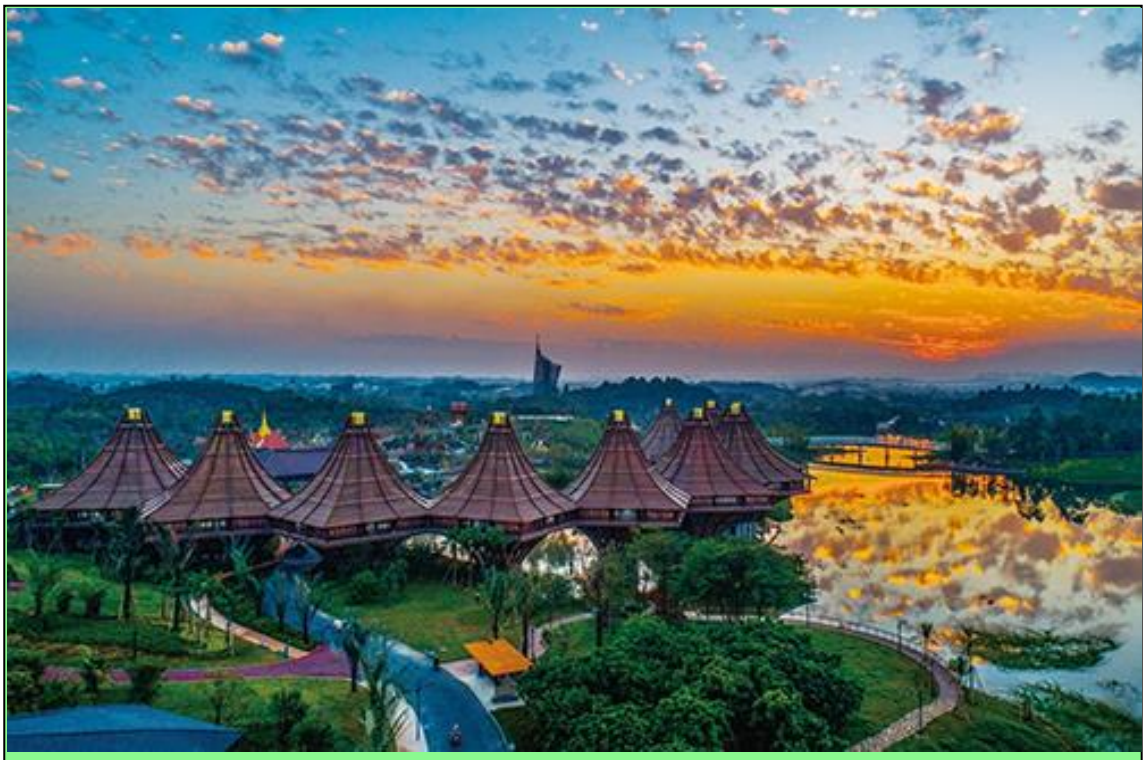

Final Program

The 2023 First International Conference on Applied Intelligence

December 8-12, 2023
Nanning, China

The 2023 First International Conference on Applied Intelligence

FINAL PROGRAM

December 8-12, 2023

Nanning, China

Outlines

WELCOME MESSAGE FROM GENERAL CHAIRS

The first International Conference on Applied Intelligence (ICAI 2023) will be held during December 8-12, 2023, Nanning, Guangxi, China. The conference is started to provide an annual forum dedicated to the emerging and challenging topics in artificial intelligence, machine learning, pattern recognition, bioinformatics, and computational biology. It aims to bring together researchers and practitioners from both academia and industry to share ideas, problems, and solutions related to the multifaceted aspects of Applied Intelligence.

This year, the conference concentrated mainly on the theories and methodologies as well as the emerging applications of Applied Intelligence. Its aim was to unify the picture of contemporary Applied Intelligence techniques as an integral concept that highlights the trends in advanced computational intelligence and bridges theoretical research with applications. Therefore, the theme for this conference was "Advanced Applied Intelligence Technology and Applications". Papers that focused on this theme were solicited, addressing theories, methodologies, and applications in science and technology.

ICAI 2023 received 228 submissions from 10 countries and regions. All papers went through a rigorous peer-review procedure and each paper received at least three review reports. Based on the review reports, the Program Committee finally selected 64 high-quality papers for presentation at ICAI 2023, included in volumes of proceedings published by Springer: two volumes of Communications in Computer and Information Science (CCIS).

The organizers of ICAI 2023, including Eastern Institute of Technology, and Guangxi Academy of Sciences, China, made an enormous effort to ensure the success of the conference. We hereby would like to thank the members of the Program Committee and the referees for their collective effort in reviewing and soliciting the papers. In particular, we would like to thank all the authors for contributing their papers. Without the high-quality submissions from the authors, the success of the conference would not have been possible. Finally,

we are especially grateful to the International Neural Network Society, and the National Science Foundation of China for their sponsorship.

Changan Yuan
ICAI 2023 General Chair

De-Shuang Huang
ICAI 2023 Steering Committee Chair

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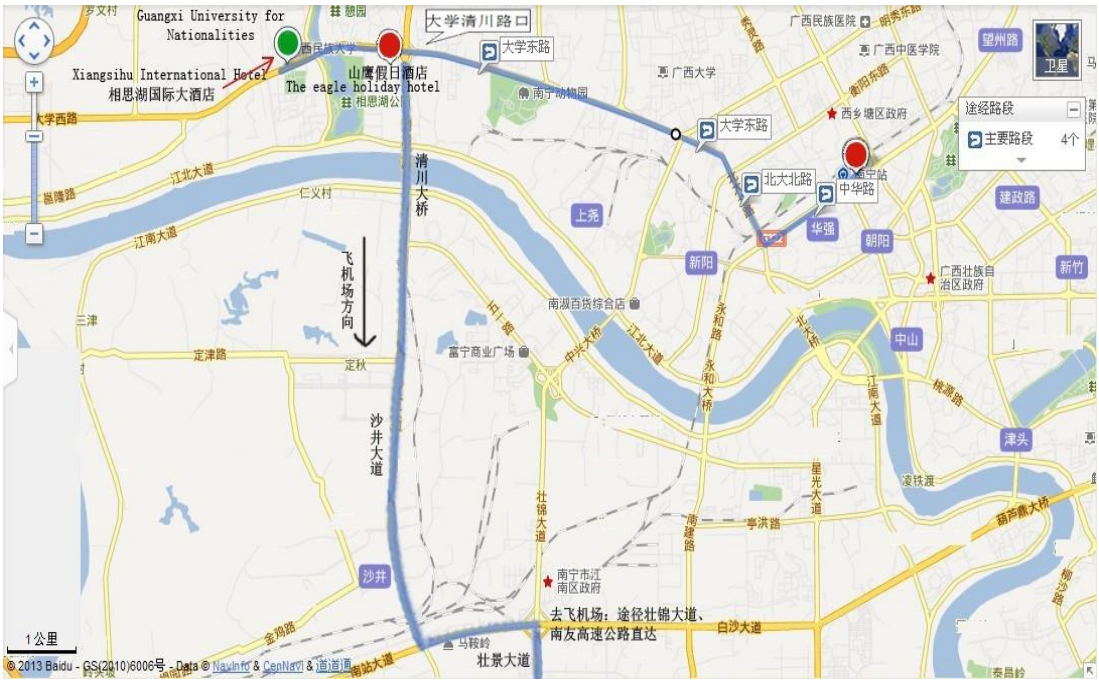
The Location of Conference Venue

Conference Venue

ICAI 2023 Conference Venue is Xiangsihu International Hotel, which is located in East Daxue Road Xixiangtang District, is a four-star business hotel with a collection of guest rooms, meeting rooms, food and beverage service, and KTV, adjacent to the Nanning zoo and Caribbean Water world. The hotel lobby faces to the south and the beautiful scenery of Xiangsi Lake, with its back to the Guangxi University for Nationalities which won the title of "National Model Unit for Greening". The hotel has various types of guest rooms, accounting to 240 rooms. All the rooms are decorated with new environmentally-friendly materials. Combined with the tranquil environment and convenient traffic, Xiangsihu International Hotel is the ideal choice for business and travel guests.

Location



General Information

I. Conference Working Language

English is the official language of the conference.

II. Conference Registration

The ICAI 2023 registration desk, located in the lobby of Xiangsihu International Hotel, Nanning, the first floor, will be open during the following hour:

- December 8, 2023 (Friday) 4:00pm-8:00pm
- December 9, 2023 (Saturday) 8:30am-6:00pm

III. Conference Events

The ICAI 2023 events are scheduled as follows:

- Banquet: 19:00-21:00 pm, December 9, 2023 (Saturday), Multi-function Hall, 4th floor.
- All the meals but Banquet: Restaurant, 2nd floor.

IV. Conference Rooms

- Multi-function Hall, 4th floor: The opening Ceremony Session and Plenary Session.
- Room A, 4th floor: All the parallel Oral Sessions.

V. Information for Oral Presenters

- Please prepare a 15-minute PowerPoint (PPT) slide. Your actual presentation time may depend on the number of presentations in your session.
- Please check this Final Program for your presentation time and room. Please go to the room five minutes before the session starts and report to the Session Chair.
- Please follow the instructions of the Session Chair(s) not to exceed your time allotted to you by them.
- If the Session Chair(s) is/are absent from the session, the last speaker is requested to serve as the Session Chair.

VI. Information for Session Chairs

The Organizing Committee would like to ask for your kind help as Session Chair (s). If you cannot fulfill your duties as session chair, please try to make sure that someone else will take your place as Session Chair(s).

As a Session Chair, you are kindly requested to help at the following:

- Arrive at the room of the session at least 5 minutes before the session starts and identify each of the speakers for the session.
- Calculate and announce the time allocated for each paper in your session for only the authors present before the session starts.
- The time allocated to a paper may be different in different sessions, due to uneven distribution of papers in different areas and a small number of absentees due to visa and other reasons. Request the presenters to leave 2 minutes for question and answers.
- Each oral presentation room is equipped with an LCD projector. If something is not working properly, please contact conference helper in the room.

Schedule Overview

December 8 Friday	**Registration (4:00 pm-8:00 pm)**
December 9 Saturday	**Opening Ceremony Session** **Chair:** De-Shuang Huang **Time:** 08:40-09:00 am
	Plenary Speaker I: Vladimir Filaretov (**Online**) **VooV Meeting:** 714-832-765 **Chair:** Prashan Premaratne **Time:** 09:00-09:50 am
	Plenary Speaker II: Vasu Alagar **Chair:** Prashan Premaratne **Time:** 09:50-10:40 am
	Coffee Break: 10:40-11:00 am
	Plenary Speaker III: De-Shuang Huang **Chair:** Prashan Premaratne **Time:** 11:00-11:50 am
	Lunch: 12:00-13:30 pm
	Oral Presentation **Time:** 13:30-15:30 pm **Room:** Room A
	Coffee Break: 15:30-15:45 pm
	Oral Presentation **Time:** 15:45-17:45 pm **Room:** Room A
	Banquet: 18:30-20:00 pm
December 10 Sunday	**Oral Presentation** **Time:** 08:00-10:00 am **Room:** Room A
	Coffee Break: 10:00-10:15 am
	Oral Presentation **Time:** 10:15-12:15 am **Room:** Room A
	Lunch & Free Activity

Introduction of Plenary Speakers

■ Plenary Speaker I: Vladimir Filaretov

Development of control systems for underwater and industrial robots with elements of artificial intelligence

Vladimir Filaretov
Academicians of Russian Engineering Academy and Russian Science Academy
Vice-president of Russian Engineering Academy, Vladivostok, Russia
Head of Robotics Laboratory at Institute of Automation and Control Processes Far Eastern
Branch of Russian Academy of Science
Head of the Department of robotics and Automation at Far Eastern Federal University
Member of Presidium of the Highest Engineering Council of Russia
Email: filaretov@inbox.ru

Abstract: The talk is dedicated to creation technologies of intelligent control systems of various robots which can automatically perform complex technological operations in non-deterministic operating environment. These systems are constructed based on information processing, obtained from different vision systems, and provide automatically generation and correction of robot's motion trajectory in a priori unknown and changeable environment. For realization of these systems, a different method of recognition and processing of information obtained from vision systems (optical and laser) will be presented. Here I will talk about method of fast combination of three-dimensional models of deformed parts obtained from laser scanners with their reference CAD-models. Based on this combination it is possible to make trajectory planning of robots in real time for exact processing of the parts. For underwater robots I will present new algorithm for combining images into a one whole raster photo map from a sequence of individual images or video frames using tile graphics and simple transformations of input images. The use of tiles allows to present the generated map in a convenient form both for a person and for the on-board control system of the robot.

Bio-sketch: Vladimir Filaretov was born in 1948. In 1973 graduated from Moscow State Technical University named after Bauman with honors with the specialty “Automatic systems”. In 1976 Mr. Filaretov was awarded the degree of candidate of sciences (engineering) and in 1990 he was awarded the degree of Doctor of Sciences in the field of automatic control. In 1992 Mr. Filaretov was confirmed in professor’s degree. In 1995 he was elected the member of a Russian and in 1996 the member of an International Engineering Academy. At present he is head of Department of Robotics and Automation at Far Eastern Federal University and Head of Robotic Laboratory of the Institute of Automatics and Control Process of Russian Academy of Sciences, President of Far Eastern Branch Russian Engineering Academy and Vice-president of Russian Engineering Academy. Professor Vladimir Filaretov is a specialist in the field of adaptive and optimal control devices of complicated nonlinear systems of automatic control with unknown and variable parameters, and also in the field of

mathematical description of complicated multi-connected mechanisms dynamics. His researches are mainly directed at creation both industrial and underwater robots and manipulators and also other dynamic systems, allowing to automate technical devices and technological processes. Professor V. Filaretov has more than 740 scientific publications, 10 monographs and 350 patents (inventions) for developed technical systems and devices.

■ Plenary Speaker II: Vasu Alagar

Contextual Reasoning

Vasu Alagar, PhD, Professor Emeritus
Department of Computer Science and Software Engineering, Concordia University, Montreal, Canada H3G 1M8
Email:vangalur.alagar@concordia.ca,alagar@cse.concordia.ca

Abstract: Contextual knowledge representation, contextual reasoning, and learning are the foundations on which AI evolves. Intelligent problem solving in any domain requires the selection of data relevant to achieve the goal, the representation of knowledge (semantic content), the context in which data originated and the context in which analysis of data will be done. So, understanding and analyzing content without context are meaningless, and every context that exists at different problem-solving stages will have some content that may or may not be useful to achieve the goal. However, in the current AI and applications on context-aware frameworks, the distinction between knowledge and context are blurred and not formally integrated. As a result, adaptation behaviors based on contextual reasoning cannot be formally derived and reasoned about. In many smart systems such as automated manufacturing, decision making, and healthcare informatics it is essential for context-awareness units to synchronize with contextual reasoning modules to derive new knowledge in order to adapt, alert, and predict. A rigorous formalism is therefore essential to represent contextual domain knowledge as well as application rules, and precisely and efficiently reason to derive the closure of contextual conclusions. This talk will first introduce a formal context representation and a context calculus used to build a formal context model for applications in a domain. Any application in that domain that requires this contextual cover can import the context toolkit of this context model and link it for context-aware applications and formal reasoning of its properties. The formal framework for contextual reasoning is provided by Contelog, which is a conservative extension of the syntax and semantics of Datalog. In Contelog framework design, contextual knowledge and contextual reasoning are loosely coupled. The significance of this design is that by fixing contextual knowledge, rules of inference may be changed and hence multiple reasonings are possible. The talk will show several case studies chosen from the Book of Examples and refer to the Doctoral Thesis of Ammar Alsaig for an in-depth study on the expressive power of its theory and a variety of implemented examples to showcase a proof of concept for the generality, expressiveness, and the rigor of Contelog.

Bio-Sketch: Vasu Alagar is an Emeritus Professor in the Department of Computer Science and Software Engineering at Concordia University, Montreal, Canada. His academic career, spawning over five decades, has been rich and varied that includes Algorithm Development and Complexity Analysis, Formal Methods, and Rigorous Development of Large Complex Systems. His recent research centers

around Formal Component-based Software Development, Context-aware Systems, and in particular the embedding of context in programming languages and Big Data discovery and Analytic. He has written and edited several books and conference proceedings. He has graduated more than 150 masters and PhD students, and his research results are widely published in many journals and conferences.

■ Plenary Speaker III: De-Shuang Huang

Graph-Data Learning and Bioinformatics Applications

De-Shuang Huang, Prof. & Ph.D,
IEEE Fellow, IAPR Fellow & AAIA Fellow
Institute of Machine Learning and Systems Biology, Eastern Institute of Technology, Ningbo, China
Email: dshuang@eitech.edu.cn

Abstract: Graph Neural Networks (GNNs) have achieved advanced performance in many fields such as traffic prediction, recommendation systems, and computer vision. Recently there are majorities of methods on GNN focusing on graph convolution, and less work about pooling. To address the problems of information loss and low feature representation capability during graph pooling operations. In this report, we explore higher efficient graph-level representation learning methods and their application to bioinformatics. Firstly, to address the problem of information loss in the pooling operation, we propose a hierarchical graph-level representation learning method with self-adaptive cluster aggregation. Secondly, to address the fact that all existing graph pooling models based on mutual information maximization need to construct negative samples and usually only consider local neighborhood information, we propose a mutual information graph pooling method based on simple Siamese network. Finally, we present an application of our proposed graph-level representation learning method to healthy aging prediction by using scRNA-seq data.

Bio-Sketch: De-Shuang Huang is a Professor in Institute of Machine Learning and Systems Biology, Eastern Institute of Technology, Ningbo, China. He is currently the Fellow of the IEEE (IEEE Fellow), the Fellow of the International Association of Pattern Recognition (IAPR Fellow), the Fellow of the Asia-Pacific Artificial Intelligence Association (AAIA), and associated editors of IEEE/ACM Transactions on Computational Biology & Bioinformatics and IEEE Transactions on Cognitive and Developmental Systems, etc. He founded the International Conference on Intelligent Computing (ICIC) in 2005. ICIC has since been successfully held annually with him serving as General or Steering Committee Chair. He also served as the 2015 International Joint Conference on Neural Networks (IJCNN2015) General Chair, July12-17, 2015, Killarney, Ireland, the 2014 11th IEEE Computational Intelligence in Bioinformatics and Computational Biology Conference (IEEE-CIBCBC) Program Committee Chair, May 21-24, 2014, Honolulu, USA. He has published over 480 papers in international journals, international conferences proceedings, and book chapters. Particularly, he has published over 260 SCI indexed papers. His Google Scholar citation number is over 23410 times and H index 80. His main research interest includes neural networks, pattern recognition and bioinformatics. His main research interest includes neural networks, pattern recognition and bioinformatics.

Parallel Sessions for Oral Presentations

Afternoon, December 9, Saturday, Room A

Intelligent Computing in Computer Vision

Chair: Prashan Premaratne

Paper 351 **13:30-13:45**	**Automated Text Recognition and Review System for Enhanced Bidding Document Analysis** *Qiang Xue, Xu Cheng, Qingyun Tan, and Ruoyan Dong*
Paper 127 **13:45-14:00**	**Efficient and Accurate Document Parsing and Verification Based on OCR Engine** *Ruoyan Dong, Kexian Zhang, Xiangbo Wang, Qiang Xue, and Qingyun Tan"*
Paper 128 **14:00-14:15**	**Intelligent Comparison of Bidding Documents Based on Algorithmic Analysis and Visualization** *Kexian Zhang, Ruoyan Dong, Yu Lu, Haoheng Tan, and Qiang Xue*
Paper 144 **14:15-14:30**	**Image Denoising Method with Improved Threshold Function** *Xueqing Li, Caixia Deng, Shasha Li, and Lu Pi*
Paper 344 **14:30-14:45**	**Relevant Tag Extraction based on Image Visual Content** *Nancy Fazal, and Pasi Fränti*
Paper 130 **14:45-15:00**	**Deepfake Detection Performance Evaluation and Enhancement through Parameter Optimization** *Bowen Pei, Jingyi Deng, Chenhao Lin, and Chao Shen*
Paper 310 **15:00-15:15**	**Smart power safety hazard inspection system based on YOLOv7** *Yiheng Liang, Xiaoming Li, and Zhenrong Deng*
Paper 121 **15:15-15:30**	**Challenges in Realizing Artificial Intelligence Assisted Sign Language Recognition** *Prashan Premaratne and Peter James Vial*

Coffee Break (15 minutes)

Intelligent Computing in Computational Biology

Chair: Wenzheng Bao

Paper 339 **15:45-16:00**	**Imputation of Compound Property Assay Data Using a Gene Expression Programming-based method** *Hongliang Zhou, Yanmei Lin, Nan Chen, and Yuzhong Peng*

Paper 315 **16:00-16:15**	**T-GraphDTA: a drug-target binding affinity prediction framework based on protein pre-training model and hybrid graph neural network** *Yijia Wu, Yanmei Lin, Yuzhong Peng, Ru Zhang, and Li Cai*
Paper 343 **16:15-16:30**	**Identification of Parkinson's Disease Associated Genes through Explicable Deep Learning and Bioinformatic** *Yuxin Zhang, Xiangrong Sun, Peng Zhang, Xudan Zhou, Xiansheng Huang, Mingzhi Zhang, Gua-nhua Qiao, Jian Xu, Ming Chen, and Wei Shu*
Paper 115 **16:30-16:45**	**Investigation and Analysis of Corneal Morphology in Young Divers** *Chenyang Mao, Xin Wang, Heng Li, Dan Zhou, Haofeng Liu, Honglun Dong, Yan Hu, and Jiang Liu*
Paper 295 **16:45-17:00**	**Staphylococcus aureus function proteins classification with time series forest** *Qi Wang, Luying He, Wenzheng Bao, and Mingzhi Song*
Paper 296 **17:00-17:15**	**Bradyrhizobium Elkanii's Genes Classification with SVM** *Luying He, Qi Wang, Wenzheng Bao, and Mingzhi Song*
Paper 297 **17:15-17:30**	**Oral lichen planus classification with SEResNet** *Xiaojing Hu, Xueyan Yang, Baitong Chen, Wenzheng Bao, and Hongchuang Zhang*
Paper 299 **17:30-17:45**	**Nucleotide sequence classification of Paeonia lactiflora based on feature representation learning** *Bolun Yang, Yi Cao, Ruizhi Han, and Wenzheng Bao*

Morning, December 10, Sunday, Room A

Intelligent Data Analysis and Prediction

Chair: Vangalur Alagar

Paper 167 **08:00-08:15**	**Prediction Interval of Principal Component Regression with Applications to Molecular Descriptors Datasets** *Yuling Fu, Zixin Bin, Ligong Wei, and Youwu Lin*
Paper 298 **08:15-08:30**	**Beibu Gulf Marine Ranch: Utilizing BeiDou Grid Code and Multi-System Integration for Modernized Management and Monitoring** *Guilin Xu, Hengtong Qiu, Xiaomin Yan, Man Wu, Jing Guo, Zhaoyong Huang, and Wenlong Huang*
Paper 345 **08:30-08:45**	**Lévy Flight Chaotic Runge Kutta Optimizer for Stock Price Forecasting** *Chenwei Bi, Qifang Luo, and Yongquan Zhou*
Paper 206 **08:45-09:00**	**Edge Collaborative Assisted Caching Content Placement Optimization Strategy Based on DDSG** *Taoshen Li, Ling You, and Zhihui Ge*
Paper 305 **09:00-09:15**	**Functional Semantics Analysis in Deep Neural Networks** *Ben Zhang, Gengchen Li, and Hongwei Lin*

Paper 336 **09:15-09:30**	**Air Defense Deployment of Anti-reconnaissance Based on Immune Optimization Algorithm With Nested Double Particle Swarm** *Ye-xin, Song, Yan-jie Wu, and Chun-sheng Gao*
Paper 106 **09:30-09:45**	**Advancing Short-term Traffic Congestion Prediction: Navigating Challenges in Learning-Based Approaches** *Chen Wang*
Paper 201 **09:45-10:00**	**A Critical Review of Multi Criteria Decision Analysis Method for Decision Making and Prediction in Big Data Healthcare Applications** *Ammar Alsaig, Alaa Alsaig, and Vasu Alagar*
Paper 301 **10:00-10:15**	**Semantic Similarity Functions and Their Applications** *Yang Liu, Alaa Alasig, and Vasu Alagar*
Coffee Break (15 minutes)	
Machine Learning and Its Applications	
Chair: Wenhao Rao	
Paper 205 **10:15-10:30**	**An improved seqdeepfake detection method** *Zhenrong Deng, Kang You, Rui Yang, Xinru Hu, and Yuren Chen*
Paper 143 **10:30-10:45**	**DeepSensitive: A Fuzzing Test for Deep Neural Networks with Sensitive Neurons** *Zixuan Yang, Chenhao Lin, Pengwei Hu, and Chao Shen.*
Paper 342 **10:45-11:00**	**Semi-supervised Clustering Algorithm based on L1 Regularization and Extended Pairwise Constraints** *Yan Li, Zhi Zhong, Long Chen, and Sijing Tan*
Paper 179 **11:00-11:15**	**Design and utilization of an auto-visual-inspection composite system for suspension cables with fast flaw identification** *Donglong Meng, Xiaolin Wang, Di Lu, Jianhui Li, Di Gan, and Huien Shi*
Paper 340 **11:15-11:30**	**Research on fuzzy weighted controller for battery discharge of dual-channel dual-active bridge** *KaiXin Shu, Yu Fang, Sheng Wang, Liang Lu, YuXuan Fang, and XueHua Wang*
Paper 168 **11:30-11:45**	**FasterPlateNet: A Fast Deep Neural Network for License Plate Detection and Recognition** *Lei Huang, Yuan-Yuan Chen, Yu-Zhong Peng, and Chao Wang*
Paper 337 **11:45-12:00**	**AF-FCOS: An Improved Anchor-Free Object Detection Method** *Hang Li; Rui Yang, Rushi Lan, and Xiaonan Luo*
Paper 124 **12:00-12:15**	**A Precise Interictal Epileptiform Discharge IED Detection Approach Based on Transformer** *Wenhao Rao, Ling Zhang, Xiaolu Wang, Jun Jiang, and Duo Chen*

The 2023 First International Conference on Applied Intelligence

December 8-12, 2023, Nanning, China

Website: http://icai.org.cn/2023/index.htm

Email: icai_conf@163.com