International Conference on Pattern Recognition, Machine Vision and Intelligent Algorithms

March 24-25, 2023

PRMVIA 2023

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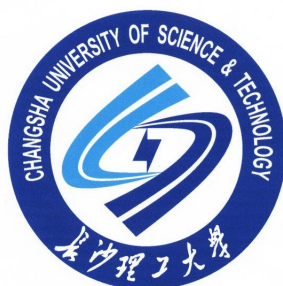Pattern Recognition, Machine Vision and Intelligent Algorithms

PRMVIA 2023

International Conference on Pattern Recognition, Machine Vision and Intelligent Algorithms

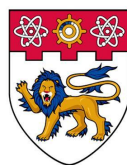## On 24th-25th March 2023

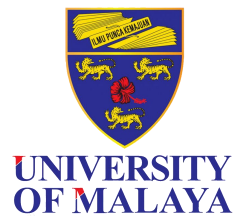# Conference Program

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International Conference on
Pattern Recognition, Machine Vision and Intelligent Algorithms

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Content

Welcome Letter

With the rapid development of computer hardware and the deep expansion of computer field, computers are required to perceive more effectively information such as sound, text, images, temperature, vibrations, etc. that humans use to develop themselves and improve the environment. Therefore, pattern recognition, a discipline that aims to broaden the field of computer application and improve their capability to perceive external information, has gained a mushroom growth.

PRMVIA is dedicated to cracking the hard nut in the latest scientific research of pattern recognition, machine vision, intelligent algorithms and other related fields, thus presenting the latest findings and providing a platform for research scholars and business practitioners to exchange and share advanced technological achievements. We really hope to make every effort to advance the development of computer science and technology. All experts and scholars are warmly invited to get involved.

We warmly invite experts and scholars to participate in PRMVIA 2023. Hope you can enjoy a joyful and fruitful academic journey!

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CERIST Research Center, People's Democratic Republic of Algeria
Dr. Vipin Balyan
Cape Peninsula University of Technology, Cape Town, South Africa

Workshops

Workshop 1
Title: Service robots, mission and obstacle in today's science and research: design, Simulation, performance
Chair: Dr. Ata Jahangir Moshayedi, School of information engineering Jiangxi university of science and technology

Workshop 2
Title: Quantum algorithms and quantum computing models
Chair: Prof. Daowen Qiu, Computer Science, Sun Yat-Sen University

Workshop 3
Title: Intelligent Equipment and Machine Vision
Chair: Assoc. Prof. Hongqian Zhu, Central South University of Forestry and Technology

Workshop 4
Title: Research on the Application of Genetic Algorithm (GA), Particle Swarm Optimization (PSO) and other Intelligent Algorithms in Industrial and Medical Fields
Chair: Prof. Song Yu, Hitachi China Research Laboratory

Workshop 5
Title: Mining the relationship between health cue and biometric data
Chair: Prof. Peirui Bai, Shandong University of Science and Technology

Workshop 6
Title: AI-Based Machine Vision in 6G Wireless Networks
Chair: Dr. Hongjun Zhu, Chongqing University of Posts and Telecommunications

Workshop 7
Title: AI-Empowered Reconfigurable Intelligent Surfaces for Wireless Networks (AI-RIS)
Chair 1: Prof. Gang Wang，Ningbo University
Chair 2: Assoc. Juan Liu，Ningbo University
Chair 3: Assoc. Yangong Zheng，Ningbo University

Workshop 8
Title: Broad learning system and its applications in pattern regression and recognition
Chair: Prof. Licheng Liu，Hunan university

Workshop 9
Title: Image Processing and Pattern Recognition
Chair: Dr. Yun Liu，College of Artificial Intelligence, Southwest University

Workshop 10
Title: Intelligent Signal Processing in Communication
Chair: Prof. Tianqi Zhang，Chongqing University of Posts and Telecommunications

Workshop 11
Title: Application and challenge of deep learning in intelligent medical image processing
Chair 1: Prof. Tao Zhou, School of Computer Science and Engineering, North Minzu University
Chair 2:Prof. Jing Bai , School of Computer Science and Engineering, North Minzu University
Chair 3:Assoc. Prof. Xiaofeng Wang, School of Computer Science and Engineering, North Minzu University

Workshop 12
Title: Adversarial Attack and Defense in Deep Learning
Chair 1 : Assoc. Prof. Chenhong Sui, College of Physics and Electronic Information, Yantai University
Chair 2 : Assoc. Prof. Yang Li School of Automation, Northwestern Polytechnical University

Workshop 13
Title: Medical Image Processing and Analysis based on Pattern Recognition and Artificial Intelligent Algorithms
Chair : Assoc. Prof. Jinlian Ma, School of Microelectronics, Shandong University

Workshop 14
Title: Resampling-based Cost Loss Attention Network for Explainable Imbalanced Diabetic Retinopathy Grading
Chair: Prof. Haiyan Li，School of Information, Yunnan University

Workshop 15
Title: Visual Understanding and Interactive Cognition
Chair 1: Prof. Nan Ma, Beijing University of Technology
Chair 2 : Dr. Cheng Xu，Beijing Union University

Workshop 16
Title: Artificial Neural Network for Visual learning

Chair:Assoc. Prof. Lei Chen, Shandong University

Workshop 17
Title: Neuro-symbolic AI: Algorithms for robust reasoning and learning
Chair: Dr. Nikhil Nayanar, Purdue University–West Lafayette

Workshop 18
Title: In-vehicle network data security and detection
Chair: Dr. Yujing Wu Yanbian University

Workshop 19
Title: Image processing by using intelligent algorithms
Chair: Assoc. Prof. Chunjiang Duanmu, Zhejiang Normal University

Workshop 20
Title: Face image reliability and cognitive analysis
Chair: Prof. Lifang Zhou, Chongqing University of Posts and Telecommunications

Workshop 21
Title: Evolutionary Computation for Intelligent Communication Networks in Smart Cities
Chair: Dr. Khoa Nguyen, Carleton University

Workshop 22
Title: Computerized Medical Image Analysis for Disease Detection, Classification and Prediction
Chair: Prof. Yahui Peng, Beijing Jiaotong University

Keynote Speakers

Speaker 1: Prof. Saman K. Halgamuge
The University of Melbourne, Australia

Title: Socially responsible Al with applications in Health

Abstract
Several major technical issues in current AI hinder the creation of socially responsible AI with access to almost all people in the planet. Unethical and socially irresponsible AI developed and used in applications evade regulations in most parts of the world, which is a multifaceted problem with widespread social, legal, political and commercial contributing factors. Would the 21st century AI need to be equipped with much better capabilities given that we have serious threats like dangerous epidemics, wild uncontrollable fires, floods etc to protect us from?

Should this AI be allowed to remain as unexplainable black boxes that can evade regulations? AI models are mostly manually designed using the experience of AI-experts; they lack human interpretability, i.e., users do not understand the AI architectures either semantically/linguistically or mathematically/scientifically; and they are unable to dynamically change when new data are continuously acquired from the environment they operate. Addressing these deficiencies would provide answers to some of the valid questions about traceability, accountability and the ability to integrate existing knowledge (scientific or linguistically articulated human experience) into the AI model which in turn would help in creating socially responsible AI. To overcome some of these deficiencies, Fair, Accessible, Interpretable and Reproducible (FAIR) AI – a new generation of AI is proposed. This keynote addresses these deficiencies and FAIR AI also describing some of our new research.

Biography

Prof Saman Halgamuge is a Fellow of IEEE, IET and AAIA. He received the B.Sc. Engineering degree in Electronics and Telecommunication from the University of Moratuwa, Sri Lanka, and the Dipl.-Ing and Ph.D. degrees in data engineering from the Technical University of Darmstadt, Germany. He is currently a Professor of the Department of Mechanical Engineering of the School of Electrical Mechanical and Infrastructure Engineering, The University of Melbourne (UoM). He is also an honorary professor at Australian National University (ANU). He is listed as a top 2% most cited researcher for AI and Image Processing in the Stanford database and his papers are cited 13,000 times with h-factor of 50. He was a

distinguished Lecturer of IEEE Computational Intelligence Society (2018-21). He supervised 50 PhD students and 16 postdocs at UoM and ANU to completion. His leadership roles include Head, School of Engineering at ANU and Associate Dean of the Engineering and IT school of UoM.

Speaker 2: Prof. Wei-Neng Chen
South China University of Technology

Title: Distributed & Multiplex-Cooperative Swarm Intelligence Algorithms

Abstract

The national "New Generation Artificial Intelligence Development Plan" lists crowd intelligence as one of the key directions in artificial intelligence theory and technology research. As a major research direction in crowd intelligence, swarm intelligence (SI) and evolutionary computation (EC) methods simulate the social behavior of animal crowds and have been widely used in industrial optimization applications. Recently, the rapid development of technologies such as the Internet of Things (IoT) and edge-cloud computing opens up new opportunities to develop a new generation of SI & EC methods on distributed computing platforms, as the inherent parallel and distributed characteristics of SI & EC are compatible with the IoT and edge-cloud computing. To this end, this report introduces a new generation of SI & EC methods with multiplex-cooperation on distributed platforms, providing a new way to solve complex and large-scale decision-making and optimization problems driven by distributed big data. First, the overall framework of distributed & multiplex-cooperative SI algorithms is proposed. Then, the multiplex-cooperative mechanism is explained from three different perspectives, including dimensional cooperation, data cooperation , and objective cooperation . Finally, some applications of related methods are presented.

Biography

Wei-Neng Chen (Senior Member, IEEE) received the bachelor's and Ph.D. degrees in computer science from Sun Yat-sen University, Guangzhou, China, in 2006 and 2012, respectively. Since 2016, he has been a Full Professor with the School of Computer Science and Engineering, South China University of Technology, Guangzhou, China. He has coauthored over 100 international journal and conference papers, including more than 60 papers published in the IEEE TRANSACTIONS journals. His current research interests include computational intelligence, swarm intelligence, network science, and their applications. Dr. Chen was a recipient of the IEEE Computational Intelligence Society (CIS) Outstanding Dissertation Award in 2016, and the National Science Fund for Excellent Young Scholars in 2016. He is currently the Vice-Chair of the IEEE Guangzhou Section. He is also a Committee Member of the IEEE CIS Emerging Topics Task Force. He serves as an Associate Editor for the IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS, and the Complex & Intelligent Systems.

Speaker 3: Prof. Zhiwen Yu
South China University of Technology

Title: Ensemble learning and its application

Abstract

Ensemble learning, as one research hot spot, aims to integrate data fusion, data modeling, and data mining into a unified framework. In this talk, we review the research progress of the mainstream approaches of ensemble learning and classify them based on different characteristics at first. then, we present challenges and possible research directions for each mainstream approach of ensemble learning, and we also give an extra introduction for the combination of ensemble learning with other machine learning hot spots such as deep learning, reinforcement learning, etc. Finally, transfer clustering ensemble approach is proposed and presented in detail.

Biography

Zhiwen Yu is a Professor in School of Computer Science and Engineering, South China University of Technology, China. He received the Ph.D. degree from the City University of Hong Kong, Hong Kong, in 2008. Dr. Yu has authored or coauthored more than 170 refereed journal articles and international conference papers, including 62 articles in the journals of IEEE Transactions, h-index 39, i10-index 119，Google citation 5574. He is an Associate Editor of the IEEE Transactions on systems, man, and cybernetics: systems. Dr. Yu is in charge of or take part in more than 30 research projects, such as the National Natural Science Foundation of China (the Key Program, the General Program and the Youth Program), National Natural Science Foundation of China for Excellent Young Scientists, the Key R&D Program of Guang Dong Province, and so on. He is a senior member of IEEE and ACM, a Member of the Council of China Computer Federation (CCF).

Speaker 4: Prof. Thomas Weise
Hefei University

Title: Frequency Fitness Assignmen

Abstract

Optimization problems are situations where we have to pick one of many possible choices and want to do this in such a way that we reach a pre-defined goal at a minimum cost. Classical optimization problems include the Traveling Salesperson Problem, the Maximum Satisfiability Problem (MaxSat), and the Bin Packing problem, for example. Since these problems are NP-hard and solving them to optimality would require exponential runtime in the worst case, metaheuristic algorithms have been developed that deliver near-optimal solutions in acceptable runtime. Examples for classical metaheuristics are the (1+1) EA, Simulated Annealing (SA), and the Standard Genetic Algorithm (SGA). Since we want that such algorithms should behave the same in both quick benchmarking experiments and in practical application, we would like them to exhibit invariance properties. Whereas the (1+1) EA is invariant under all order-preserving transformations of the objective function value, SA is not invariant under scaling of the objective function and the SGA is not invariant under translations of the objective function. Frequency Fitness Assignment (FFA) is an algorithm module that can be plugged into existing algorithms and makes them invariant under all injective transformations of the objective function value (which goes far beyond order-preserving transformations). We plug FFA into the (1+1) EA. We show that the resulting (1+1) FEA can solve Trap, TwoMax, and Jump problems in polynomial runtime, whereas the (1+1) EA needs exponential runtime. Moreover, the (1+1) FEA performs very significantly faster on the NP-hard MaxSat problem. We conclude the presentation with an outline of other properties of FFA and our other recent works.

Biography

Dr. Thomas Weise, German, was born in 1981. In 2005, Dr. Weise received his MSc degree in computer science from the Chemnitz University of Technology in Chemnitz, Germany. In 2009, he received a doctorate in computer science from the Kassel University in Kassel, Germany. After completing his doctoral research, he joined the University of Science and Technology of China as a postdoctoral fellow to continue to study the field of optimization algorithms. He was promoted to Associate Professor in 2011. In 2016, he accepted the position of Full Professor of Hefei University and became the founding director of the Institute of Application Optimization. In just a few years, Dr. Weise recruited and formed a strong

independent research team, whose members are doctors from top universities at home and abroad. Dr. Weise is the author of more than 120 peer-reviewed academic papers, including more than 45 articles and more than 65 conference papers. His works have been cited more than 4180 times, his h-index is 28, and his i10-index is 55. Dr. Weise has four first author papers in IEEE Transactions on Evolutionary Computation and one first author paper in IEEE Computational Intelligence Magazine. In addition, Dr. Weise has also published articles in Information Fusion, Pattern Recognition, Information Sciences, Applied Soft Computing, the European Journal of Operational Research, Evolutionary Computation, the Journal of Global Optimization, the Journal of Computer Science & Technology, the Journal of Combinatorial Optimization, and others.

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Conference Schedule

March 25, 2023	PRMVIA 2023
Keynote Speeches	
8:50-9:00	**Admission**
9:00-9:10	**Opening Ceremony** *PRMVIA General Chair: Prof. Juanying Xie,* *Shaanxi Normal University, China*
9:10-9:20	**Welcome Address** *PRMVIA General Chair: Prof. Jin Zhang,* *Changsha University of Science & Technology, China*
9:20-10:00	**Distinguished Talk 1: Distributed & Multiplex-Cooperative Swarm Intelligence Algorithms** *Prof. Weineng Chen, South China University of Technology, China*
10:00-10:40	**Distinguished Talk 2: Ensemble learning and its application** *Prof. Zhiwen Yu, South China University of Technology, China*
10:40-10:50	**Photograph**
10:50-11:30	**Distinguished Talk 3: Frequency Fitness Assignment** *Prof. Thomas Weise, Hefei University, China*

March 25, 2023	PRMVIA 2023	
Time	**Title**	**Speaker**
13:30-14:10	**Distinguished Talk 4: Socially responsible AI with applications in Health** *Prof. Saman Halgamuge, University of Melbourne, Australia*	
14:10-14:20	1. Robust broad learning system for pattern regression	*Licheng Liu*
14:20-14:30	2. Multi-Modal Pretraining Based on Contrastive Learning and its Application in Medical Domain	*Yi Zhu*

14:30-14:40	3. Zero-Shot Learning based on Vision Transformer	*Qianwei Hu*
14:40-14:50	4. Collaborative Learning-based Dual Network for Few-Shot Image Classification	*Min Xiong*
14:50-15:00	5. DA-YOLOv5 Improved YOLOv5 based on Dual Attention for Object Detection on Coal Chemical Industry	*Yan Wang*
15:00-15:10	6. Binary-like Real Coding Genetic Algorithm	*Yongkang Lan*
15:10-15:20	7. Face Image Reliability and Cognitive Analysis	*Lifang Zhou*
15:20-15:30	8. University Innovation Lab full-space 3D visualization display system based on 3D real sense and panoramic technology	*Xianhui Yu*
15:30-15:40	**Photograph**	
15:40-15:50	9. SimpleFusion: 3D Object Detection by Fusing RGB Images and Point Clouds	*Yongchang Zhang*
15:50-16:00	10. Identification of Dangerous Rural Houses Using Oblique Photogrammetry and Photo Recognition Technology	*Yin Liu*
16:00-16:10	11. Hybrid attention deep adaptive residual graph convolution network for few-shot classification	*Guang Liu*
16:10-16:20	12. Identification Of Imaging Features Of Diabetes Mellitus And Tuberculosis Based On YOLOv8x Model Combined With RepEca Network Structure	*Linjun Jiang*
16:20-16:30	13. Object Detection Algorithm for Railway Scenes Based on Infrared and RGB Image Fusion	*Xin Xu*
16:30-16:40	14. Research on fear mental resilience training based on virtual reality and dynamic decision fusion	*Yangzhao Yu*
16:40-16:50	15. Robust Salient Object Detection via Adversarial Training	*Ao Wang*
16:50-17:00	**Award Ceremony**	

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Meeting Minutes