

# 12th International Conference on Information Science and Technology

## ICIST2022 Final Program



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## Welcome Messages

On behalf of the Organizing Committee of the 12th International Conference on Information Science and Technology (ICIST2022), we welcome you to attend this event taking place in Kaifeng, Henan, China, during October 14-16, 2022. Thanks to the success of the previous events, ICIST has become a well-established series of popular and high-quality conferences on information science and technology. ICIST2022 aimed to provide a high-level international forum for scientists, engineers, and educators to present the state of the art of neural network research and applications in related fields. The conference also featured plenary speeches given by world-renowned scholars, regular sessions with broad coverage, and special sessions focusing on popular topics.

As a common practice, each submission was reviewed by at least two, and on average three, program committee members or reviewers. After rigorous peer reviews, the committee decided to accept 62 papers for publication in the proceedings. These papers cover many topics on theory, methodology, and applications. In addition to the contributed papers, the technical program included two keynote speeches by renowned scholars: Prof. Zongben Xu (Member of the Chinese Academy of Sciences) at Xi'an Jiaotong University & Pazhou Laboratory, Guangzhou) and Prof. Dacheng Tao (IEEE Fellow, ACM Fellow, Fellow of Australian Academy of Science) at University of Sydney and JD Academy.

Many organizations and volunteers made great contributions toward the success of this conference. We would like to express our sincere gratitude to Henan University for its sponsorship, City University of Hong Kong, and Huanghe Science and Technology College for their co-sponsorship, and the IEEE Systems, Man and Cybernetics Society for its technical co-sponsorship. We would also like to sincerely thank all the committee members for their great efforts in organizing the conference. Special thanks to the Program Committee members and reviewers whose insightful reviews and timely feedback ensured the high quality of the accepted papers and the smooth flow of the conference. Finally, we would like to thank all the speakers, authors, and participants for their support.

Baojun Qiao, Jun Wang, General Chairs

Hanxiong Li, Kaili Shao, Xianyu Zuo, Organizing Chairs

Qinmin Yang, Zhihui Zhan, Program Chairs

# Organization

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Jun Wang, City University of Hong Kong, Hong Kong

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Kaili Shao, Huanghe Science and Technology College, Henan, China  
Xianyu Zuo, Henan University, Kaifeng, Henan, China

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Zhihui Zhan, South China University of Technology, Guangzhou, Guangdong, China

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Xiaofang Liu, Nankai University, Tianjin, China  
Yifei Sun, Shaanxi Normal University, Xian, Shaanxi, China

## Registration Chairs

Shenshen Gu, Shanghai University, Shanghai, China  
Hai Huan, Nanjing University of Information Science and Technology, Nanjing, China  
Yang Liu, Henan University, Kaifeng, Henan, China  
Shaofu Yang, Southeast University, Nanjing, China

## Local Arrangements Chair

Yadi Wang, Henan University, Kaifeng, Henan, China

## Program Committee

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Bo	Zhao	Beijing Normal University
Yanzheng	Zhu	Huaqiao University

## Program at a Glance

October 15, 2022 (Saturday)		
14:00-14:15	<b>Opening Ceremony @ Tencent Meeting</b>	
14:15-15:15	<b>Plenary Speech I: Prof. Zongben Xu</b>	
15:15-15:30	Tea break	
15:30-16:30	<b>Plenary Speech II: Prof. Dacheng Tao</b>	
18:00-19:30	Dinner	
October 16, 2022 (Sunday)		
	<b>Parallel Sessions @Tencent Meeting</b>	
8:20-10:00	<b>S1: Information Processing</b>	<b>S2: Prediction and Forecasting</b>
10:00-12:00	<b>S3: Control Systems</b>	<b>S4: Intelligent Systems</b>
12:00-13:00	Lunch break	
13:00-15:00	<b>S5: Pattern Recognition</b>	<b>S6: Machine Learning</b>
15:00-16:20	<b>S7: Network Systems</b>	<b>S8: Optimization Methods</b>

**Link to enter the opening ceremony and plenary session:**

**<https://meeting.tencent.com/dm/v7xs13mIBhqf>**

**Meeting code: 885-337-074**

**ICIST2022**


**885 337 074**

**13:45 — 3小时15分钟 — 17:00**

2022年10月15日(GMT+08:00)2022年10月15日



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 **腾讯会议**

## Plenary Speech I

### Title: On Presuppositions of Machine Learning: A Best-fitting Theory

**Professor Zongben Xu,**

Xi'an Jiaotong University, China

Member of the Chinese Academy of Sciences

**Abstract:** Machine learning has been applied with a set of prerequisites or hypotheses, the optimal setting of which is a 'the chicken or the egg' problem. Those hypotheses include in particular (i) the Large Capacity Hypothesis on hypothetical space, (ii) the Independence Hypothesis on loss function, (iii) the Completeness Hypothesis on training data, (iv) the Prior-Determine-Regularizer Hypothesis on regularization terms, and (v) the Euclidean Hypothesis on analysis framework. We analyze the role, effect, and limitations of those hypotheses in this talk, and propose a systematic way, could name a best-fitting theory, to break through each of the hypotheses. More specifically, we propose the model-driven deep learning approach to burst the Large Capacity Hypothesis, develop a noise modeling principle to breach the Independence Hypothesis, suggest the axiomatic curriculum/self-paced learning approach for the Completeness Hypothesis, the implicit regularization method for the Prior-Determine-Regularizer Hypothesis, and Banach space geometry for the Euclidean Hypothesis. In each case, we show the best-fitting strategy and substantiate the value and outcome of the breaking through. We also show that the continuing effort to bursting the hypotheses of ML is needed, which is then opening new hot directions of ML research.



Zongben Xu was born in 1955. He received his Ph.D. degree in mathematics from Xi'an Jiaotong University, China, in 1987. His current research interests include applied mathematics and mathematical methods of big data and artificial intelligence. He established the  $L_{1/2}$  regularization theory for sparse information processing. He also found and verified Xu-Roach Theorem in machine learning, and established the visual cognition-based data modeling principle, which has been widely applied in scientific and engineering fields. He initiated several mathematical theories, including the non-logarithmic transform-based CT model, and ultrafast MRI imaging, which provides principles and technologies for the development of a new generation of intelligent medical imaging equipment. He is the recipient of the Tan Kan Kee Science Award in Science Technology in 2018, the National Natural Science Award of China in 2007, and the winner of the CSIAM Su Buchin Applied Mathematics Prize in 2008. He delivered a 45-minute talk at the International Congress of Mathematicians 2010. He was elected as a member of the Chinese Academy of Sciences in 2011.

Zongben Xu was the vice-president of Xi'an Jiaotong University. He currently makes several important services for government and professional societies, including the director of Pazhou Lab (Guangzhou), the director of the National Engineering



Laboratory for Big Data Analytics, a member of the National Big Data Expert Advisory Committee and the Strategic Advisory Committee member of the National Open Innovation Platform for New Generation of Artificial Intelligence.

## Plenary Speech II

**Title: More Is Different: ViTAE elevates the art of computer vision**

**Professor Dacheng Tao**, the University of Sydney, Sydney, Australia  
Fellow of the Australian Academy of Science, AAAS Fellow, ACM Fellow, and  
IEEE Fellow

**Abstract:** Deep learning has witnessed remarkable success in many application domains and is now shifting towards training super deep models with extremely large-scale labeled or unlabeled data on expensive computational resources. In this talk, I will present some of the recent progress. Specifically, I will first show the PAC-Bayes generalization bounds and present some practical implications for new algorithm designs. Then, I will propose an efficient architecture design for visual transformers, named ViTAE, by exploring the intrinsic inductive biases. Next, he will introduce a novel self-supervised training method called RegionCL, which uses a simple region swapping strategy to build effective supervisory signals from rich positive/negative pairs at both the instance level and the region level. It greatly advances the ability of representative self-supervised learning frameworks including MoCo, SimCLR, and SimSam. Finally, some promising applications of visual transformers and self-supervised learning will be presented, including image classification, object detection, semantic segmentation, and pose estimation.



Dacheng Tao is the Inaugural Director of the JD Explore Academy and a Senior Vice President of JD.com. He is also an advisor and chief scientist of the digital science institute in the University of Sydney. He mainly applies statistics and mathematics to artificial intelligence and data science, and his research is detailed in one monograph and over 200 publications in prestigious journals and proceedings at leading conferences. He received the 2015 Australian Scopus-Eureka Prize, the 2018 IEEE ICDM Research Contributions Award, and the 2021 IEEE Computer Society McCluskey Technical Achievement Award. He is a fellow of the Australian Academy of Science, the World Academy of Sciences, the Royal Society of NSW, AAAS, ACM, IAPR, and IEEE.

**Online Sessions:** The online session platform is the Tencent Meeting (VooV outside mainland China (<https://voovmeeting.com/>))

**October 16, 2022 (Sunday): 8:20-10:00**

**Meeting ID: 608-577-458**

**Meeting link: <https://meeting.tencent.com/dm/HwYern4PWVhf>**

**Chairs: Wing Ng and Jianchao Fan**

<b>Time</b>	<b>Session 1: Information Processing</b>
8:20 — 8:40	Wing Ng, Yongzhi Xu, Xing Tian, Yuxiang Yang, Haotian Wu and Ying Gao Improved Bloom Filter for Efficient Image Retrieval on Mobile Device
8:40 — 9:00	Xueli Zhang, Wing Ng and Ting Wang Robust Self-Attention ConvLSTM-based Traffic Flow Prediction Model
9:00 — 9:20	Guanghu Kuang, Jichao Wang, Jianchao Fan and Jun Wang Marine Aquaculture Information Extraction from Optical Remote Sensing Images Based on MDOAU2-net
9:20 — 9:40	Shuai Zhang, Jun Xing, Xinzhe Wang, and Jianchao Fan Improved YOLOX-S Marine Oil Spill Detection Based on SAR Images
9:40 — 10:00	Jian Yong, Junhong Zhao, Ting Liu, Ting Lei, Wei Deng and Peng Liu Tracking Synchronization of Coupled Non-identical Neural Networks Via Iterative Learning Control

**October 16, 2022 (Sunday): 8:20-10:00**

**Meeting ID: 338-219-460**

**Meeting link: <https://meeting.tencent.com/dm/43FTnguQS4L9>**

**Chairs: Fan Zhang and Yang Liu**

<b>Time</b>	<b>Session 2: Prediction and Forecasting</b>
8:20 — 8:40	Yunong Zhang, Yining Zhang and Jielong Chen Three-Variable Weng-Zhang Algorithms with Subscript-Consistent Traversal Type Added as Well as Five-Variable Ones Applied to UKGDPNG Year Forecast
8:40 — 9:00	Siyuan Guo and Fan Zhang A SPCNN Model for Patient-Independent Prediction of Epilepsy Using MFCC Features
9:00 — 9:20	Yanping Mu, Xiaofeng Zhang, Meng Zhang and Huimin Wang Epilepsy Prediction Based on PTE and TE Of EEG Signals Using DSC-CNN
9:20 — 9:40	Yijun Zhao, Shaozhi Li, Mian Wang, Xiang Wan and Kun Xia An Adaptive K-Nearest-Neighbor Approach for Predicting Chemical Composition Content in Soil
9:40 — 10:00	Yang Liu, Ruiyi Wang, Kejing Cao, Jiuhao Wang, Zezhao Shi, Yadi Wang, and Yi Zhou Research on Sonar Images Target Detection Based on Two-channel Attention Convolutional Network

**October 16, 2022 (Sunday): 10:00-12:00**

**Meeting ID: 608-577-458**

**Meeting Link: <https://meeting.tencent.com/dm/HwYern4PWVhf>**

**Chairs: Long Jin and Ronghu Chi**

<b>Time</b>	<b>Session 3: Control Systems</b>
10:00 — 10:20	Xiaolin Guo, Ronghu Chi, Na Lin and Yang Liu Taylor Expansion Linearization-Based Partial-Form Model-Free Adaptive Control
10:20 — 10:40	Fei Gao, Lu Zhang and Zhi Weng Control of Nonlinear Systems with Predefined Constraints Using Neural Networks
10:40 — 11:00	Guan Huang, Zhuo Zhang and Weisheng Yan Distributed Leader-Following Optimal Control for Linear Multi-Agent Systems with Nonzero Leader's Control Input
11:00 — 11:20	Baojian Qin, Wenhao Zhang, Shijian Dong, Shenquan Wang and Yulian Jiang Robotic Arm Trajectory Tracking Control Based on RBF Neural Network Adaptive Control Algorithm
11:20 — 11:40	Wenhui Dou, Shihong Ding and Chen Ding Practical Adaptive Event-triggered Finite-time Stabilization for a Class of Second-order Systems
11:40 — 12:00	Zhengtai Xie, Jialiang Fan, Xiujian Du and Long Jin Revisiting QP-based Control Schemes for Redundant Robotic Systems with Different Emphases

**October 16, 2022 (Sunday): 10:00-12:00**

**Meeting ID: 128-216-777**

**Meeting link: <https://meeting.tencent.com/dm/jKmb9AK9cNnj>**

**Chairs: Fan Zhang and Yuming Feng**

<b>Time</b>	<b>Session 4: Intelligent Systems</b>
10:00 — 10:20	Pan Zhang, Yuhan Liu and Wei Zhang Design of Airline Baggage Automatic Handling System Based on Depth Camera
10:20 — 10:40	Pan Zhang, Jiulin Cheng, Wei Zhang, Xin Lu and Yuhao Chen Research on Trajectory Planning of Airline Baggage Handling Robot
10:40 — 11:00	Tongxin Xiao, Guoliang Yu, Zhiyu Jin, Chunxue Ji, Longshan Wang and Fan Zhang Improved ALOHA-based RFID Tag Anti-collision Algorithm
11:00 — 11:20	Sufang Zhou, Jianing Fan, Xiaoyu Du, Baojun Qiao, Zhi Qiao Efficient Multi-disease Privacy-Preserving Medical Pre-Diagnosis Based on Partial Homomorphic Encryption
11:20 — 11:40	Ji Lu, Jianzhen Xiao, Canhui Chen, Mingzhi Mao and Yunong Zhang Discrete Zhang Neural Dynamics Algorithms for Time-Varying Matrix Generalized Sinkhorn Scaling
11:40 — 12:00	Auwal Abubakar, Yuming Feng and Abdulkarim Ibrahim Inertial Projection Method for Solving Monotone Operator Equations

**12:00-13:00 Lunch break**

**October 16, 2022 (Sunday): 13:00-15:00**

**Meeting ID: 289-776-401**

**Meeting link: <https://meeting.tencent.com/dm/Sa9veWfxgGUK>**

**Chairs: Jian Wang and Wei Zhang**

<b>Time</b>	<b>Session 5: Pattern Recognition</b>
13:00 — 13:20	Xiaoyu Du, Lvzhou Lin, Zhijie Han, and Changtao Zhang An Intrusion Detection Algorithm Based on Hybrid Autoencoder and Decision Tree
13:20 — 13:40	Pan Zhang, Ming Cui, Yuhao Chen and Wei Zhang Airline Baggage Classification/Recognition and Measurement Based on Computer Vision
13:40 — 14:00	Qilin Ren, Guangdong Xue, Xiaoling Gong and Jian Wang A Novel Fuzzy Rule Based Neuro-system with Sparse Rule Extraction for Classification Problems
14:00 — 14:20	Kuan Zhang, Mingkai Zheng and Yi Liu Multi-Class Pavement Disease Recognition Using Object Detection and Segmentation
14:20 — 14:40	Da Teng, Daoerji Fan, Fengshan Bai and Yuecai Pan End-to-End Model Based on Bidirectional LSTM and CTC for Online Handwritten Mongolian Word Recognition
14:40 — 15:00	Yiqing Zhang, Wei Zheng, Jiang Xue and Jianyong Sun Deep Temporal Sequence Prediction Neural Network for MIMO Detection

**October 16, 2022 (Sunday): 13:00-15:00**

**Meeting ID: 620-908-956**

**Meeting link: <https://meeting.tencent.com/dm/aV2zeL1eebXR>**

**Chairs: Yadi Wang and Xiaoding Guo**

<b>Time</b>	<b>Session 6: Machine Learning</b>
13:00 — 13:20	Zhantao Liang, Mingming Ha and Derong Liu Theoretical Analysis of Value-Iteration-Based Q-Learning with Approximation Errors
13:20 — 13:40	Shunxiang Yang, Cheng Lian and Zhigang Zeng Masked Autoencoder for ECG Representation Learning
13:40 — 14:00	Xiaoding Guo, Yadi Wang, Zhijun Miao, Xiaojin Yang, Jinkai Guo, Xianhong Hou, and Feifei Zao ER-MRL: Emotion Recognition based on Multimodal Representation Learning
14:00 — 14:20	Yadi Wang, Xiangyu Wang, Xianyu Zuo, Hangjun Che, Baojun Qiao and Ying Du Feature Selection via Normalized Dynamic Change of Selected Feature with Class
14:20 — 14:40	Zhaoyang Feng, Xing Wang and Deqian Fu Dual Machine Reading Comprehension for Event Extraction
14:40 — 15:00	Zhongcai Lyu and Jie Zhu Enriching Style Transfer in Multi-Scale Control Based Personalized End-To-End Speech Synthesis

**October 16, 2022 (Sunday): 15:00-16:20**

**Meeting ID: 289-776-401**

**Meeting link: <https://meeting.tencent.com/dm/Sa9veWfxgGUK>**

**Chairs: Jiasen Wang and Yifei Sun**

<b>Time</b>	<b>Session 7: Network Systems</b>
15:00 — 15:20	Jiasen Wang and Jun Wang A Dual Assignment Network with Applications in Deterministic Communication Path Selection and Multi-Vehicle Target Assignment
15:20 — 15:40	Zhuo Liu, Yifei Sun, Xin Sun, Jie Yang and Yifei Cao Computing Signed Networks Structural Balance via Node Influenced Memetic Algorithm
15:40 — 16:00	Qingyuan Li, Tiansa Chen, Yueyuan Zhang, Jun Huang and Lei Yu Distributed Observer Design for Multi-agent Systems with Semi-Markov Switching Topology and Incremental Quadratic Constraints
16:00 — 16:20	Wenxue Wang, Qingxia Li, Wenhong Wei and Simin Yang Multi-objective Community Detection Algorithm based on the Adaptive Mutation Operator
16:20 — 16:40	Gang Bao Attractivity Analysis for Recurrent Neural Networks With State-Dependent External Input

**October 16, 2022 (Sunday): 15:00-16:40**

**Meeting ID: 620-908-956**

**Meeting Link: <https://meeting.tencent.com/dm/aV2zeL1eebXR>**

**Chairs: Sitian Qin and Hangjun Che**

<b>Time</b>	<b>Session 8: Optimization Methods</b>
15:00 — 15:20	Yi Jiang, Zhi-Hui Zhan and Jun Zhang A New and More Challenging Compositive Multi-Task Optimization Problem Test Suite
15:20 — 15:40	Jie Li, Wen Zhang, Pu Cheng, Yujing Wang and Xiaoyu Du Adaptive Binary Whale Optimization Algorithm for Computation Offloading Optimization in Mobile Edge Computing
15:40 — 16:00	Zehua Xie, Xinrui Jiang, Sitian Qin and Jiqiang Feng A Neurodynamic Approach for a Class of Convex-Concave Minimax Problems
16:00 — 16:20	Hangjun Che, Jun Wang and Andrzej Cichocki Neurodynamics-driven Sparse Signal Reconstruction Based on Iteratively Reweighted Convex Optimization
16:20 — 16:40	Hongzong Li and Jun Wang Collaborative Neurodynamic Algorithms for Solving Sudoku Puzzles

## Poster Sessions

October 16, 2022 (Sunday): 8:00-10:00

Chair: Gang Bao

<b>Session 9: Industrial Applications</b>
Jianxu Xing, Feng Lu, Liang Cen, Xiaoming Yin, Kang Pan and Haifeng Liu A Novel Energy Carbon Emission Codes Based Carbon Efficiency Evaluation Method for Enterprises
Libao Deng, Yuanzhu Di, Zhe Yang, Chunlei Li and Xianxin Mao A Self-Adaptive Differential Evolution Algorithm Based on Model Transformation for Flexible Job-Shop Scheduling Problem with Lot Streaming
Yu Wang, Zhi Qiao, Junru Yin and Mingliang Zhang Design and Implementation of Links Generation For Inter Domain Routing System
Chengyuan Zhu, Kaixiang Yang, Qinmin Yang, Hao Jiang and Yanyun Pu Visibility and Meteorological Parameter Model Based on Rashomon Regression Analysis

October 16, 2022 (Sunday): 10:00-12:00

Chair: Man-Fai Leung

<b>Session 10: Intelligent Systems</b>
Man-Fai Leung, Chin-Hung Kwok and Hangjun Che A Hybrid Intelligent System for Assisting Low-Vision People with Over-the-Counter Medication
Jianqiao Yu, Hui Liang and Yi Sun Deep Learning Single View Computed Tomography Guided by FBP Algorithm
Saisai Yu, Jianlong Qiu, Xin Bao, Ming Guo, Xiangyong Chen and Jianqiang Sun Movie Rating Prediction Recommendation Algorithm Based on Xgboost-DNN
Mengxue Yan, Yan Zhao, Ming Guo, Haoyu Sun, Jianlong Qiu and Feng Zhao A Multimodal Dataset for Gait Recognition in Different Terrains Using Wearable Sensors

October 16, 2022 (Sunday):13:00-15:00

Chair: Jianlong Qiu

<b>Session 11: Control Systems</b>
Qi Chen, Guozhong Wang, Lin Wang, Yong Sun, Xuguo Jiao, Xiaowen Zhou, Wenchao Meng and Qinmin Yang Bounded UDE based MPPT Control for Wind Turbines
Xuecheng Zhang, Xiaojie Qiu, Wenchao Meng, Yuliang Li and Lihong Zhang An Event-Triggered Predictive Control for Weight Control System
Chunting Xue, Feng Zhao, Xiangyong Chen, Jianlong Qiu, Guanzheng Wang and Tong Wang Adaptive Finite-Time Neural Network Control for Non-strict Feedback Systems
Tong Wang, Feng Zhao, Xiangyong Chen, Jianlong Qiu, Guanzheng Wang and Chunting Xue Observer-based Input-Output Finite-Time Control of T-S Fuzzy Stochastic Systems
Zhenhai Miao, Meng Li, Zepei Sun and Yong Chen Adaptive Sliding Mode Control for Motor Cyber Physical System
Hanguang Su, Xinyang Luan, Yiwen Zheng and Qianhui Xu

Online Event-Triggered Optimal Control of Nonlinear Large-Scale Systems with Unknown Dynamics
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**October 16, 2022 (Sunday): 15:00-17:00**

**Chair: Jianlong Qiu**

<b>Session 12: Clustering and Classification</b>
Kunpeng Jiang, Huifang Guo, Kun Yang, Haipeng Qu, Miao Li and Liming Wang An Self-Adaptive Cluster Centers Learning Algorithm Based on EM Algorithm
Jinwu Li and Yan Zhang Time Series Segmentation and Clustering Method Based on Cloud Model
Yayun Wang, Shiwei Fu and Chun Liu A Relation Network Based Approach for Few-Shot Point Cloud Classification
Mengxiang Geng, Ming Guo, Jianlong Qiu, Yingchan Cao and Xiangyong Chen Classification Algorithm of Logistics Packaging Based on Multi-scale Convolutional Neural Network

END