Liverpool University, China

Guideline

FOR ONSITE ATTENDANCE

Important Notes

- Please enter the meeting room at least 15 minutes before your session. Your punctual arrival and active involvement will be highly appreciated.
- Please wear your name tag for all the conference activities. Lending it to others is not allowed. If you have any companying person, please do inform our staff in advance.
- Please keep all your belongings (laptop and camera etc.) at any time. The conference organizer does not assume any responsibility for the loss of personal belongings.
- Please show name tag and meal coupons when dining.
- Due to force majeure including but not limited to earthquake, natural disaster, war and country policy, the organizer reserves the rights to change the conference dates or venue with immediate effect and takes no responsibility.

Oral & Poster Presentation

- Regular oral presentation: 15 minutes (including Q&A).
- Get your presentation PPT or PDF files prepared. Presentations MUST be uploaded at the session room at least 15 minutes before the session starts.
- Laptop (with MS-Office & Adobe Reader), projector & screen, laser pointer will be provided in all oral session rooms.
- Poster Presenters should bring your Home-made Posters (size A1) to the conference venue and put them on designated place on January 9.

Guideline

FOR VIRTUAL ATTENDANCE

Platform: Zoom

- Step 1: Download ZOOM from the link: https://zoom.us/download

How to use ZOOM

* A Zoom account is not required if you join a meeting as a participant, but you cannot change the virtual background or edit the profile picture.

- Rename: Before you enter the conference room, please change your name to Paper ID + Name
- Chat and raise your hand: During the session, if you have any questions, please let us know by clicking “raise your hands” and use “chat” to communicate with conference secretary.
- When you deliver your online speech, please open your camera.
- During the Question section, if you have any questions about keynote speakers or authors, you can also click “raise your hands” or “chat”
- Share Screen: Please open your power point first, and then click “share screen” when it’s your turn to do the presentation.

How to join the conference online

- Find your paper ID and suitable meeting ID on the conference program.
- Open the ZOOM, click the join, paste the meeting ID, then you can join the conference.
- Click the stop share after you finish your presentation

Time Zone

- **Japan Standard Time: UTC +9**

Device

- A computer with an internet connection (wired connection recommended)
- USB plug-in headset with a microphone (recommended for optimal audio quality)
- Webcam: built-in or USB plug-in

Online Room Information

Online Room Information

Zoom ID: 892 7657 8568

Zoom Link: https://us02web.zoom.us/j/89276578568

* Please rename your Zoom Screen Name in below format before entering meeting room.

Role	Format	Example
Conference Committee	Position-Name	Conference Chair-Name
Keynote/ Invited Speaker	Position-Name	Invited Speaker- Name
Author	Session Number-Paper ID-Name	S1-BP0001-Name
Delegate	Delegate-Name	Delegate-Name

Conference Venue

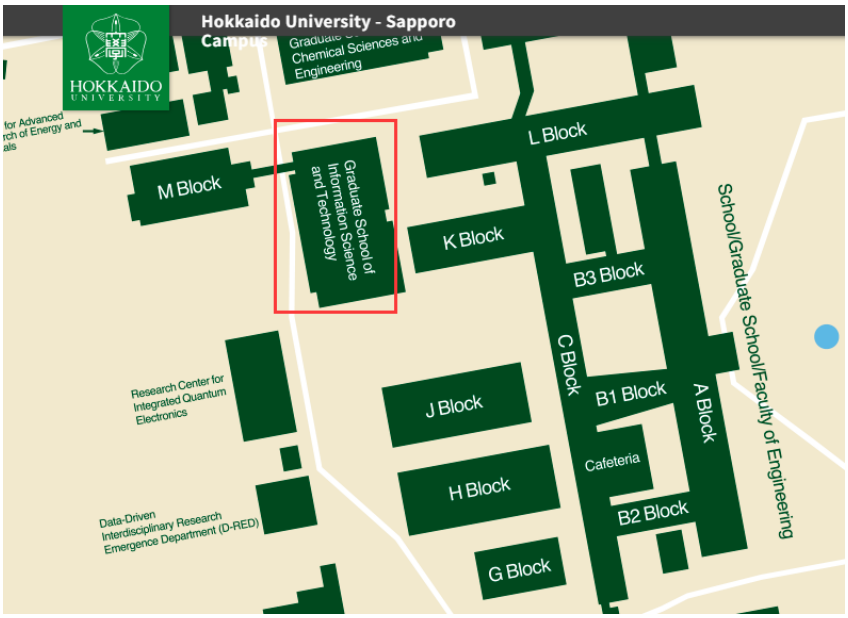
Hokkaido University, Japan

Address: 5 Chome Kita 8 Jonishi, Kita Ward, Sapporo, Hokkaido 060-0808, Japan

* The organizer doesn't provide accommodation, and we suggest you make an early reservation.

Conference Room

Conference Map: https://www.global.hokudai.ac.jp/maps/?p=sapporo
Conference rooms are at the building **Graduate school of information science and technology**



January 9, 2026 (10:00-16:00) Registration and materials collection

Registration room is Room 3-21 (3F)

January 10, 2026 Onsite speeches & onsite sessions

Morning seesion including keynote& invited speeches is at Room A24 (2F)

Session 1& 4 are at Room A24 (2F)

Session 2& 5 are at Room 5-08 (5F)

Session 3& 6 are at Room 3-21 (3F)

January 11, 2026 Online speeches & online sessions

Please note that all the online keynote & invited speeches and online authors' oral presentation sessions are arranged for January 11, 2026. **(There is no onsite conference room on January 11, 2026)**

Simple Program

January 9, 2026

Onsite registration

Time	Event	Venue
10:00-16:00	Registration for on-site participants	3F Conference room 3-21 Building: Graduate school of information science and technology Hokkaido University, Japan

Online Test
Time Zone: UTC +9

Zoom ID: 892 7657 8568
Zoom Link: https://us02web.zoom.us/j/89276578568

Time		Speakers & Sessions
Zoom Test (UTC +9)	10:30-10:40	Test for Keynote Speaker- Prof. Qing Li
	10:40-10:50	Test for Keynote Speaker- Prof. Nikola Kasabov
	10:50-11:00	Test for invited speaker - Dr. Junshi Xia
	11:00-11:35	Test for online Session Chair and presenters BP0010, BP0014, BP5003, BP5006, BP5008, BP3002, BP0056, BP5007-A

January 10, 2026

Onsite

Morning Sessions: Opening Remark, Keynote Speeches Onsite Conference room: 2F Room A24 Building: Graduate school of information science and technology	
Time	**Speaker**
9:00-9:05	Opening Remark by Assoc. Prof. Ling Xiao, Hokkaido University, Japan
9:05-9:45	Keynote Speech 1 Prof. Toshihiko Yamasaki, The University of Tokyo, Japan Speech Title: Deepfakes Beyond Illusion: Opportunities, Risks, and Responsible Vision AI
9:45-10:25	Keynote Speech 2 Prof. Mianxiong Dong, Muroran Institute of Technology, Japan Speech Title: Interpreting Physiological Waveforms: AI-based Functional Decoding of Non-invasive Signals
10:25-10:40	Group Photo & Coffee break
10:40-11:05	Invited Speech 1 Assoc. Prof. Jiyi Li, Hokkaido University, Japan Speech Title: Crowdsourcing and Human Computation: Quality, Applications, and Challenges in the LLM Era
11:05-11:30	Invited Speech 2 Assoc. Prof. Kazuya Ueki, Meisei University, Japan Speech Title: Next-Generation Video Retrieval: Multimodal Intelligence for Accurate and Interactive Search
11:30-11:55	Invited Speech 3 Asst. Prof. Guoming Wang, Zhejiang University, China Speech Title: Bridging the Gap in Medical AI: Multimodal LLM Frameworks for Longitudinal Care, Ultrasound Diagnostics, and Survival Prediction
11:55-13:30	Lunch time

January 10, 2026

Onsite

Afternoon Sessions Building: Graduate school of information science and technology		
Time	**Conference Room**	**Session**
13:30-15:00	A24 (2F)	**Session 1: Adaptive Network Security Defense and Threat Perception** BP0012, BP0002, BP0015-A, BP0050, BP0032, BP0035 Chaired by: Prof. Hua-An LU, National Taiwan Ocean University, Taiwan
13:30-15:15	5-08 (5F)	**Session 2: Digital Image Processing and Human-Computer Interaction Design** BP0022, BP0003, BP0028, BP0019, BP0031, BP0052, BP0051 Chaired by: Assoc. Prof. Warut Pannakkong, Thammasat University, Thailand
13:30-15:00	3-21 (3F)	**Session 3: Cross-Modal Intelligent Sensing Communication Systems and IoTs Engineering Applications** BP0025, BP0006, BP0009, BP0048-A, BP0029, BP0026 Chaired by: Asst. Prof. Guoming Wang, Zhejiang University, China
15:00-15:30	**Break time**	
	Poster Session: Advanced Information Theory and Innovative Applications BP0049-A, BP0017, BP5022-A, BP5014	
15:30-17:00	A24 (2F)	**Session 4: Machine Learning Theory and Computational Models** BP0011, BP0016-A, BP0024, BP0053, BP0041, BP0042 Chaired by: Assoc. Prof. Sung-Jung Hsiao, Takming University of Science and Technology, Taiwan

15:30-16:45	**5-08 (5F)**	**Session 5: Advanced Artificial Intelligence and Applications** **BP0023, BP0034, BP0033, BP0038, BP0027** **Chaired by: Prof. Wen-Tsai Sung, National Chin-Yi University of Technology, Taiwan**
15:30-16:45	**3-21 (3F)**	**Session 6: Machine Learning-Based Intelligent Image Analysis and Computer Vision** **BP5001, BP5002, BP5005, BP5011, BP5004-A** **Chaired by: Assoc. Prof. Kazuya Ueki, Meisei University, Japan**
17:45-20:00	**Dinner time**	

January 11, 2026 (Online)

Time Zone: UTC +9

Zoom ID: 892 7657 8568

Zoom Link: https://us02web.zoom.us/j/89276578568

Time	Speaker
10:30-11:10 UTC +9	Keynote Speech 3 Prof. Nikola Kasabov, Auckland University of Technology, New Zealand Speech Title: Brain-inspired and quantum-inspired computational intelligence: Challenges and Opportunities
11:10-11:50 UTC +9	Keynote Speech 4 Prof. Qing Li, The Hong Kong Polytechnic University, Hong Kong, China Speech Title: PolyRAG: a Multi-level Querying Method for an Indoor Robot Smart Space
11:50-12:15 UTC +9	Invited Speech 4 Senior Research Scientist Dr. Junshi Xia, RIKEN Center for Advanced Intelligence Project (AIP), Japan Speech Title: Mapping High-resolution Land Cover Products Anywhere
12:15-14:15 UTC +9	Session 7: Image Models and Intelligent Computing Oral Presentations: BP0010, BP0014, BP5003, BP5006, BP5008, BP3002, BP0056, BP5007-A Chaired by: Dr. Napat Sukthong, Mahasarakham University, Thailand

Detailed Program

January 10, 2026

Opening Remark	
Time	9:00-9:05, January 10, 2026
Conference Room	2F Room A24 at the Building-Graduate school of information science and technology

Conference Chair

Assoc. Prof. Ling Xiao

Hokkaido University, Japan

Ling Xiao (IEEE Senior Member) is a tenured Associate Professor at Hokkaido University, Japan. Previously, she served as a Project Assistant Professor at the University of Tokyo (UTokyo) from October 2023 to March 2025, and as a Postdoctoral Researcher at UTokyo from June 2021 to September 2023. She received her Ph.D. from Huazhong University of Science and Technology in December 2020. From October 2018 to November 2019, she was a visiting Ph.D student at the University of Queensland, Australia, supported by the China Scholarship Council (CSC) scholarship.

Her research interests include multimodal processing, fine-grained anomaly and similarity detection, intelligent perception and decision-making, efficient multimodal large language models, robot navigation, and machine learning (with an emphasis on continual learning, reinforcement learning, open-world recognition, and adversarial robustness). She has published over 30 peer-reviewed journal and conference papers, including works in IEEE Transactions on Multimedia, Knowledge-Based Systems, Advanced Engineering Informatics, and IEEE Transactions on Artificial Intelligence, as well as top-tier conferences such as CVPR 2024, ICML 2024, ECCV 2024, and ICMR 2025, where she received the Best Paper Award.

She serves as a reviewer for leading journals including the International Journal of Computer Vision (IJCV), IEEE Transactions on Neural Networks and Learning Systems (TNNLS), and IEEE Transactions on Circuits and Systems for Video Technology (TCSVT), as well as flagship conferences such as CVPR, NeurIPS, ICML, AAAI, and ICASSP. Since June 2025, she has served as an Associate Editor of IEICE Transactions and as a grant review expert for the Research Grants Council (RGC) of Hong Kong.

Keynote Speech 1

Host	**Assoc. Prof. Ling Xiao, Hokkaido University, Japan**
Time	**9:05-9:45, January 10, 2026**
Venue	**2F Room A24 at the Building-Graduate school of information science and technology**

Prof. Toshihiko Yamasaki

The University of Tokyo, Japan

Toshihiko Yamasaki received the B.S. degree in electronic engineering, the M.S. degree in information and communication engineering, and the Ph.D. degree from The University of Tokyo. He is currently a Professor at Department of Information and Communication Engineering, Graduate School of Information Science and Technology, The University of Tokyo. He was a JSPS Fellow for Research Abroad and a visiting scientist at Cornell University from Feb. 2011 to Feb. 2013. His current research interests include attractiveness computing, multimedia, computer vision, pattern recognition, and so on. Dr. Yamasaki is a member of IEEE, ACM, AAAI, IEICE, ITE, IPSJ, and JSAI.

Title: Deepfakes Beyond Illusion: Opportunities, Risks, and Responsible Vision AI

Abstract: Recent breakthroughs in generative AI have fundamentally transformed how visual content is created, enabling the synthesis of images and videos that are often indistinguishable from real-world recordings. Among these developments, deepfake technologies exemplify both the technical maturity of modern vision models and their profound societal impact.

On the constructive side, synthetic visual generation has expanded creative and industrial possibilities, supporting applications such as digital entertainment, virtual humans, immersive simulation, and data-efficient learning. At the same time, the growing accessibility of deepfake tools has introduced new vulnerabilities. The malicious manipulation of visual media now poses tangible risks to social trust, personal reputation, and the reliability of visual evidence, making the governance of synthetic media a pressing challenge.

Our research addresses this tension by approaching deepfakes not merely as a threat to be detected, but as a phenomenon that reshapes the foundations of computer vision itself. We have developed advanced techniques for deepfake detection and attribution, while also leveraging generative manipulation as a resource for robust learning, evaluation under distribution shifts, and enhanced human–AI interaction. Through these efforts, we seek to establish principled frameworks for both safeguarding visual integrity and harnessing synthetic data productively.

Keynote Speech 2

Host	**Assoc. Prof. Ling Xiao, Hokkaido University, Japan**
Time	**9:45-10:25, January 10, 2026**
Venue	**2F Room A24 at the Building-Graduate school of information science and technology**

Prof. Mianxiong Dong

Muroran Institute of Technology, Japan

Mianxiong Dong received B.S., M.S. and Ph.D. in Computer Science and Engineering from The University of Aizu, Japan. He is the Vice President and Professor of Muroran Institute of Technology, Japan. He is the recipient of The 12th IEEE ComSoc Asia-Pacific Young Researcher Award 2017, Funai Research Award 2018, NISTEP Researcher 2018 (one of only 11 people in Japan) in recognition of significant contributions in science and technology, The Young Scientists' Award from MEXT in 2021, SUEMATSU-Yasuharu Award from IEICE in 2021, IEEE TCSC Middle Career Award in 2021. He is Clarivate Analytics 2019, 2021, 2022, 2023, 2025 Highly Cited Researcher (Web of Science) and Fellow of AAIA, Member of NAAI, Foreign Fellow of EAJ.

Title: Interpreting Physiological Waveforms: AI-based Functional Decoding of Non-invasive Signals

Abstract: Over the past decade, advances in representation learning and generative modeling have begun to reshape how we interpret physiological signals. Yet many ubiquitous, non-invasive waveforms—such as urine flow profiles and EEG—remain underutilized: datasets are fragmented, interpretations rely heavily on human heuristics, and individualized decision-making is still limited. This talk explores a possible pathway through two complementary case studies. I will first motivate the problem from a clinical and systems perspective, contrasting invasive gold-standard tests (e.g., pressure–flow studies) with simpler non-invasive monitoring, and framing waveforms as time-resolved projections of underlying organ and brain function. Then will elevate the discussion to multichannel EEG, outlining how concepts from Large EEG Models and diffusion-based generators—together with multi-conditional guidance, physiological priors, and graph-informed structure—can be used to synthesize physiologically consistent brain signals for data augmentation, BCI classification, and functional representation learning under scarcity and strong subject variability.

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

Keynote Speech 3 (Online)

Time	10:30-11:10 (UTC+9), January 11, 2026
Zoom ID	892 7657 8568
Zoom link	https://us02web.zoom.us/j/89276578568

Prof. Nikola Kasabov

Auckland University of Technology, New Zealand

Professor Nikola Kasabov is Life Fellow of IEEE, Fellow of the Royal Society of New Zealand, Fellow of the INNS College of Fellows, DVF of the Royal Academy of Engineering UK. He is the Founding Director of the Knowledge Engineering and Discovery Research Institute (KEDRI), Auckland and Professor at the School of Engineering, Computing and Mathematical Sciences at Auckland University of Technology, New Zealand. He is also George Moore Chair Professor of Data Analytics at the University of Ulster UK, Honorary Professor at the Teesside University UK and the University of Auckland NZ, Visiting Professor at the Bulgarian Academy of Sciences. Kasabov is Past President of the Asia Pacific Neural Network Society (APNNS) and the International Neural Network Society (INNS). He has been a chair and a member of several technical committees of IEEE Computational Intelligence Society and Distinguished Lecturer of IEEE (2012-2014). He is Editor of Springer Handbook of Bio-Neuroinformatics, EIC of Springer Series of Bio-and Neuro-systems and co-EIC of the Springer journal Evolving Systems. He is Associate Editor of several journals, including Neural Networks, IEEE TrNN, Tr CDS, Information Sciences, Applied Soft Computing. Kasabov holds MSc and PhD from TU Sofia, Bulgaria. His main research interests are in the areas of neural networks, intelligent information systems, soft computing, bioinformatics, neuroinformatics. He has published more than 680 publications, highly cited internationally. He has extensive academic experience at various academic and research organisations in Europe and Asia, including: TU Sofia Bulgaria; University of Essex UK; University of Otago, NZ; Advisory Professor at Shanghai Jiao Tong University and CASIA China; Visiting Professor at ETH/University of Zurich and Robert Gordon University UK; Visiting Scholar at University of Dalian, China. Kasabov has received a number of awards, among them: Doctor Honoris Causafrom Obuda University, Budapest; INNS Ada Lovelace Meritorious Service Award; NN Best Paper Award for 2016; APNNA 'Outstanding Achievements Award'; INNS Gabor Award for 'Outstanding contributions to engineering applications of neural networks'; EU Marie Curie Fellowship; Bayer Science Innovation Award; APNNA Excellent Service Award; RSNZ Science and Technology Medal; 2015 AUT Medal; Honorary Member of the Bulgarian, the Greek and the Scottish Societies for Computer Science (https://academics.aut.ac.nz/nkasabov).
Software technologies for Grid, Cloud, Fog, Quantum 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 in 1970. He has presented over 750 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.

Title: Brain-inspired and quantum-inspired computational intelligence: Challenges and Opportunities

Abstract: The talk reviews principles of computation in both brain-inspired SNN and QC, that can be further used to complement each other in future intelligent systems. SNN, exemplified here on the NeuCube brain-inspired architecture, are efficient for learning of spatio-temporal data and for capturing both time and space from data in their connectionist structures. They are power efficient and provide continuous learning and fast reaction to new data, which is based on their event (spike)-based principle. Still, SNN models may have many parameters that need to be optimised regularly for on-line streaming data analysis, such as in cybersecurity, multisensory data processing and on-line health diagnosis. Better classification accuracy of complex states of a SNN model is also an open problem. To address these problems, the paper presents first the main principles of QC, before it presents how QC can be used for parameter optimisation and SNN state classification, making references to the state-of-the art in the subject area. Applications in computer vision, neuroimaging and environmental modelling are presented.

Keynote Speech 4 (Online)

Time	11:10-11:50 (UTC+9), January 11, 2026
Zoom ID	892 7657 8568
Zoom link	https://us02web.zoom.us/j/89276578568

Prof. Qing Li

The Hong Kong Polytechnic University, China

Qing Li is a Chair Professor and Head of the Department of Computing, the Hong Kong Polytechnic University. He received his B.Eng. from Hunan University (Changsha), and M.Sc. and Ph.D. degrees from the University of Southern California (Los Angeles), all in computer science. His research interests include multi-modal data management, conceptual data modeling, social media, Web services, and e-learning systems. He has authored/co-authored over 500 publications in these areas, with over 59,400 citations and H-index of 99 (source: Google Scholars). He is actively involved in the research community and has served as an Editor-in-Chief of Computer & Education: X Reality (CEXR) by Elsevier, an associate editor of IEEE Transactions on Artificial Intelligence (TAI), IEEE Transactions on Cognitive and Developmental Systems (TCDS), IEEE Transactions on Knowledge and Data Engineering (TKDE), ACM Transactions on Internet Technology (TOIT), Data Science and Engineering (DSE), and World Wide Web (WWW) Journal, in addition to being a Conference and Program Chair/Co-Chair of numerous major international conferences. He also sits/sat in the Steering Committees of DASFAA, ACM RecSys, IEEE U-MEDIA, WISE and ICWL. Prof. Li is a Fellow of IEEE.

Title: PolyRAG: a Multi-level Querying Method for an Indoor Robot Smart Space

Abstract: Smart Space denotes dynamic, adaptive environments enhanced with robotics and AI technologies. Examples include smart homes/offices/cafes. By leveraging and integrating Computer Vision, Natural Language Processing, AIoT, Data Mining, Recommender Systems, and Sympathetic Computing, Smart Space can help improve efficiency, personalization, and user satisfactions with seamless interactions. In this talk, we introduce PolyRAG, a multi-level knowledge QA framework supporting multi-level querying for an indoor robot application system. Building on top of a naive RAG layer, we build a knowledge pyramid by adding a knowledge graph layer and an ontology schema, so as to obtain a good balance of recall and precision when applied to a specific domain such as coffee robot interactions. We employ cross-layer augmentation techniques for comprehensive knowledge coverage and dynamic updates of the Ontology scheme and instances. To ensure compactness, we utilize cross-layer filtering methods for knowledge condensation in KGs. An experimental coffee robot prototype is constructed, and preliminary empirical studies are conducted to show the effectiveness of our PolyRAG supporting a waterfall model for querying from ontology to KG to chunk-based raw text.

Invited Speech 1

Host	**Assoc. Prof. Ling Xiao, Hokkaido University, Japan**
Time	**10:40-11:05, January 10, 2026**
Venue	**2F Room A24 at the Building-Graduate school of information science and technology**

Assoc. Prof. Jiyi Li

Hokkaido University, Japan

Jiyi Li received the Ph.D. degree from the Graduate School of Informatics, Kyoto University, Japan. He is currently an Associate Professor with the Graduate School of Information Science and Technology, Hokkaido University, Japan. His research interests include crowdsourcing and human computation, data mining, natural language processing, data engineering, and multimedia. He has published more than 90 papers in major international conferences and journals including AAAI, IJCAI, WWW, SIGIR, ACL, EMNLP, MM, CIKM and ICASSP. He received the 19th DBSJ Kambayashi Young Researcher Award from the Database Society of Japan.

Title: Crowdsourcing and Human Computation: Quality, Applications, and Challenges in the LLM Era

Abstract: Crowdsourcing and human computation have become indispensable methods for leveraging collective intelligence in the collaboration between humans and AI. This presentation provides an overview of key challenges and recent advances in this field, focusing on three main topics. First, it discusses quality control in crowdsourcing, including the aggregation of crowd responses, truth inference, and learning from noisy crowd labels. Second, it introduces case studies of crowdsourcing applications beyond data collection tasks. Finally, it explores emerging challenges in the era of large language models (LLMs).

Invited Speech 2

Host	**Assoc. Prof. Ling Xiao, Hokkaido University, Japan**
Time	**11:05-11:30, January 10, 2026**
Venue	**2F Room A24 at the Building-Graduate school of information science and technology**

Assoc. Prof. Kazuya Ueki

Meisei University, Japan

He received a B.S. in Information Engineering in 1997, and an M.S. in the Department of Computer and Mathematical Sciences in 1999, both from Tohoku University, Sendai, Japan. In 1999, he joined NEC Soft, Ltd., Tokyo, Japan. He was mainly engaged in research on face recognition. In 2007, he received a Ph.D. from Graduate School of Science and Engineering, Waseda University, Tokyo, Japan. In 2013, he became an Assistant Professor at Waseda University. He is currently an Associate Professor in the School of Information Science, Meisei University. His current research interests include pattern recognition, video retrieval, character recognition, and semantic segmentation. He is currently working on the video retrieval evaluation benchmark (TRECVID) sponsored by the National Institute of Standards and Technology (NIST), contributing to the development of video retrieval technology. In 2016, 2017, and 2022, his submitted systems achieved the highest performance in the TRECVID AVS task.

Title: Next-Generation Video Retrieval: Multimodal Intelligence for Accurate and Interactive Search

Abstract: Recent advances in vision-language models (VLMs) have opened new opportunities to improve video retrieval beyond traditional text-to-video matching. This talk presents four key techniques that leverage the strong reasoning and generative capabilities of multimodal models. (1) Test-time query expansion employs large language models and image generation to produce diverse variations of user queries, helping the system capture broader visual concepts. (2) Caption-guided model adaptation fine-tunes retrieval models using automatically generated captions, reducing the need for manual annotations and enabling domain-specific improvements. (3) Semantic re-ranking through visual question answering (VQA) verifies the semantic consistency between query descriptions and retrieved content, refining precision at the top ranks. (4) Interactive retrieval with real-time vision-language reasoning introduces user-driven refinement and multimodal feedback such as re-querying with images or follow-up questions, allowing search results to be dynamically improved during interaction. Together, these techniques demonstrate how VLM-based reasoning can transform video retrieval from simple keyword matching into context-aware and adaptive search. The presentation will highlight experimental insights, discuss implementation challenges, and explore future pathways toward fully interactive video understanding systems.

Invited Speech 3

Host	Assoc. Prof. Ling Xiao, Hokkaido University, Japan
Time	11:30-11:55, January 10, 2026
Venue	2F Room A24 at the Building-Graduate school of information science and technology

Asst. Prof. Guoming Wang

Zhejiang University, China

Dr. Wang is an Assistant Professor at Zhejiang University, specializing in multimodal intelligence, privacy-preserving machine learning, and AI-driven healthcare applications. He earned his Ph.D. in 2020 from Nanyang Technological University (Singapore), where his doctoral research focused on advanced privacy technologies, including cryptographic protocols, differential privacy, homomorphic encryption, and their implementation in secure electronic medical systems.

Since joining Zhejiang University in 2020, Dr. Wang has pioneered research in multimodal machine learning and retrieval-augmented large language models, with an emphasis on enhancing AI reasoning capabilities. His academic excellence is reflected in over 20 publications at top-tier venues such as CVPR, AAAI, ACM Multimedia (ACM MM), COLING, and IEEE Global Communications Conference (GLOBECOM), and his recent recognition as an Industry Expert at ACM MM 2024.

Translating Research into Impact:

Dr. Wang leads AI-driven medical initiatives that bridge cutting-edge technology with clinical practice:

*Developed an AI-powered healthcare system adopted by 20+ hospitals.

*Designed intelligent platforms enabling 20+ physicians to advance research in disease prediction for complex conditions including migraine, pancreatic cancer, cardiovascular disorders, pulmonary infections, and diabetic nephropathy through multimodal learning.

His work exemplifies a commitment to advancing both theoretical frontiers of machine learning and their transformative applications in global healthcare.

Title: Bridging the Gap in Medical AI: Multimodal LLM Frameworks for Longitudinal Care, Ultrasound Diagnostics, and Survival Prediction

Abstract: The integration of heterogeneous medical data—ranging from unstructured clinical narratives and precise numerical time-series to complex diagnostic imaging—remains a critical challenge for artificial intelligence in healthcare. This presentation introduces a unified vision for a closed-loop medical AI ecosystem, supported by three distinct but interconnected methodological advancements.

First, we present MedAI Hub, a platform designed to bridge the divide between daily clinical care and cutting-edge biomedical research. By utilizing tools like the PRISM platform for migraine management, the hub facilitates continuous, high-fidelity data acquisition and knowledge synthesis.

Second, to address the technical challenge of processing mixed clinical data, we introduce the CETS (Concatenated Embedding of Text and Sequences) framework. CETS enables Large Language Models (LLMs) to process non-numerical text and numerical sequences (such as vitals and lab scores) through dual-stream encoding, significantly outperforming traditional text-only approaches in patient survival prediction tasks.

Third, we extend this multimodal capability to diagnostic imaging with LLAUS and HEART, the first diverse AI assistants for medical ultrasound. To overcome the scarcity of ultrasound-text datasets, we propose a novel "Low-to-High" data generation pipeline and a "Zoom-In" mechanism that allows LLMs to detect subtle lesions and congenital heart defects with expert-level accuracy.

Together, these works demonstrate how multimodal LLM architectures can transform fragmented medical data into actionable clinical insights, democratize diagnostic expertise, and accelerate the translation of research into patient care.

Lunch Time
11:55-13:30

Invited Speech 4 (Online)

Time	11:50-12:15 (UTC+9), January 11, 2026
Zoom ID	892 7657 8568
Zoom link	https://us02web.zoom.us/j/89276578568

Senior Research Scientist Dr. Junshi Xia

RIKEN Center for Advanced Intelligence Project (AIP), Japan

Dr. Junshi Xia received the B.S. degree in Geographic Information Systems and the Ph.D. degree in Photogrammetry and Remote Sensing from the China University of Mining and Technology, Xuzhou, China, in 2008 and 2013, respectively, and a Ph.D. degree in Image Processing from the Grenoble Images Speech Signals and Automatics Laboratory, Grenoble Institute of Technology, Grenoble, France, in 2014. From 2014 to 2015, he was a Visiting Scientist at the Department of Geographic Information Sciences, Nanjing University, Nanjing, China. From 2015 to 2016, he served as a Postdoctoral Research Fellow at the University of Bordeaux, Bordeaux, France. Between 2016 and 2018, he was a Japan Society for the Promotion of Science (JSPS) Postdoctoral Overseas Research Fellow at the University of Tokyo, Tokyo, Japan. Since 2018, he has been with the RIKEN Center for Advanced Intelligence Project (AIP), Tokyo, where he is currently a Senior Research Scientist. His research interests include multiple classifier systems in remote sensing, hyperspectral remote sensing image processing, and deep learning applications in remote sensing. Dr. Xia received first place in the IEEE Geoscience and Remote Sensing Society Data Fusion Contest organized by the Image Analysis and Data Fusion Technical Committee in 2017. Since 2019, he has served as an Associate Editor for the IEEE Geoscience and Remote Sensing Letters (GRSL), Remote Sensing, and Frontiers in Remote Sensing, as well as a Guest Editor for Remote Sensing and the IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS).

Title: Mapping High-resolution Land Cover Products Anywhere

Abstract: High-resolution land cover mapping plays a vital role in urban planning, environmental monitoring, and disaster management. This work introduces OpenEarthMap (OEM), a global benchmark dataset for sub-meter land cover mapping, containing 5,000 satellite/aerial images from 97 regions in 44 countries, annotated into eight classes with over 2.2 million spatially detailed segments. OEM enables fair evaluation across diverse geographies and supports research in semantic segmentation, domain adaptation, and few-shot learning. We present benchmark results of state-of-the-art (SOTA) models, develop lightweight architectures for resource-constrained environments, and propose the UDA-NAS framework for addressing distributional shifts. Extensions include OEM-SAR for all-weather mapping and BRIGHT for multimodal building damage mapping. Furthermore, we introduce the world′ s first globally applicable, open-source submeter-resolution 3D land cover mapping technology from monocular imagery, supported by a large-scale synthetic dataset (SynRS3D) and a multi-task unsupervised domain adaptation method. Collectively, these contributions establish a comprehensive foundation for accurate, scalable, and resilient high-resolution land cover mapping worldwide.

Session 1

January 10, 2026

Session 1: Adaptive Network Security Defense and Threat Perception
Venue: 2F Room A24 at the Building- Graduate school of information science and technology
Time: 13:30-15:00
Session Chair: Prof. Hua-An LU, National Taiwan Ocean University, Taiwan

Onsite

BP0012

Predicting Benefits from Event Logs using Generative AI

Poohridate Arpasat and Wichian Premchaiswadi
Siam University, Thailand

Abstract-This research presents the development of a Generative Artificial Intelligence for analyzing and predicting the benefits of event logs prior to Process Mining analysis. The system operates in a local environment, which ensures security and prevents the leakage of sensitive data. It utilizes the gpt-oss:latest model via the Ollama platform and is developed in Python to enhance the efficiency of data exploration and interpretation, and to reduce the time required for event log analysis. The system is capable of automated analysis, ranging from generating preliminary analytical overviews and creating diverse analytical perspectives, to producing in-depth reports with actionable recommendations. The case study utilized real-world data from a hospital's outpatient department. The results demonstrate that the system effectively performs Data Type Classification and rapidly generates predictive analytics that provide deep insights. This study highlights the potential of Local Large Language Models (LLMs) to make advanced process analysis technologies more accessible to non-expert users, reducing the time and complexity involved in the experimental process.

BP0002

Generative AI-Based Defense Against Deepfakes in Intelligent Audio Systems

Hung-Jr Shiu[1] and Yu-Chun Liu[2]
1: National Taipei University, Taiwan
2: National Hsinchu Girls' Senior High School, Taiwan

Abstract-With the rapid development of Generative Artificial Intelligence (GAI), voice generation technology is expanding into areas like voice assistants, customer service, and entertainment, but this growth brings risks as advancements in voice spoofing and deepfake techniques raise security

concerns. Increasing cases of fraud using synthetic voices highlight the need to protect voice assets. Existing anti-deepfake methods rely on adversarial perturbations to interfere with synthesis models but often require model-specific training, leading to inconsistent effectiveness. This project introduces a modulation-based method that shifts the voice spectrum to higher frequencies, providing adaptable, stable protection against spoofing while maintaining voice clarity.

BP0015-A

Brain-Computer Interface for Secure Authentication

Cheng-Liang Lu and Weizhi Meng
Technical University of Denmark, Denmark

Abstract-This work presents a novel authentication approach using brainwave data as an alternative to traditional cookie-based session methods. Given the vulnerabilities of cookies, such as leakage and circumvention of Two-Factor Authentication (2FA), brain computer interface (BCI) technologies offer a promising path toward more secure web authentication. Electroencephalogram (EEG) signals were collected using a Muse S headband and processed with Fast Fourier Transform (FFT) to extract power spectral density (PSD) features across major frequency bands (delta, theta, alpha, beta). Multiple machine learning classifiers were evaluated, including Support Vector Machine, Random Forest, Gradient Boosted Models, and neural networks. Among them, the Extra Trees model achieved the best performance, yielding an accuracy of 0.83, precision of 0.69, recall of 0.52, and an F1 score of 0.60. A prototype system was implemented to demonstrate seamless integration into website workflows. This study highlights the potential of brainwave-based authentication to enhance security and usability, reducing reliance on vulnerable cookie-session mechanisms.

BP0050

Forensic Blind Spots in Ephemeral Cloud VMs: Evaluating Amazon Inspector and Detective with Memory Forensics

Neeti Dhital, Yuzo Taenaka and Youki Kadobayashi
Nara Institute of Science and Technology, Japan

Abstract-Ephemeral cloud workloads such as A WS Spot Instances can vanish in minutes, often before A WS's native security tools have gathered enough data to respond. When this happens, volatile evidence that exists only in memory disappears. This paper shares an empirical evaluation of Amazon Inspector and Amazon Detective in such short-lived environments and compares their visibility with direct memory acquisition using A VML and LiME. Four controlled attacks: quiet Python data theft, Node.js beaconing, cryptomining, and metadata exfiltration were executed between August – September 2025 in the ap-northeast-2 (Seoul) region. The results show that AWS Detective and Inspector remain effective for long-running workloads but did not produce timely findings within the

brief lifespan of ephemeral instances. Rapid memory capture filled that gap by preserving in-memory evidence before shutdown. Although the per-instance cost is low, total storage expense scales with workload size. Applying selective, risk-based acquisition policies keeps total cost economical while preserving forensic completeness. The study illustrates how lightweight, cost-aware forensics can complement managed detection and strengthen incident response for ephemeral resources.

BP0032

Optimizing Human-AI Collaboration in Portfolio Management: A Performance and Trust Analysis of Hybrid Advisory Systems

Tongpool Heeptaisong, Nathaporn Utakrit, Archavit Junthing, Karma Yoezer, **Tammarong Pakittiwet**, Soe Htet and Naing Lin Aung
King Mongkut's University of Technology North Bangkok, Thailand

Abstract-This study examines how to optimize human–AI collaboration in portfolio management by addressing persistent challenges of trust, transparency, and the integration of human expertise within AI-driven advisory systems. A systematic literature review of 25 recent studies identifies key research gaps, including the absence of structured hybrid frameworks, limited performance evaluation methods, and insufficient analysis of trust mechanisms in financial decision-making. To address these gaps, the study integrates behavioral finance, technology acceptance theory, and dynamic capabilities theory to construct a comprehensive conceptual framework that outlines six interconnected components of a hybrid advisory system. The conceptual framework was evaluated by the experts with positive feedback. To operationalize the framework, a functional prototype of an AI-driven financial advisory chatbot was developed, implementing risk assessment, explainable recommendations, and human-in-the-loop validation. Results indicate consistently high acceptance, usefulness, ease of use, and trust across both groups, confirming the prototype's usability and supporting the practical applicability of the conceptual framework.

BP0035

Critical Infrastructure Security Exploration and Mitigation From Possible Threats: A Case Study of Control Room

Nathaporn Utakrit, Tongpool Heeptaisong, **Thanapond Buadeang**, Trin Chansuwan, Patchara Sumalanurak, Ukrit Sanitjai and Natlicha Boongthong
King Mongkut's University of Technology North Bangkok, Thailand

Abstract-Critical infrastructure systems are increasingly exposed to hybrid threats that blend cyberattacks with physical sabotage. This study proposes a comprehensive design framework that integrates human-centered principles, disaster resilience, and structural integrity. Primary data were collected through on-site observation, while secondary data were derived from international standards, including ISO 11064, NIST SP 800-53, NFPA 72/75, and FEMA P-361. The findings reveal

multidimensional vulnerabilities stemming from fragmented design practices, inadequate ergonomic considerations, and insufficient disaster-preparedness measures. To address these gaps, the study proposes a holistic resilience framework that integrates physical, cyber, and human-centered security dimensions through a risk-prioritized model encompassing structural integrity, cyber-physical protection, and ergonomic optimization. This research identified key design elements and best practices for enhancing operational reliability and resilience. Ultimately, this study aims to establish a conceptual framework or guidelines to effectively design a CCTV control room that can enhance its resilience against a wide range of threats and risks. The findings emphasized the importance of weaving these factors together to significantly improve incident response and overall security effectiveness. The research provided a practical roadmap for designing the next generation of CCTV control rooms that proactively mitigate risk and optimize performance.

Session 2

January 10, 2026

Session 2: Digital Image Processing and Human-Computer Interaction Design
Venue: 5F Room 5-08 at the Building- Graduate school of information science and technology
Time: 13:30-15:15
Session Chair: Assoc. Prof. Warut Pannakkong, Thammasat University, Thailand

Onsite

BP0022

Aided Design Approach for Creating Sticker LINE Cartoon Characters by Stable Diffusion Model

Krisna Pintong and **Thitirat Siriborvornratanakul**
National Institute of Development Administration (NIDA), Thailand

Abstract-This study explores the generation of images from text prompts using the open-source Stable Diffusion model, enhanced through DreamBooth fine-tuning to introduce new, domain-specific visual concepts from limited example images. The aim is to develop AI-assisted design tools that empower creators to generate LINE Sticker cartoon characters more efficiently and creatively. The research process involved data collection from the LINE Sticker Store, image preprocessing, automatic caption generation using BLIP, and fine-tuning with Stable Diffusion 2.0. The DreamBooth method enabled the model to internalize unique character features and stylistic patterns while maintaining generalization for new image synthesis. Experimental results showed that the fine-tuned model could effectively produce novel and diverse sticker designs based on textual descriptions. However, several challenges emerged: incomplete or unstructured prompts often caused semantic confusion, incorrect word order affected visual coherence, and the training process required substantial computational time—approximately three days per session. To evaluate user preference, an online poll was conducted with 84 participants aged 20 and above, revealing that 80% favored the new idea images generated by the fine-tuned model over the original outputs. These findings highlight the potential of combining diffusion-based generative models with fine-tuning techniques to support creative design workflows, while also emphasizing the need for improved prompt engineering, model efficiency, and human-centered evaluation in future research.

BP0003

A Construction of Precision Agriculture for Tea Plantation Using Green Energy Mechanism

Wen-Tsai Sung[1], Indra Griha Tofik Isa[1] and Sung-Jung Hsiao[2]
1: National Chin-Yi University of Technology, Taiwan
2: Takming University of Science and Technology, Taiwan

Abstract-In East Asian countries, tea is an integral part of culture, history, and identity, resulting in high demand. To maintain tea plant productivity, one alternative that can be implemented is precision agriculture (PA) technology. In this study, PA technology will integrate an object detection model and a green energy mechanism to monitor the tea leaf condition, whether it is in good condition or not. The object detection model used is YOLOv10s and has been evaluated through comparative experiments by incorporating several lightweight models such as YOLOv4-tiny, YOLOv7-tiny, YOLOv6s, and YOLOv8s. The experimental results indicate the YOLOv10s model has achieved the best performance in terms of evaluation metrics of precision, recall, F1-score, and mAP_{50}. Meanwhile, the solar power system is utilized as a green energy mechanism. Evaluation of the solar power system was conducted by charging a DC power battery storage, which indicates the optimal result. Therefore, the solar power system can be integrated with a tea leaf monitoring system, which provides convenience, sustainability, and low-cost precision tea plantation agriculture.

BP0028

Mobile-ARTiFACT: An Augmented Reality Learning Platform for Cultural Heritage Digitization and Education

Mary Yzabel P. Olavides and **Hazel A. Trapero**
University of the Philippines Cebu, Philippines

Abstract-As educational technology advances, there is increasing opportunity to integrate cultural heritage (CH) preservation with immersive and adaptive learning tools. This pilot study introduces mobile-ARTiFACT, a mobile Augmented Reality (AR) application (app) designed to address the challenges faced by Philippine cultural institutions in digitizing and sharing cultural heritage artifacts. The system architecture of mobile-ARTiFACT integrates Light Detection and Ranging (LiDAR) photogrammetry for generating accurate 3D models of physical artifacts, allowing users to experience authentic digitization workflows. Developed using Swift, Xcode, Reality Composer, and RealityKit, the app provides a robust, low-cost platform that supports adaptive content delivery, intuitive user interaction, and scalable deployment across educational and heritage sectors. The study applied the Technology Acceptance Model (TAM) and the Handheld Augmented Reality Usability Scale (HARUS). The research participants used the system and provided feedback through guided sessions. Their responses were analyzed using directed content analysis based on key constructs: Perceived Usefulness (PU), Perceived Ease of Use (PEoU), Manipulability, Comprehensibility, and Intention to

Use. Results showed high engagement and positive perceptions, particularly in PU, PEoU, and Comprehensibility. The participants appreciated the practical introduction to digitization processes. However, some concerns were noted regarding the technical complexity of handling LiDAR-enabled devices during photogrammetry. This work contributes to the Advanced Learning Technologies (ALT) domain by demonstrating how immersive AR tools can bridge gaps between cultural preservation and education. Mobile-ARTiFACT offers a promising model for empowering educators and institutions with digital infrastructure that supports both heritage conservation and next generation learning experiences.

BP0019

An Agentic LLM Framework for Inventory Replenishment Planning in E-Commerce SMEs

Pathitta Timtong and **Warut Pannakkong**
Thammasat University, Thailand

Abstract-The rapid rise of e-commerce has created both opportunities and challenges for small and medium-sized enterprises (SMEs), particularly in balancing inventory efficiency with strict platform policies and penalty structures. This paper proposes a decision-support framework that integrates large language models (LLMs) with AI agent reasoning principles to assist SMEs in making replenishment decisions. Unlike replenishment policies or experience-based approach, the framework allows SME owners to interact through natural language, embedding operational constraints such as budget limits, supplier schedules, and platform requirements directly into the decision process. A case study of a Thai SME in the household goods sector illustrates the framework's application, comparing three approaches: the experience-based replenishment approach, a continuous-review (Q,r) policy, and the AI agent-based framework. The results indicate that while each approach involves trade-offs between procurement efficiency and penalty exposure, the AI-enhanced framework provides a balanced outcome with interpretability and adaptability. These findings suggest the potential of accessible AI tools to support SMEs in navigating dynamic and penalty-driven e-commerce environments.

BP0031

Enhancing Air Pollution Awareness in Bangkok: A Mobile HCI Approach Integrating Real-Time Alerts and Gamification

Tongpool Heeptaisong, Nathaporn Utakrit, **Vivien Therese Basco Villalobos**, Piyapat Pholchan, Pongpisut Somsagun and Sonam Norbu
King Mongkut's University of Technology North Bangkok, Thailand

Abstract-Air pollution continues to pose serious health risks in major Southeast Asian cities, particularly due to high concentrations of PM2.5. Although mobile applications are available to provide air quality information, many struggle to maintain user engagement or communicate

information in a way that feels personally meaningful. This study investigates these challenges through a survey of 45 participants in Bangkok. The results indicate that users prioritize credibility, real-time data, and clear protective guidance, while gamification and community features are viewed as secondary. Based on these findings, we developed MIST, a mobile prototype designed to support situational awareness through reliable information presentation and concise health recommendations. A heuristic evaluation by HCI experts highlighted strengths in clarity and visual structure, while also identifying needs for onboarding and improved notification control. This study offers an initial design approach that foregrounds credibility as a foundation for environmental health applications. The prototype serves as a design probe for future field studies aimed at evaluating long-term engagement and practical behavioral impact.

BP0052

Quality Assurance Station For Barcode Verification Utilizing Image Processing Technology

Nathakorn Sawangwong, Chanchanok Charoenrak, Warinthorn Kiadtikornthaweeyot Evans and **Chirattikan Srisook**

Thammasat University, Thailand

Abstract-This research presents the development and evaluation of an automated quality assurance station designed to minimize human error and enhance inspection accuracy using image processing and artificial intelligence techniques. The system integrates a real-time barcode detection model based on the YOLOv8, enabling rapid and consistent identification of defective and non-defective barcodes. To assess its performance, both static and dynamic testing scenarios were conducted, simulating conditions commonly found in industrial production environments. Additionally, the system's performance was benchmarked against two human inspectors to evaluate the practical benefits and limitations of AI-assisted inspection.

In static testing, the automated system achieved 100% detection accuracy with an average processing time of approximately 3 seconds per piece, significantly outperforming human inspectors, who required 7.043 and 8.025 seconds on average. These results highlight the system's superior speed and consistency under controlled conditions. In dynamic testing, barcodes were evaluated at conveyor speeds of 25%, 50%, and 100%. The system maintained high accuracy at low speeds, correctly identifying nearly all samples at 25% speed, but performance declined at higher speeds, reaching 67.35% accuracy at full speed due to motion blur and hardware limitations. Overall, the findings demonstrate the feasibility and potential of automated barcode inspection systems to enhance productivity, reliability, and operational efficiency in manufacturing environments.

BP0051

Machine Learning-Based Models for Predicting Road Crash Severity Using Environmental Factors

Muhammad Fadhirul Anuar Mohd Azami[1,2], **Md Yushalify Misro[1]** and Rizati Hamidun[3]

1: Universiti Sains Malaysia, Malaysia

2: Sunway University, Malaysia

3: Malaysian Institute of Road Safety Research (MIROS), Malaysia

Abstract- Road crash severity prediction is essential for enhancing traffic safety and supporting evidence-based interventions. While numerous studies have explored human, vehicle, and roadway characteristics, there is limited research focused specifically on predicting crash severity on environmental attributes within machine learning frameworks. Despite their critical influence on crash outcomes, weather, light condition, location type, and area type are significant to predict road crash severity. Crash data covering the years 2014 to 2020, were used in this analysis, displays a notable class imbalance, with fatal crashes constituting the majority category. Therefore, this study aims to evaluate machine learning performance in predicting the severity of road crashes using environmental data, investigate the impact of class imbalance handling techniques on the predictive performance of the models and identify the optimal model–resampling combination that provides the best balance between accuracy and minority class detection. Three machine learning models which is Random Forest (RF), Extreme Gradient Boosting (XGBoost), and Support Vector Machine (SVM) have been used in classifying road crash severity. Three resampling techniques were implemented such as Random Undersampling (RUS), Synthetic Minority Oversampling Technique (SMOTE), and class weighting (CW) in order to observe the best model configuration in the road crash severity prediction and the minority class detection. Model performance was evaluated focusing on accuracy, precision, recall and F1-score. Initially the performance of ML models was strongly biased toward the fatal class, yielding minimal detection of serious and slight categories. Incorporating resampling strategies substantially enhanced minority class recognition, with SMOTE and CW providing the most balanced performance across severity levels. Among all configurations, XGBoost combined with SMOTE achieved the most effective balance between overall accuracy (0.4105) and improved detection of minority classes. Thus, this study addresses the importance of integrating imbalance handling techniques when modeling crash severity using environmental variables.

Session 3

January 10, 2026

Session 3: Cross-Modal Intelligent Sensing Communication Systems and IoTs Engineering Applications
Venue: 3F Room 3-21 at the Building- Graduate school of information science and technology
Time: 13:30-15:00
Chaired by: Asst. Prof. Guoming Wang, Zhejiang University, China

Onsite

BP0025

Multilevel Edge-Disjoint Fiber-Tree Planning and Spectrum Assignment for Filterless Optical Networks

Der-Rong, Din
National Changhua University of Education, Taiwan

Abstract- We study the joint planning of multilevel edge-disjoint fiber trees and spectrum assignment in filterless optical networks (FONs) under a 1,500 km reach constraint. Given a physical topology and a traffic matrix, the objective is to minimize the maximum per-edge spectrum occupancy,(max)┬(e∈E)⁡〖W_e 〗 of frequency slots (FSs) on any fiber under fixed traffic, treating the number of levels K (i.e., the number of levels) as a design parameter. We propose a feasibility-preserving simulated annealing (SA) and a multiple-initial-state simulated annealing (MISSA) to construct edge-disjoint trees, complemented with MST/SPT-seeded heuristics that jointly optimize tree construction and demand-to-tree assignment. We compare these methods to a single-level SA baseline and to heuristic algorithm and genetic-algorithm baselines. Experiments on three standard topologies (G7, I10, G17) with ten randomized runs per K show that leveling reliably suppresses hotspots: relative to K=1, the peak edge load falls by ~44% on G7, ~30% on I10, and ~32% on G17 at K=10, with diminishing returns beyond K ≈ 7-8. Across all networks and K, MISSA and SA produce numerically identical minima and averages; MISSA consistently achieves a slightly lower worst case than SA, narrowing the max–min spread as K grows. Overall, the results indicate that increasing K ("leveling") is the dominant lever for peak-load reduction; within that design, MISSA offers robust, near-optimal performance with improved worst-case behavior and practical runtime.

BP0006

Creating Wireless Sensor Network Target Tracking Strategy and Data Fusion Based on Blockchain Technology Integration

Sung-Jung Hsiao[1] and Wen-Tsai Sung[2]
1: Takming University of Science and Technology, Taiwan
2: National Chin-Yi University of Technology, Taiwan

Abstract-The problem of using measurements from multiple sensors to track moving objects, including moving targets, moving robots and various transportation vehicles, has aroused great interest in daily use. Flight tests using radar, sonar systems and electro-optical tracking systems to track aircraft such as missiles, unmanned aerial vehicles, micro or mini air vehicles and rotorcraft in various situations. It is also useful in non-military applications such as robotics, air traffic control and management, air quality surveillance and ground traffic tracking. In practice, target tracking situations include target maneuvers, intersections, and separations. There are different algorithms for target tracking in such situations. Our research uses blockchain technology to encrypt and encapsulate the data integrated by our system into blocks and then link the data of each block into a database system, so that the data of our sensors can be used in information security. There is an absolute improvement. Blockchain technology is currently mostly used for virtual currency transactions. This is because blockchain technology has an excellent encryption security mechanism, and all transaction information is difficult to tamper with, or even cracked. Therefore, so far, blockchain technology has been used in virtual finance. If this technology is applied to our sensor data fusion system, the sensor data we fuse will be difficult to tamper with and crack. Yes, this is an information security system that can withstand the test.

BP0009

An IoT-Based Smart Bedside Information System with Hybrid Encryption for Healthcare Applications

Hung-Ming Chen[1], **Shu-Ping Lu[2]** and Yung-Feng Lu[1]
1: National Taichung University of Science and Technology, Taiwan
2: Fu Jen Catholic University, Taiwan

Abstract-Healthcare institutions worldwide face critical challenges including increasing patient loads, limited nursing resources, and escalating cybersecurity threats. Taiwan's nurse-to-patient ratios significantly exceed international standards (1:9 to 1:16 vs. optimal 1:6), while traditional paper-based bedside documentation systems are prone to human error and workflow inefficiencies. This paper presents a novel smart healthcare bedside e-paper display system that addresses these challenges through innovative integration of Internet of Things (IoT) technology, hybrid encryption protocols, and energy-efficient display solutions. Our system architecture comprises three core components: (1) a bedside e-paper display interface powered by ADP-Corvette-F1 N25 R2.0 with integrated nursing call functionality, (2) a secure mobile application for healthcare professionals, and (3) a web-based management dashboard. The system implements a sophisticated dual-layer security framework combining RSA-2048 and AES-256 encryption with dynamic block key generation, ensuring robust protection of sensitive patient data during transmission. A novel Diffie-Hellman key exchange protocol secures QR code access, preventing unauthorized information disclosure. Clinical evaluation demonstrates significant improvements in nursing workflow efficiency: 75% reduction in

patient information retrieval time (from 3.2±0.8 to 0.8±0.2 minutes) and 95.7% improvement in patient identification accuracy (error rate reduced from 2.3% to 0.1%). The hybrid encryption algorithm achieves 91.2% performance improvement over RSA-only implementations while maintaining superior security levels. The system's modular IoT architecture enables seamless integration with additional monitoring systems including environmental sensors and occupancy detection. This research contributes the first implementation of e-paper technology in bedside patient information systems with integrated nursing call functionality, providing a scalable, energy-efficient solution that addresses critical healthcare delivery challenges while ensuring compliance with medical device certification requirements and data protection standards.

BP0048-A

Deep Learning-Based Approach for Vibration Monitoring and Maintenance of Production Equipment

Kyeongseok Lee[1], Young-Soo Jeong[1], Heejon Park[2], Sehun Park[2] and Seseong Lim[2]
1: Pusan National University, South Korea
2: Jinyoung Korea CO., LTD., South Korea

Abstract-Efforts have been made to achieve efficient maintenance of production machinery with the advancement of sensor and communication technologies. To ensure equipment safety, it is essential to employ technologies capable of effectively processing and utilizing data generated from monitoring systems that detect vibrations,deformations, and other mechanical responses. Vibration in machinery originates from dynamic energy produced by the power source and is transmitted through structural components to the external environment. These vibration signals inherently contain critical information regarding the operational condition of the equipment. However, due to the structural complexity of mechanical systems, the measured vibration responses are often distorted and diffused, making it difficult to accurately identify the source of excitation. A detailed analysis of the nonlinear transmission characteristics of each individual system is impractical and inefficient. To overcome this limitation, various deep learning approaches have been developed that can autonomously learn and infer intrinsic features and interrelationships within nonlinear data. Therefore, this study presents a time-series learning-based approach to detect abnormal vibrations in mechanical equipment.

BP0029

LINE Health Today: An n8n Automation Workflow for Accessible Public Health Communication

Nathaporn Utakrit, **Sanguansak Sanpen**, Techaphat Kamonlawan and Atsawaphat Srikhampha
King Mongkut's University of Technology North Bangkok, Thailand

Abstract-Elderly populations in Thailand face significant barriers to accessing online public health information due to complex web navigation and information overload. This project addresses this challenge by developing "LINE Health Today," an automated workflow built on the n8n platform that delivers simplified, large language model (LLM) generated health news summaries directly through the LINE messaging application. The system integrates curated sources to successfully transform dense articles into concise, accessible, and accurate updates. Preliminary user validation highlighted the tool's convenience and clarity, demonstrating that leveraging automation alongside familiar communication platforms can effectively bridge the digital accessibility gap and enhance health literacy among seniors.

BP0026

A Novel Data Sharing Scheme Based on Verifiable Credentials: Application to PCF Data Sharing

Nobuaki Endou

NTT Space Environment and Energy Laboratories, NTT, Inc., Japan

Abstract—Verifiable Credentials technology is gaining traction as a means of transmitting trustworthy credentials in the digital world. Product carbon footprint data sharing among supply chain companies is one of the leading use cases currently under exploration. Advancing its application is expected to reveal technical challenges and opportunities for improvement, thereby fostering further technological development. This paper proposes a new model to enable secure and efficient data sharing using verifiable credentials. In our model, we propose two schemes that are independent and combinable. The first scheme is to share data that includes a Watermark in a verifiable form. The main advantage of this method is that it allows tracking and revocation of shared data. The second scheme of sharing data makes data sharing scalable in a manner that downstream product companies can verify that the data is created by certified upstream product companies. To confirm feasibility, we design, implement, and evaluate our proposed system for sharing product carbon footprint data. The results show that the proposed model significantly enhances security and efficiency. The proposed schemes, inspired by the challenges in product carbon footprint data sharing use case, are designed with general applicability, enabling its adaptation to a wide range of scenarios.

Poster Session

January 10, 2026

Poster Session: Advanced Information Theory and Innovative Applications

Time: 15:00-15:30

Onsite

BP0049-A

Evolutionary Informatics Framework for Characterizing Gene-Specific Divergence in Orthoebolaviruses

Myeongji Cho, **Hakyung Lee** and **Hyeon S. Son**
Seoul National University, Republic of Korea

Abstract-Viral evolution represents a complex information system shaped by selective pressures that drive host adaptation and immune evasion. To quantitatively capture these dynamics, we developed an evolutionary informatics framework for characterizing gene-specific divergence and compositional variability across six member viruses of the genus Orthoebolavirus-Ebola virus (EBOV), Sudan virus (SUDV), Bundibugyo virus (BDBV), Taï Forest virus (TAFV), Reston virus (RESTV), and Bombali virus (BOMV). Seven conserved genes (GP, L, NP, VP24, VP30, VP35, and VP40) were analyzed using a data-processing pipeline integrating MUSCLE alignment and Maximum Likelihood phylogeny with the Tamura–Nei model in MEGA X. Compositional indices-GC3, ENC, and P2-were computed as quantitative features to evaluate nucleotide composition, codon usage bias, and translational selection. Integrating these indices enabled multidimensional profiling of divergence patterns among genes and species. VP30 exhibited a distinct phylogenetic topology and the highest interspecies variability, indicating unique evolutionary constraints. SUDV VP30 showed strong codon usage bias and translational selection, consistent with optimized expression control. Given its role in transcription initiation and the transcription–replication switch, VP30 appears to be adaptively fine-tuned under lineage-specific pressures, reflecting its pivotal role in Orthoebolavirus evolution. These results illustrate how informatics-driven analysis facilitates knowledge discovery and quantitative understanding of viral evolution.

BP0017

ST-Mamba: A Scalable Spatio-Temporal Deep Learning Framework for PM2.5 Forecasting in Taiwan

Chih-Lun Chen, Shanq-Jang Ruan and **Chung-An Shen**
National Taiwan University of Science and Technology, Taiwan

Abstract-Accurate prediction of PM2.5 concentrations is essential for mitigating the health impacts of air pollution, particularly in densely populated regions like Taiwan. This thesis introduces Spatio-Temporal Mamba (ST-Mamba), a scalable and computationally efficient deep learning framework for PM2.5 forecasting. ST-Mamba integrates three key components: Radial Sector Encoding (RSE) to model spatial relationships among monitoring stations, a bidirectional Mamba module for capturing complex temporal dependencies with linear time complexity, and a Dynamic Conditional Gating mechanism for context-aware fusion of spatio-temporal features. The model is trained on a comprehensive two-year dataset collected from 75 air quality monitoring stations across Taiwan, incorporating pollutant and meteorological data. Extensive experiments demonstrate that ST-Mamba consistently outperforms traditional statistical models and advanced deep learning baselines across multiple prediction horizons. The results highlight ST-Mamba's scalability, robustness, and suitability for real-time, city-scale air quality forecasting.

BP5022-A

A LiDAR-Guided PTZ Camera Framework for Real-Time Environmental Object Detection and Tracking

Tao Ye and **Chul-Hee Lee**
Inha University, Korea

Abstract—With the growing demand for intelligent environmental perception, reliable multi-source fusion and stable object tracking in outdoor scenarios have become key challenges. This paper presents a LiDAR-TZ camera fusion system for real-time environmental object detection and tracking. The system integrates YOLOv11-based visual detection, PointPillars point cloud processing, and an enhanced Extended Kalman Filter (EKF) in a unified framework to achieve robust spatiotemporal perception. A spatially constrained virtual-point augmentation method is introduced to improve feature stability and model generalization under sparse point cloud conditions. Additionally, a dual-layer fusion EKF strategy combines PointPillars' detection output with adaptive noise modeling for centroid measurement, enabling continuous state estimation and tracking even under intermittent data conditions. The system has been implemented and evaluated using public datasets and real-world outdoor experiments. Experimental results show an average positional deviation of ±1.42 m, an effective detection range of approximately 30 m, with a maximum range of 42 m, and an operating speed of about 32 FPS, maintaining a 96.8% frame-level detection continuity. These results demonstrate the effectiveness of the fusion strategy in overcoming single-sensor limitations, providing a reliable foundation for intelligent monitoring and environmental understanding.

BP5014

Structure-Aware Motion Deblurring and Perspective Rectification for Real-Time Lightweight UAV License Plate Recognition

Zexin Shen[1], Yingxuan Fang[1], Chun-Ta Wei[1], Peiying Zhou[1], Zelong Hong[2] and Wanqing Lin[1]

1: Quanzhou University of Information Engineering, China

2: Shaoxing University, China

Abstract — Unmanned Aerial Vehicles (UAV) offer a flexible and cost-effective platform for intelligent traffic monitoring. However, license plate recognition (LPR) from UAV imagery remains a technically challenging problem due to various UAV-specific imaging challenges, including motion blur, geometric distortion, and limited onboard computation. This paper presents a lightweight and robust LPR framework specifically designed for UAV applications. A DeblurGANv2-based module is employed to restore image sharpness under dynamic flight conditions, while a keypoint-guided perspective correction algorithm compensates for geometric distortions caused by oblique viewing angles. For sequence recognition, a convolutional recurrent neural network (CRNN) optimized with the connectionist temporal classification (CTC) loss enables end-to-end character decoding without explicit segmentation. The entire framework is optimized for real-time efficiency, achieving a compact model size of 1.1 MB and an inference speed of 21 frames per second on the Jetson Xavier NX platform. Experimental evaluation on a UAV-specific dataset containing 3,000 annotated images captured under diverse illumination, motion blur, and viewing conditions demonstrates an accuracy of 85.0% and a recall of 74.6%, outperforming conventional baselines while substantially reducing computational overhead. The proposed system provides a practical and deployable solution for real-time UAV-based license plate recognition, contributing to the advancement of intelligent aerial traffic surveillance in complex urban environments.

Session 4

January 10, 2026

Session 4: Machine Learning Theory and Computational Models
Venue: 2F Room A24 at the Building- Graduate school of information science and technology
Time: 15:30-17:00
Session Chair: Assoc. Prof. Sung-Jung Hsiao, Takming University of Science and Technology, Taiwan

Onsite

BP0011

Constructing Time-Series Badminton Prediction Model within Gated Recurrent Units

Ming-Hung Lin, **Luu-Ly Tran**, Han-Yu Chen and Chih-Chieh Chang
National Taiwan University of Science and Technology, Taiwan

Abstract-This study tackles the challenge of image recognition in badminton due to its small size and complex movement trajectory by developing a new dataset and predicting shot sequences. The experimental procedure involves two main steps: detailed preprocessing of original data (extracting key features, normalizing, and dividing into training and test sets) and using machine learning algorithms to predict future shots. We validated the model with 20 repeated experiments and multiple evaluation metrics (Accuracy, Precision, Recall, F1 score) and confirmed statistical significance and stability through T-tests. The results demonstrate that the Gated Recurrent Unit (GRU) effectively predicts shot sequences. The proposed architecture model with joint ReLU achieved 55.85% accuracy compared to a random guessing baseline of 16.67%, showcasing superior performance and promising applications. Therefore, this research provides a new tool for badminton data analysis and lays the groundwork for broader sports data analysis and behavior prediction.

BP0016-A

From Passenger Movement Data to Air Transport Market Information: A Big Data Analysis Application

Hua-An Lu and Kung-Don Ye
National Taiwan Ocean University, Taiwan

Abstract-Air travelers must book flights before their journey. Trips might be simple, with just one leg transported by one airline, or complicated, consisting of multiple stages served with relay partners. Extracting the critical market information from millions of passenger movement data is vital for airline and airport development. This study aims to exploit big data analysis tools to parse the competitive transfer markets in the corridor between Southeast Asia and North America before and after COVID-19. Potential compared hubs include Hong Kong Airport (HKG), Taoyuan International Airport (TPE), Incheon Airport (ICN), and Narita Airport (NRT). The air traffic data for 2019 and

2024 were subscribed to the International Air Transport Association (IATA) Market Intelligent Service (MarketIS). Analysis levels include markets of the country and airport-based, while the transport pattern is divided into direct and transfer. For specific flights, the passenger movement for three kinds of transfer functions, i.e., behind, beyond, and bridge, also revealed the competitiveness of home-court airlines. From the Power Query and BI processing, the dashboard can present a well-designed interface to assist managers in predominating on the required information.

BP0024

Considering Cluster Validity in Attribute Extension for Small Data Set Predictions

Luu-Ly Tran[1], **Chih-Chieh Chang[1]**, Hsiang-An Yu[1], Yu-Chi Chen[2] and Raylin Tso[3]
1: National Taiwan University of Science and Technology, Taiwan
2: National Taipei University of Technology, Taiwan
3: National Chengchi University, Taiwan

Abstract-Cluster validity has been widely used in determining the optimal clusters with huge data sample size in recently years. However, there is less discussion of validity cluster in small data size. This study presents a new approach, which considers the cluster validity to improve predictive ability for small data set problems. The first step of the proposed method is the use of K-means data clustering technique, with seven cluster validity indices to determine the optimal number of clusters; and the second step is to build up the attribute extending function for each attribute in clusters to generate new attributes by computing the membership possibility. Finally, cross-validation and t-tests are used on two real manufacturing cases, to verify the effectiveness of the proposed method by comparing it with other forecasting methods. The results show that the combinations of C-index and attribute extension have the better improvement in these two cases.

BP0053

A Hybrid Forecasting Approach using Holt-Winters Forecasting Technique and Monte Carlo Simulation with a Neural Network for High-Variance Data

Maneerat Mueanpet and **Wuttinan Nunkaew**
Thammasat University, Thailand

Abstract-This paper proposes a hybrid forecasting approach that integrates traditional statistical methods with a Neural Network (NN) for high variance data to address uncertainty, improve accuracy, and support operational planning decisions. The proposed method first applies Holt-Winters (HW) time series analysis to generate a baseline forecast, then uses the forecasted values and residuals from HW as input to a Monte Carlo (MC) simulation to produce probabilistic forecast paths, which are

subsequently analyzed by a Neural Network (NN) model to learn nonlinear patterns and forecast variability. Case study data from an electronics manufacturing company show that the proposed hybrid forecast reduces MSE, RMSE, MAE, and MAPE, while also increasing R2 compared with conventional methods. By enhancing the traditional Holt-Winters model and combining it with MC simulation and NN, the proposed approach effectively handles high-variance data and provides uncertainty-aware forecasts, offering actionable insights for operational applications, such as production planning, inventory management, and logistics operations.

BP0041

Rule-based approach for finding the maximum set of shortest vertex-independent paths

Boris Melnikov[1] and Yulia Terentyeva[2]
1: Shenzhen MSU–BIT University, China
2: Center for Information Technologies and Systems of Executive Authorities, Russia

Abstract- The paper proposes a method for finding the maximum set of shortest vertex-independent paths between the vertices of a graph, as well as an analytical proof of the effectiveness of the search in the case of the existence of one backup path. That is, the efficiency of the developed algorithm has been proved for the case when the maximum number of shortest vertex-independent paths is 2. The algorithm finds two routes that reserve each other, if available, and thereby solves an extremely urgent problem that often arises during the design and/or modernization of the communication network, as well as during its operation. The method is based on knowledge about a specific subject area, and the rules used to build paths are strict and deterministic, so we can say that we use the rule-based approach. It is shown that the task of finding backup routes must be searched comprehensively, and not sequentially using the algorithm for finding the shortest path.

BP0042

Algorithms for Solving the Traveling Salesman Problem Based on Randomly Distributed Data

Boris Melnikov, Pavel Oganesyan and Bowen Liu
MSU-BIT University, Shenzhen, China

Abstract- In this study, we present a method and its implementations for the traveling salesman problem considering matrices with a uniform random distribution of path costs. The method is a modification of the branch-and-bound method with specific heuristics. Data generation and validation used for this study are discussed. The mathematical study of the problem being solved can probably be considered complete as early as the 1970s; even earlier, an approach to its solution in the form of the branch-and-bound method was described. The purpose of this paper is to describe such a heuristic implementation of the branch-and-bound method, which with almost a single probability gives the optimal solution to a random problem in an acceptable time. We call random variants of the problem,

in which each cell of the traveling salesman matrix for a problem instance represents a realization of a uniformly distributed random variable. It is important to note that approaches to the heuristic solution of a random variant differ significantly from approaches to geometric and pseudo geometric variants. In our opinion, we have achieved our goal: thus, the maximum time to obtain a solution for 100 random problem instances of dimension 99 did not exceed 2 minutes, while the exact solution was always found; the last thing was verified by the fact that the branch-and-bound method was always counted to completion. In the paper, we provide a brief description of the heuristics used for this purpose, the most important of which is the construction of the so-called sequence of right-hand subproblems.

Session 5

January 10, 2026

Session 5: Advanced Artificial Intelligence and Applications
Venue: 5F Room 5-08 at the Building- Graduate school of information science and technology
Time: 15:30-16:45
Session Chair: Prof. Wen-Tsai Sung, National Chin-Yi University of Technology, Taiwan

Onsite

BP0023

Authorship, Bias, and Collaboration: Navigating AI Integration in Creative Industries

Chutisant Kerdvibulvech
National Institute of Development Administration (NIDA), Thailand

Abstract-Artificial Intelligence (AI) has become a transformative force in the creative industries, fundamentally reshaping how artistic content is conceived, produced, and evaluated. Far from serving merely as a tool, AI increasingly functions as a collaborator and co-creator, enabling novel forms of expression, automating labor-intensive tasks, and augmenting human creative capacities across domains such as visual arts, music, film, design, and gaming. This integration raises complex questions concerning authorship, bias, and human–AI collaboration. Traditional notions of authorship are challenged by AI-generated or co-created works, prompting debates over ownership, intellectual property, and cultural legitimacy. Simultaneously, algorithmic, dataset, and evaluative biases can influence the diversity, inclusivity, and cultural representation of creative outputs. Effective human–AI collaboration necessitates iterative co-creation, clear role delineation, and AI literacy, ensuring that human agency remains central in creative decision-making. This paper presents a conceptual framework positioning human agency at the core of interactions among authorship, bias, and collaboration, highlighting their interdependence in AI-mediated creative workflows. Finally, the study identifies challenges, opportunities, and future research directions, emphasizing comparative analyses, longitudinal skill development, policy and legal considerations, human-in-the-loop design, and cross-cultural impacts, aiming to guide ethical, innovative, and inclusive integration of AI in creative practices.

BP0034

Framework Design and Application of AI Agent Ecosystems for SMEs

Anirut Suebsing
Ubon Ratchathani University, Thailand

Abstract-The ecosystem of Artificial Intelligence (AI) agents signifies a disruptive model for small and mediumsized firms (SMEs) in developing economies. This paper introduces the Low-Code Orchestrated Distributed Intelligence (L-ODI) framework, a systematic four-layer architecture that

incorporates autonomous AI agents into small and medium-sized enterprise processes through user-friendly low-code workflow orchestration. We elucidate the architecture of the L-ODI framework and illustrate its actual implementation in Thai SMEs, emphasizing substantial efficiency improvements (e.g., up to 80% decrease in manual processing time) and operating cost reductions (20-30%). Empirical case studies from Thailand demonstrate how AI agents may automate comprehensive business operations and operate as "digital employees," facilitating uninterrupted operation and datadriven decision-making. We examine critical hurdles and consequences for adoption within the context of Thailand, encompassing data quality concerns, workforce skill deficiencies, and regulatory factors, including adherence to Thailand's Personal Data Protection Act. The study finishes with thoughts on assuring the responsible deployment of AI agents and delineates future research directions to facilitate sustainable digital transformation for SMEs.

BP0033

Evaluating the Adoption of AI-Driven No-CodePlatforms Using the Technology Acceptance Model(TAM) in Achieving Sustainable Development Goals: The SafeDrive Mobile Application

Tongpool Heeptaisong, Nathaporn Utakrit, **Tanatuch Terasunthornwat**, Althea Mariz Subong Lindugan, Satayu Saengchan, Manam Sut Jat Aung and Nattapong Ngamwiliaipan
King Mongkut's University of Technology North Bangkok, Thailand

Abstract-Artificial Intelligence (AI) has advanced rapidly, enabling no-code platforms that allow users to create applications without programming expertise. AI driven no-code platforms generate layouts, workflows,and deployable applications from natural language prompts. However,the quality of outputs depends on prompt clarity and often requires refinement. This study investigates the adoption of AI-driven no-code platforms through the Technology Acceptance Model (TAM), extended with AI-specific factors such as trust and output quality. A quantitative and experimental design was employed with 32 participants who were studying, or had academic or professional backgrounds in Information Technology. Each participant used a prompt to build a prototype of the SafeDrive, an emergency response mobile application, across three platforms, such as Canva, Lovable, and Replit. After each interaction,participants completed a survey using TAM constructs perceived usefulness, perceived ease of use, behavioral intention, and usage behavior. Results showed the differences across platforms. Canva scored highest on all TAM constructs highlighting its accessibility and user-friendliness. Lovable achieved moderate ratings, while Replit received the lowest scores, reflecting its suitability for technically proficient users. Further results revealed that Canva was valued for simplicity, whilst Lovable was valued at its engaging interface, and Replit was suitable for its coding flexibility despite requiring higher technical skill. Overall, findings demonstrated that the design and ease of use influence adoption of AI-based no-code platforms. Moreover, no-code solutions like the SafeDrive app can contribute to Sustainable Development Goals by enabling rapid, inclusive innovation in safety and community well-being.

BP0038

Designing AI-Powered Healthcare Applications with No-Code Tools: A Usability Study Using Design Sprint Methodology

Nathaporn Utakrit, Sarun Konsomboon, Ratchatapon Palahan, Tongpool Heeptaisong, **Surisak Tivacharoenroj** and Sitanan Kansorn

King Mongkut's University of Technology North Bangkok, Thailand

Abstract-This research examines the usability of a healthcare application prototype developed using an AI-powered no-code platform, guided by a structured design sprint methodology. The primary objective was to assess the extent to which no-code tools can accelerate healthcare innovation and enhance accessibility for individuals with limited technical expertise. The prototype, MyWellHome, integrates health and lifestyle services,including AI-driven medical consultations, cost-reducing hospital booking features, preventable health management tools, and community-oriented companion services. A total of thirty participants interacted with the prototype and subsequently evaluated its usability through the System Usability Scale (SUS). The results indicated high usability scores, affirming the system's intuitive design and practical utility. Qualitative feedback further underscored ease of navigation, functional relevance, and alignment with user needs. Moreover, the application demonstrated strong alignment with several UN Sustainable Development Goals (SDGs), particularly in promoting equitable healthcare access, digital innovation, and inclusive employment opportunities. The findings highlighted the potential of AI-powered no-code platforms to democratize healthcare application development and foster sustainable digital health solutions.

BP0027

Automating Gold Market: An N8N–LINE Chatbot Approach

Nathaporn Utakrit[1], **Wichayaphan Traithipthomrongchoke[1]**, Pariyakorn Kanlayavinai[1], Phacharapheuek Anurak[2] and Tharit Panyaruean[3]

1: King Mongkut's University of Technology North Bangkok, Thailand

2: Deloitte, Bangkok, Thailand

3: Chulalongkorn University, Thailand

Abstract-This study validates gold's essential dual function as both a hedge and a haven instrument that mitigate portfolio risk while simultaneously maintaining cultural significance. Research findings additionally revealed that digital technologies, including gold price applications and chatbot systems, enhanced information accessibility and investment convenience, though digital inequity remains a substantial barrier. The automated system, developed using n8n and LINE chatbot, demonstrates innovation potential in creating reliable and user-friendly information channels for all consumer segments, reflecting that the gold market's future depends on both global economic factors and technological advancements supporting equitable access.

Session 6

January 10, 2026

Session 6: Machine Learning-Based Intelligent Image Analysis and Computer Vision
Venue: 3F Room 3-21 at the Building- Graduate school of information science and technology
Time: 15:30-16:45
Session Chair: Assoc. Prof. Kazuya Ueki, Meisei University, Japan

Onsite

BP5001

A Dual U-Net Framework for Sparse-View Cone-Beam CT Reconstruction with Multi-Scale Projection Refinement and Overlap-Aware Training

Chang-Chieh Cheng and Zhong-Lin Yang
National Yang Ming Chiao Tung University, Taiwan

Abstract—Sparse-view cone-beam computed tomography (CBCT) enables reduced radiation dose and faster acquisition, but reconstructing high-quality volumes from limited projections remains challenging due to severe artifacts and loss of detail. This work proposes DU-MSRNet, a dual U-Net framework that enhances sparse-view CBCT reconstruction through progressive projection refinement and overlap-aware training. DU-MSRNet consists of two stages: a projection-domain U-Net (PDU) progressively increases the number of views in the sinogram (e.g., from 100 to 800), and an image-domain U-Net (IDU) further refines the re-constructed 3D volume. To address artifacts introduced by patch-based processing, we introduce an overlap-aware loss that enforces consistency across overlapping 3D patches during training, effectively reducing stitch-ing artifacts. The method is trained and evaluated on the LDCT dataset, which contains 160 CT volumes of various anatomical regions. Experimental results show that DU-MSRNet outperforms conventional FDK, linear interpolation, and recent U-Net-based methods in both quantitative metrics and visual quality. Specifically, it achieves higher SSIM and PSNR while preserving anatomical structures and suppressing noise. DU-MSRNet provides an effective and scalable solution for sparse-view CBCT reconstruction and has potential for broader application in low-dose tomographic imaging.

BP5002

SMOGN and GWO Aided Bike Sharing Demand Prediction Model for Smart City

Wei-Cheng Huang[1], **Yu-Sian Lin[2], Yu-Chih Chiu[2]**, Her-Terng Yau[1] and Ping-Huan Kuo[2]
1: National Chung Cheng University, Taiwan
2: National Cheng Kung University, Taiwan

Abstract—In recent years, rental bikes have been introduced to many cities so that the residents can move around the city more easily. This is especially important in those traffic-congested cities. The widespread use of bikes instead of motor vehicles is effective in relieving traffic congestion in urban areas. It helps save a tremendous amount of time as well. To ensure a stable supply of rental bikes, the analysis of bike usage in order to predict the peak hours of high rental bike demand is necessary. The factors that affect bike demand include season, weather, time, etc. This paper aims mainly to find the best model that considers environmental factors for predicting bike rental demand. An AI model for predicting bike rental demand in different time intervals is also built. This study first uses the correlation coefficient method to explore the relationships between parameters and the pattern of bike rentals. Various models are tried with parameter tuning. Experiment results show the model that combines Random Forest and Extreme Gradient Boosting (XGB) is the best model. An optimization algorithm is also employed so that the model is capable of automatic parameter tuning and learning. The model is expected to be capable of predicting the bike rental demand a few hours ahead in order to tackle the bike dispatch task properly.

BP5005

Conv-Former: A lightweight CNN-Transformer for osseous metastasis classification

Swailem Neil Angelo G. Lumba, Raphael B. Alampay and Patricia Angela R. Abu
Ateneo Laboratory for Intelligent Visual Environments, Ateneo de Manila University, Philippines

Abstract—Osseous metastasis, or the spread of cancer cells from their primary site to the bones, is a challenging problem in medical imaging analysis. These challenges exist particularly when using bone scintigraphy for binary classification due to similarities in increased tracer intake, trauma, arthritis, and parts affected by metastasis. Lesions often exhibit low contrast, overlapping structures, and variable tracer uptake, complicating the accurate differentiation between normal and pathological scans. As such, early detection and proper treatment greatly aid the patient's quality of life. Existing models are often restricted to Convolutional Neural Networks (CNNs) as larger models often tend to be either too complex, struggling with overfitting and inefficiency, or too weak to capture the nuanced patterns in the data. This study proposes a binary classification model using a hybrid CNN-Transformer architecture called Conv-Former, designed for bone scintigrams. Building on global and local features, the model employs convolutions for efficiency followed by the convolutional block-attention mechanism modules, while a transformer component captures global spatial dependencies. Conv-Former achieves 95.05% specificity and 94.44% sensitivity, gaining +4% to +15% specificity and +8% to +10% sensitivity over global-local CNN implementations with 16x less parameters and

+2% specificity over the best CNN-Transformer model. The model also shows comparable performance to Magnetic Resonance Imaging solutions at a fraction of the cost. The study shows a novel approach to develop a robust, accurate, and computationally balanced solution for the detection of osseous metastases in practical clinical applications and research.

BP5011

Efficient One-Shot Attendance on the Edge: A Hybrid System for Classroom Biometrics

Sarthak Karandikar, Abhijeet Suryawanshi, Kabeer Ahmed Merchant, and Minakshi Atre
Pune Vidyarthi Griha's College of Engineering and Technology, India

Abstract—Automated attendance management is a critical application of intelligent imaging in education. This paper presents a pragmatic one-shot attendance system designed as an embedded, real-time vision system for resource- constrained edge devices like the NVIDIA Jetson Nano. Our proposed system employs a carefully architected hybrid approach, combining a classical machine learning algorithm for robust, low-latency face detection with a lightweight Siamese network for scalable one-shot recognition. The face detection module uses the computationally efficient Haar Cascade classifier for high-speed performance on edge hardware. For recognition, a purpose-built Siamese neural network is fine-tuned with a contrastive loss function to learn a discriminative 128-dimensional embedding space where Euclidean distances correspond to facial similarity. This enables accurate one-shot identification from a single reference image per student, a critical requirement for practical deployment. This hybrid architecture significantly reduces computational overhead compared to contemporary end-to-end deep learning models. We provide a comprehensive account of the system's end-to-end implementation, including a Streamlit frontend, a FastAPI backend, and seamless integration with Firebase and Google Sheets for robust data management. Extensive experiments demonstrate a 98.5% test accuracy on a custom 20-student dataset, and the model's generalizability is confirmed by a 95.8% verification accuracy on the standard Labeled Faces in the Wild (LFW) benchmark. On-device benchmarks reveal an average inference latency of just 48 ms per face, further reduced to 33 ms via post-training quantization. A rigorous comparative analysis validates that our hybrid method offers a superior trade-off between accuracy, latency, and operational scalability for edge deployment when contrasted with models like MobileNetV2 and Vision Transformers (ViT), establishing its viability as a high-performance solution for real-time biometrics in embedded applications.

BP5004-A

Artificial Intelligence in Human-Computer Interaction: A Systematic Review of Trends, Challenges, and Opportunities

Adhan Efendi[1], **Mochamad Purwanto[2]**, and Yohanes Sinung Nugroho[3]
1: National Chin-Yi University of Technology, Taiwan
2: National Taiwan University, Taiwan
3: Bandung State Polytechnic, Indonesia

Abstract—This paper presents a systematic review of the integration of Artificial Intelligence (AI) in Human-Computer Interaction (HCI). The study explores current trends, identifies major challenges, and highlights emerging opportunities for intelligent and user-centered systems. Through a PRISMA-based methodology, we analyzed 10 selected papers from IEEE, Science Direct, and MDPI databases between 2015 and 2025. The findings reveal significant growth in explainable AI (XAI), multimodal interaction, and affective computing. However, concerns regarding transparency, bias, and ethical standards remain pressing. This review contributes to understanding the evolution of AI-driven HCI and proposes directions for future research.

Session 7 (Online)

January 11, 2026 (UTC+9)

Session 7: Image Models and Intelligent Computing
Zoom ID: 892 7657 8568
Zoom link: https://us02web.zoom.us/j/89276578568
Time: 12:15-14:15
Session Chair: Dr. Napat Sukthong, Mahasarakham University, Thailand

Online (UTC+9)

BP0010

Mitigating Diversity Decline in Low-Resource Text Generation: A Rewrite-and-Select Framework with Training-Time Optimization

Leyang Lan[1,3], Jiyi Li[2] and Fumiyo Fukumoto[3] and Renjie Zhou[1]
1: Hangzhou Dianzi University, China
2: Hokkaido University, Japan
3: University of Yamanashi, Japan

Abstract-Training deep learning models with limited labeled data remains a persistent challenge across many NLP tasks, particularly when only a few dozen labeled examples are available. Existing synthetic data generation approaches often rely on post-filtering or high- temperature sampling, which either discard a large portion of generated data or introduce semantic drift. To mitigate these issues, we introduce a rewrite-and-select framework with training-time diversity optimization. Our approach promotes both structural and semantic diversity while preserving output quality under such resource-scarce conditions. Experimental results show that it consistently outperforms traditional post-filtering and high-temperature sampling strategies.

BP0014

An Explainable Machine Learning Framework for Risk Factor Analysis in Healthcare: A Case Study on Breast Cancer

Napat Sukthong
Mahasarakham University, Thailand

Abstract-This study presents a comprehensive and interpretable framework for breast cancer risk factor analysis that combines the predictive capability of machine learning (ML) with the transparency of Explainable Artificial Intelligence (XAI). Using the Wisconsin Diagnostic Breast Cancer dataset, three classification models—Logistic Regression, Random Forest, and XGBoost—were evaluated. The XGBoost model achieved the highest performance, attaining an accuracy of 97.3%, consistent with state-of-the-art benchmarks. To overcome the critical limitation of model

opacity, the SHAP (SHapley Additive exPlanations) framework was applied to generate feature-level insights and enhance interpretability. Distinct from previous SHAP-based approaches, the proposed framework integrates multi-model comparison with local interpretability validated against on cological literature. The analysis identified mean radius, perimeter mean, and concave points mean as the most influential predictors of malignancy, aligning with established histopathological and sonographic indicators of tumor morphology and aggressiveness. These findings demonstrate that high-performing, transparent AI systems can serve as reliable decision-support partners for clinicians, improving diagnostic confidence and supporting a human-in-the-loop paradigm for clinical decision-making.

BP5003

Dynamic Weighting Diffusion Model with Multi-Scale Feature Fusion for Low-Light Image Enhancement

Ming Wang[1,2], Xiuqi Tang[1,2], Lingyu Zhai[1,2] and Pengfei Fan[1]
1: Xi'an Jiaotong-Liverpool University, China
2: University of Liverpool, UK

Abstract—Low light image enhancement is vital for night surveillance, security monitoring, and nighttime photography, where low contrast, high noise, and color distortion are pervasive. Traditional approaches—histogram equalization, gamma correction, Retinex—often over amplify noise or blur textures, while CNN and GAN based methods demand large paired datasets and can suffer from instability. Denoising Diffusion Probabilistic Models (DDPMs) offer a stable, iterative denoising framework that produces high quality, artifact free images. In this work, we customize DDPMs for low light enhancement with two key innovations: (1) a dynamic weighting strategy that transitions emphasis from global illumination recovery in early diffusion steps to local detail refinement in later steps, implemented via fixed cosine/sine schedules, linear interpolation, or a learnable network; and (2) a multi scale feature injection module that integrates coarse and fine image representations at each denoising stage. Evaluated on the LOL benchmark, a dataset with real-world paired low-light and normal-light images, our method matches or surpasses the CLE Diffusion (Yin et al., 2023) baseline and other state of the art techniques in PSNR, SSIM, and perceptual metrics. Fixed cosine/sine scheduling delivers the most stable and interpretable performance, while the learnable variant suggests avenues for future data driven optimization. This work establishes a flexible, high fidelity diffusion pipeline for practical low light image enhancement.

BP5006

LoRA Fine-Tuning of Stable Diffusion XL for Multi-Person Image Synthesis

Haicheng Zhu[1], Chenkai Li[2], Minghao Gao[3] and Qiu Jin[4]
1: Communication University of China, China
2: Tongji University, China
3: Zhejiang University, China
4: Huazhong Agricultural University, China

Abstract—We present a parameter-efficient fine-tuning framework that augments Stable Diffusion XL (SDXL) with Low-Rank Adaptation (LoRA) modules and structured multi-modal guidance—namely human-pose and person-count priors—to enhance fidelity and control in multi-person scene generation. By injecting trainable low-rank updates into the U-Net backbone and fusing dual CLIP embeddings with normalized pose keypoints and learned count embeddings, our method enforces semantic alignment, perceptual quality, and structural correctness under limited adaptation budgets. We introduce a unified loss combining noise prediction, CLIP similarity, LPIPS, pose-consistency, and count-error terms, and demonstrate significant gains over the SDXL baseline: +0.8 % in CLIP score, +11.6 % in ImageReward, +11 % in people-count accuracy, and +43 % in hand-generation correctness on an interactive human-scene benchmark. Our approach requires updating <1 % of model parameters, offering a practical pathway for customizing large-scale diffusion models to specialized spatial tasks without full retraining.

BP5008

Coarse-to-Fine 3D Face Modeling with Photometric Consistency Optimization

Zhao Yaopu, Gong Guanghong and Li Ni
Beihang University, China

Abstract—Reconstructing three-dimensional (3D) facial geometry from two-dimensional (2D) images remains a fundamental challenge in computer vision due to its ill-posed nature and vulnerability to occlusions. While classical 3D Morphable Models (3DMMs) and learning-based approaches have shown promise, they often fall short in capturing fine-level facial details. In this work, we propose a coarse-to-fine 3D face reconstruction framework that integrates photometric consistency optimization and a UV position map representation. Our method follows a two-stage training strategy: pre-training on a synthetic dataset to learn general facial structures, followed by fine-tuning on a smaller set of high-resolution 3D scans to improve realism and accuracy. A photometric consistency loss, supervised through left-right paired views, is introduced to further refine texture recovery and geometric fidelity. Experimental results on our custom test set demonstrate that the proposed approach achieves superior detail recovery and accuracy compared to several well-established baseline methods.

BP3002

A Real-Time Mobile System for Ground-Based Cloud Classification Using Lightweight Models

Yurui Dai[1], Jieying Shen[2] and Jiying Liu[3]
1. Anhui University, China
2. Communication University of China, China
3. Harbin Institute of Technology, Shenzhen, China

Abstract-Cloud classification plays a vital role in weather forecasting, environmental monitoring, and atmospheric science. Traditional methods rely on human observers, which are labor-intensive and subjective. Al- though the ubiquity of smartphones enables large-scale acquisition of ground-based cloud images, existing deep learning approaches face significant challenges in real- world deployment. Current datasets often suffer from geographic bias, non-sky elements, and high intra-class variability, while models exhibit limited generalization under uncontrolled imaging conditions. To address these issues, this study proposes a real-time mobile cloud classification system that integrates lightweight deep learning models with collective intelligence. The system employs a rigorous data preprocessing pipeline, including chromatic filtering and sky segmentation, to enhance input quality. We evaluate the approach on benchmark datasets such as SWIMCAT and CCSN, us- ing both DeepCloud and triplet-based models. Experi- mental results demonstrate that the proposed method improves classification accuracy and robustness, facili- tating practical deployment in citizen science applications. The framework not only advances mobile cloud recognition but also provides a scalable solution for participatory environmental monitoring.

BP0056

Lightweight Deep Learning for Automated Stroke Detection in Non-Contrast CT Imaging

Kantapat Kwansomkid, Kharittha Jangsamsi and Sanan Srakaew
King Mongkut's University of Technology Thonburi, Thailand

Abstract-Stroke remains a major global cause of mortality and long-term disability, underscoring the need for rapid and reliable diagnostic support. Non-Contrast Computed Tomography (NCCT) is the first-line imaging modality in emergency settings, yet early ischemic changes often appear as subtle hypoattenuation, contributing to inter-observer variability and delayed diagnosis. This study presents StrokeNet-CT, a lightweight deep learning framework for automated binary stroke detection that distinguishes normal NCCT scans from stroke-affected cases. Built upon the MobileNetV2 architecture, the model leverages transfer learning to mitigate the scarcity of annotated medical data while maintaining a compact footprint suitable for real-time clinical workflows. The system was trained on 6,650 NCCT images and evaluated on an independent test set, achieving an accuracy of 95.78%, precision of 97.97%, recall of 89.35%, and F1-score of 93.46%. The high precision indicates minimal false-positive rates, supporting its use in reducing alert fatigue in clinical workflows. Although the dataset combines ischemic and hemorrhagic strokes without subtype annotation, the

proposed framework demonstrates strong potential as an efficient triage-assist tool, particularly in resource-constrained or time-critical environments.

BP5007-A

High-speed nanoscale microscopy in three dimensions

Andrew Harvey, Weilun Sun, Daniel Olesker, Jonathon Taylor and Conall Thompson
University of Glasgow, United Kingdom

Abstract—Conventional approaches to microscopy record essentially two-dimensional images with a trade between transverse resolution and depth of field. Advances in computational imaging, using engineered point-spread functions have enabled an increase in depth of field, but generally with poor image quality arising from axial variations in the point-spread function. We report how the axial variations in Airy beams can be exploited to enable diffraction-limited, aberration-free 3D microscopy in a single snapshot for imaging of both 3D surfaces and 3D volumes. Localisation microscopy of point emitters enables microscopy with nanoscale nanoscale resolution and when implemented with various exotic point-spread functions this can be extended to 3D imaging. We will show how 3D locational microscopy based on Airy beams can enable much higher emitter densities, which enables the essential high-speed 3D measurement required in applications ranging through fluid dynamics, cardio-vascular monitoring and single-molecule imaging.

Conference Recommendations

Conference Name: 2026 8th International Conference on Image, Video and Signal Processing (IVSP 2026)- https://ivsp.net/

Conference date: **March 17-19, 2026**

Conference venue: **Meiji University Surugadai Campus, Tokyo, Japan**

The accepted and registered papers can be published in the **IVSP 2026 SPIE Conference Proceedings**, which will be included in SPIE Digital Library and indexed by Ei Compendex, Scopus.

Keynote Speakers: Prof. Xudong Jiang (IEEE Fellow), Nanyang Technological University, Singapore; Prof. Gonzalo Arce (IEEE Life Fellow / SPIE fellow/ AAIA fellow), University of Delaware, USA and Prof. Tae-Kyun Kim, Korea Advanced Institute of Science and Technology, Korea

Submission method: https://www.zmeeting.org/submission/IVSP2026

E-mail: ivsp@acm-sg.org

Submission Deadline	**January 15, 2026**

Conference name: 2026 14th International Conference on Information Management and Engineering (ICIME 2026) - https://icime.org/

Conference date: **August 5-7, 2026**

Conference venue: **Keio University, Japan (Yagami Campus)**

Accepted and registered papers will be published in Conference Proceedings, which will be submitted for indexing to **Ei Compendex, Scopus**.

Keynote speakers: Prof. Irwin King, The Chinese University of Hong Kong (ACM Fellow, IEEE Fellow, INNS Fellow and AAIA Fellow) and Prof. Zheng Yan, Xidian University, China (IEEE Fellow, IET Fellow, AAIA Fellow, and AIIA Fellow)

Submission method: https://www.zmeeting.org/submission/ICIME2026

Email: icimeinfo@163.com

Submission Deadline	**February 5, 2026**

Note

Note