**Advanced Program**

### **ICIS2024**

6th International Conference

On

**Intelligence Science**

October 25-28, 2024

Nanjing, China

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### **Advanced Program**

### 6th International Conference on

**IntelligenceScience**（**ICIS2024**）

October 25-28, 2024

Nanjing, China

**Sponsored by**

Chinese Association for Artificial Intelligence (CAAI)
China Chapter under International Society for Information Studies

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###### Keynotes Speakers

Ⅰ The Law of Paradigm Revolution for Emerging Discipline

Zhong Yixin

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**Abstract:** The paradigm for a discipline is defined as the scientific worldview and its methodology observed by that discipline and is thus the supreme force regulating the research of the discipline. It can only be summarized from the practice of that discipline and will be established far lag behind than the occurrence of that discipline. As result, an emerging discipline will have no its own paradigm available in the initial stage of its development and should borrow a paradigm from other discipline existed already. Consequently, the borrowed paradigm for an emerging discipline will mismatch with its research needs, leading the emerging discipline being in an abnormal state of development. To walk out from the abnormal development, the paradigm for emerging discipline should be summarized. And then the replacement of the paradigm borrowed by its own paradigm should be carried out. This is so-called the paradigm revolution in emerging discipline. Artificial intelligence (AI in brief) is an emerging discipline for the present time. Therefore, the paradigm revolution in AI is absolutely necessary.

**Bio-Sketch:** Yixin Zhong, professor at AI School, Beijing University of Posts and Telecommunications (BUPT for short), Beijing 100876, China. The major interests for his teaching and research include Communication Theory, Shannon Theory, Information Science, Artificial Neural Network, Artificial Intelligence. He has published over 520 papers in above areas (most in Chinese) and 16 manuscripts, such as Principles of Artificial Intelligence (2007), Principle of Advanced AI (2014), Theory of Artificial Intelligence based on the Mechanism of Intelligence Creation (2021), General Theory of Intelligence (2023), and etc.

 He has served as Associate Editor for IEEE Trans on Neural Network (1993-2005), President of China Association for Artificial Intelligence (2001-2010), Vice President of World Federation of Engineering Organizations (WFEO) (2007-2010), Chief Editor for the book series on Intelligence Science and Technology (2013-2018), Chair of China Chapter under the International Society for the Study of Information (2016 - ), President of AI Institute for Jinan University (2017 - ), President of International Society for the Study of Information (2021-2023).

**Ⅱ Complex Systems Approaches to Diseases, Climate Change, and the Future: Why Now? Why AI?**

Jiming Liu

### Department of Computer Science, Hong Kong Baptist University

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**Abstract:** The intelligent interpretation of high-resolution remote sensing images is a technological high point that countries all over the world compete for. However, the high-resolution observation requirement brings difficulties to efficient target information acquisition, and the multi-scale singularity, complexity and diversity of targets greatly increase the difficulty of target modeling and target information learning and identification. Visual perception and brain cognition (sparseness, learning, selectivity and directionality) provide ideas for efficient and accurate high-resolution remote sensing image perception and interpretation. Drawing on the mechanism of biological visual cognition and perception, the acquisition (sense), interpretation (knowledge) and application (use) of high-resolution remote sensing information are studied..

**Bio-Sketch:** Professor Jiming Liu is a Chair Professor in Computer Science (since 2010), and the Associate Vice-President (Research Development) (since 2022), at Hong Kong Baptist University (HKBU), where he and his team conduct funded research projects on AI, Autonomy-Oriented Computing & Machine Learning, as well as Computational Epidemiology, while at the same time engaging in the real-world challenges/initiatives of AI and Data Science-enabled disease control.

Invited Speakers

Ⅰ Exploring Statistical Learning in Multi-View Deep Joint Subspace Analysis

Pradipta Maji

Machine Intelligence Unit, Indian Statistical Institute, Kolkata, India

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**Abstract:** Multi-view data analysis is an important machine learning paradigm, which ex-plores the consistency and complementary properties of multiple views to discov-er patterns hidden in data. One of the important issues associated with real-life high-dimensional multi-view data is how to integrate relevant and complementary information from multiple views, while generating discriminative joint subspaces for analysis. Although the integration of multi-view data is expected to provide an intrinsically more powerful model than its single-view counterpart, it poses its own set of challenges. The most important problems associated with multi-view data analysis are the handling heterogeneous nature of different views and high-dimension low-sample size nature of individual views, selection of relevant and complementary views while generating discriminative joint subspaces for analy-sis, and capturing the lower dimensional non-linear geometry of each view. In a multi-view scenario, it is expected that the joint subspace should be learned in such a way that the similarity in the latent space implies the similarity in the corre-sponding concepts. The joint subspace should also reflect the intrinsic properties of each of the individual views and should efficiently capture the non-linear cor-related structures across different views. In this regard, some novel deep learning algorithms will be discussed, which are developed based on the theory of statisti-cal learning. The theory of canonical correlation analysis is judiciously integrated with the learning objective of the multimodal discriminative deep Boltzmann ma-chine to learn a joint subspace from the maximally correlated subspaces, while the concept of Hilbert-Schmidt independence criterion helps to encapsulate the cross-view dependency in terms of consensus and/or complementary knowledge from the input pairs of views. Based on the Bayes error analysis, an upper bound on the error probability of the novel deep models is estimated, which facilitates de-termining the optimal architectures of the models.

**Biography** Pradipta Maji received the B.Sc. (Hons.) degree in physics and M.Sc. degree in electronics science from Jadavpur University, India, in 1998 and 2000, respectively.,Currently, he is a Research Scholar in the Department of Computer Science and Technology, Bengal Engineering College (DU), West Bengal, India. His research interests include cellular automata, pattern recognition, data mining, soft computing, artificial intelligence.(Based on document published on 14 October 2003).

**Ⅱ Application Cases of Intelligent Techniques for Sustainable Cities**

Tianrui Li

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**Abstract:** With the rapid development of urbanization, massive data has been accumulated around urban management related fields. Sustainable urban management has entered the era of big data intelligence. How to effectively obtain useful knowledge from these big data by deep mining and intelligent learning techniques has become the key problem to be solved in the current sustainable urban development. This report focuses on application cases of intelligent techniques for sustainable cities, e.g., urban taxi route recommendations, rental sug-gestions, ambulance deployment strategies, food delivery optimization, and subway stop scheduling. It concludes by discussing the challenges of sustainable urban big data analysis.

**Biography** Tianrui Li (Senior Member, IEEE) received the BS, MS, and PhD degrees from Southwest Jiaotong University, Chengdu, China, in 1992, 1995, and 2002, respectively. He was a postdoctoral researcher with Belgian Nuclear Research Centre, Mol, Belgium, from 2005 to 2006, and a visiting professor with Hasselt University, Hasselt, Belgium, in 2008; University of Technology, Sydney, Australia, in 2009; and University of Regina, Regina, Canada, in 2014. He is currently a professor and the director of the Key Laboratory of Cloud Computing and Intelligent Techniques, Southwest Jiaotong University, China. He has authored or coauthored more than 300 research papers in refereed journals and conferences. His research interests include Big Data, machine learning, data mining, granular computing, and rough sets.

Ⅲ Towards brain-like machine intelligence with large-scale spiking neural networks

Yonghong Tian

School of Computer Science, School of Electronics and Computer Engineering, Peking University

Network Intelligence Research, Pengcheng Laboratory

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**Abstract:** The brain’s structure and functions have long served as a wellspring for advancements in intelligent technologies throughout human history. Brain-inspired spiking neural networks (SNNs) emulate neural dynamics through event-based computations, effectively capturing temporal information for brain-like, energy-efficient processing. Currently, SNNs have found successful applications in diverse fields such as image recognition and object detection, poised to potentially revolutionize artificial intelligence. However, the scalability of SNNs has remained limited, impeding further performance enhancements and their practical deployment. Therefore, developing methods and theories for constructing large-scale SNNs is crucial to unlocking their full potential. In this presentation, I will discuss recent breakthroughs in the development of large-scale SNNs, covering advancements in spiking neuron technologies, network architectures, algorithms, programming frameworks, and applications in neuromorphic computing

**Bio Sketch:** Yonghong Tian (S’00-M’06-SM’10-F’22) is currently the Dean of School of Electronics and Computer Engineering, a Boya Distinguished Professor with the School of Computer Science, Peking University, China, and is also the deputy director of Artificial Intelligence Research, PengCheng Laboratory, Shenzhen, China. His research interests include neuromorphic vision, distributed machine learning and AI for Science. He is the author or coauthor of over 350 technical articles in refereed journals and conferences such as Neture Communications, Science Advances, IEEE TPAMI, IJCV, ICML, NeuIPS etc. Prof. Tian was an Associate Editor of IEEE TCSVT (2018.1-2021.12), IEEE TMM (2014.8-2018.8), IEEE Multimedia Mag. (2018.1-2022.8), and IEEE Access (2017.1-2021.12). He co-initiated IEEE Int’l Conf. on Multimedia Big Data (BigMM) and served as the TPC Co-chair of BigMM 2015, and aslo served as the Technical Program Co-chair of IEEE ICME 2015, IEEE ISM 2015 and IEEE MIPR 2018/2019, and General Co-chair of IEEE MIPR 2020 and ICME2021. He is a TPC Member of more than ten conferences such as CVPR, ICCV, ACM KDD, AAAI, ACM MM and ECCV. He was the recipient of the Chinese National Science Foundation for Distinguished Young Scholars in 2018, two National Science and Technology Awards and three ministerial-level awards in China, and obtained the 2015 EURASIP Best Paper Award for Journal on Image and Video Processing, and the best paper award of IEEE BigMM 2018, and the 2022 IEEE SA Standards Medallion and SA Emerging Technology Award. He is a Fellow of IEEE, a senior member of CIE and CCF, a member of ACM.

**Overview of Technical Program**

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| **October 25 Friday** |
| 8:00-18:00 | Registration |
| 19:00 - 21:00 | IAIS Meeting (Yixin Zhong(钟义信), Huacan He(何华灿), Peizhuang Wang(汪培庄), Zhongzhi Shi(史忠植), Liqun Han(韩力群), Yanning Zhang(张艳宁), Kun Wu(邬焜)，Kang Ouyan(欧阳康)) |
| **October 26 Saturday** |
| 9:00-9:15 | **ICIS2024 Opening Ceremony** | Conference Room: ICIS2024 RoomA |
| 9:15-10: 00 | **Plenary Session 1** | Conference Room: ICIS2024 RoomA |
| 10:00-10:30 | Coffee Break |
| 10:30-12:00 | **Plenary Session 2** | Conference Room: ICIS2024 RoomA |
| 12:00-13:30 | Lunch Break |
| 13:30-15:30 | **Session A1**Machine Leaning Conference Room: ICIS2024 RoomA | **Session B1**Causal Reasoning Conference Room: ICIS2024 RoomB |
| 15:30-16:00 | Coffee Break |
| 16:00-18:00 | **Session A2**Large Language Model & Intelligent Robot Conference Room: ICIS2024 RoomA | **Session B2**Peceptual IntelligenceConference Room: ICIS2024 RoomB |
| **Sunday October 27** |
| 9:00-10:30 | **Plenary Session 3** | Conference Room: ICIS2024 RoomA |
| 10:30-11:00  | Coffee Break |
| 11:00-12:00 | **Plenary Session 4**Conference Room: ICIS2024 RoomA | Conference Room: ICIS2024 RoomA |
| 12:00-13:30 | Lunch Break |
| 13:30-15:30 | **Session A3**AI for Science Conference Room: ICIS2024 RoomA | **Session B3**Medical Artificial Intelligence Conference Room: ICIS2024 RoomB Conference Room: ICIS2024 RoomA |
| 15:30-16:00 | Coffee Break |
| 16:00-18:00 | **Session A4**IAIS （International Academy of Information Scince）Conference Room: ICIS2024 RoomA | **Session B4**Intelligence Science Conference Room: ICIS2024 RoomB |

**ICIS2024 RoomA**

Conference ID: 889 8638 2322（ZOOM）

Password:388707

Link: https://us06web.zoom.us/j/88986382322?pwd=Q3VKWFJWQ0Q4Q0xlRmRHc3k3SGxDdz09

**ICIS2024 RoomB**

Conference ID: 823 1373 4722（ZOOM）

Password: 444534

Link: https://us06web.zoom.us/j/82313734722?pwd=ak1CNnVORWpGaFkxMWcva0s5aXdWZz09

**Technical Program**

**Friday October 25, 2024**

8:00am – 6:00pm: Registration

**Saturday October 26, 2024**

**9:00am-9:15am: ICIS2024 Opening Ceremony**

**Chair: Jinhui Tang, Organization Chair**

**Conference Room: ICIS2024 RoomA**

Mengyin Fu: Greetings from General Chairs , Welcome from Nanjing University of Science and Technology

Zhongzhi Shi: Introduction to ICIS2024 Program

**9:15-10: 00 :Plenary Session 1 Keynotes**

**Chair: Zhongzhi Shi**

**Conference Room: ICIS2024 RoomA**

Yixin Zhong: The Law of Paradigm Revolution for Emerging Disciplime

**10:00am-10:30am Coffee Break**

**10:30am-12:00am: Plenary Session 2 Keynotes**

**Chair:** Haofeng Zhang

**Conference Room: ICIS2024 RoomA**

Jiming Liu: Complex Systems Approaches to Diseases, Climate Change, and the Future: Why Now? Why AI?

**12:0**0**pm-1:30pm: Lunch Break**

**1:30pm– 3:30pm: Parallel Sessions**

**Session A1: Machine Leaning （1）**

**Chair: Jinwen Ma**

**Conference Room: ICIS2024 RoomA**

1. Difference-Enhanced Learning of the Deep Semantic Segmenta-tion Networks for First Break Picking

 *Zhongyang Wen and* *Jinwen Ma*

2. A Framework of Reinforcement Learning for Truncated L´evy Flight Exploratory

*Quan Liu, Shile Feng and Zixian Gu*

3. Detection of depression in EEG Signals Based on Convolutional transformer and adaptive transfer learning

*Qianqian Tan and Minmin Miao*

4. Twin Bounded Least Squares Support Vector Regression

 *Ran Chen, Muhan Liu and Jinwen Ma*

**Session B1: Causal Reasoning**

**Chair:** *Chuyu Xiong*

**Conference Room: ICIS2024 RoomB**

1. Research on the Causal Forest Algorithm based on Factor Space Theory

*Fanhui Zeng, Kaile Lin, Xiaotong Liu, Pengxue Zhang and Sixing Ren*

2. Superpositioner – A Non-logical Computation Model

*Chuyu Xiong*

3. Factor Analog Reasoning Model and its Solution Research

*Tianyuan Wang , Fanhui Zeng and Sixing Ren*

4. Research on Factor Support Vector Multi-classification Algorithm based on Factor Space Theory

*Kaijie Zhang, Fanhui Zeng, Jiaxin Li*

**3:30pm-4:00pm: Coffee Break**

**4:00pm-6:00pm: Parallel Sessions**

**Session A2: Large Language Model & Intelligent Robot**

**Chair:** Chungi Shi

**Conference Room: ICIS2024 RoomA**

1. Improve LLM Inference Performance with Matrix Decomposition Strategies

*Jiyuan Shi and Chunqi Shi*

2. Trajectory Prediction of Unmanned Surface Vehicle Based on Improved Transformer

*Zhipeng Cheng, Jian Yu, Junyu Chen, Jihuan Ren, and Xiang Wu*

3. Deep Neural Network Based Relocalization of Mobile Robot in Visual SLAM

*Azhar Muhammad Hamza, Chaoxia Shi , and Yanqing Wang*

4. A Vision-Based Method for UAV Autonomous Landing Area Detection

 *Qiutong Zhang, Qingyuan Xia, Lisheng Wei, Bohai Deng*

**Session B2: Peceptual Intelligence**

**Chair:** Zhenmin Tan

**Conference Room: ICIS2024 RoomB**

1. Research on Object Detection for Intelligent Sensing of Navigation Mark in Yangtze River

 *He, Pinfu Yang, Xiaofeng Zou, Shengli Zhang, Shuqing Cao, and Chaohua Gan*

2. Cascaded Sliding-Window-based Relativistic GAN Fusion for Perceptual and Consistent Video Super-Resolution

 *Dingyi Li*

*3*. Integration of Raman Spectroscopy, On-line Microscopic Imaging and Deep learning-based Image Analysis for Real-time Monitoring of Cell Culture Process

 *Xiaoli Wang, Guangzheng Zhou, and Xue Zhong Wang*

4. DRL-SLAM: Enhanced Object Detection Fusion with Improved YOLOv8

*Farooq Usman, Chaoxia Shi, and Yanqing Wang*

5. Driver Fatigue Recognition Based on EEG Signal and Semi-Supervised Learning

 *Lin Chen and Xiaobo Chen*

6.SC-EcapaTdnn : ECAPA-TDNN with Separable Convolutional for Speaker Recognition

 *Erhua Zhang, Yifan Wu and Zhenmin Tang*

**Sunday October 27**

**9:00-10:30 Plenary Session 3**

**Chair: Zhongzhi Shi**

**Conference Room: ICIS2024 RoomA**

Pradipta Maji: Exploring Statistical Learning in Multi-View Deep Joint Subspace Analysis

**10:00am-10:30am Coffee Break**

**10:30am-12:00am: Plenary Session 4**

**Chair: Zechao Li**

**Conference Room: ICIS2024 RoomA**

Tianrui Li：Application Cases of Intelligent Techniques for Sustainable Cities

Yonghong Tian：Towards brain-like machine intelligence with large-scale spiking neural networks

**12:0**0**pm-1:30pm: Lunch Break**

**1:30pm– 3:30pm: Parallel Sessions**

**Session A3:** **AI for Science**

**Chair:** Kai Zhang

**Conference Room: ICIS2024 RoomA**

1. Evolving Financial Markets: The Impact and Efficiency of AI-Driven Trading Strategies

*Zhiyi Liu, Kai Zhang, Deyu Miao*

2. DSFM Method: A New Approach to Enhancing Discrimination Ability on AI-Generated Datasets

*Bin Wang, Wenhao Wang, Pingping Wang, Jinyu Cong, Jian Wang and Benzheng Wei*

**Session B3: Medical Artificial Intelligence**

**Chair:** Yang Gao

**Conference Room: ICIS2024 RoomB**

1. Enhancing Weakly Supervised Medical Segmentation via Heterogeneous Co-training with Box-wise Augmentation and Pseudo-label Filtering

*You Wang, Lei Qi, Qian Yu, Yinghuan Shi, and* *Yang Gao*

2. FCGA-Former: A Hybrid Factor Space Classification Model for Predicting the Tumor Mutation Burden of Lung Adenocarcinoma

*Zi Ang Cai and Han Zhang and Ziyi Yang and Xiaoyan Zhang*

**3:30pm-4:00pm: Coffee Break**

**4:00pm-6:00pm:**

**Session A4: Machine Learning （2）**

**Chair:** Yaru Liu

**Conference Room: ICIS2024 RoomA**

1. MLEE: Event Extraction as Multi-Label Classification Task at Token Level

 *Jinshun Yang, Shuangxi Huang, and Mingfeng Huang*

2. Research on Improvement of Sweeping Learning Chain Algorithm Based on Factor Space Theory

*Yaru Liu,Fanhui Zeng and Sihang Ren*

3. End-to-End Control of a Quadrotor Using Gaussian Ensemble Model-Based Reinforcement Learning

*Qiwen Zheng, Qingyuan Xia, Haonan Luo, Bohai Deng and Shengwei Li*

**Session B4: Intelligence Science**

**Chair:** Haofeng Zhang

**Conference Room: ICIS2024 RoomB**