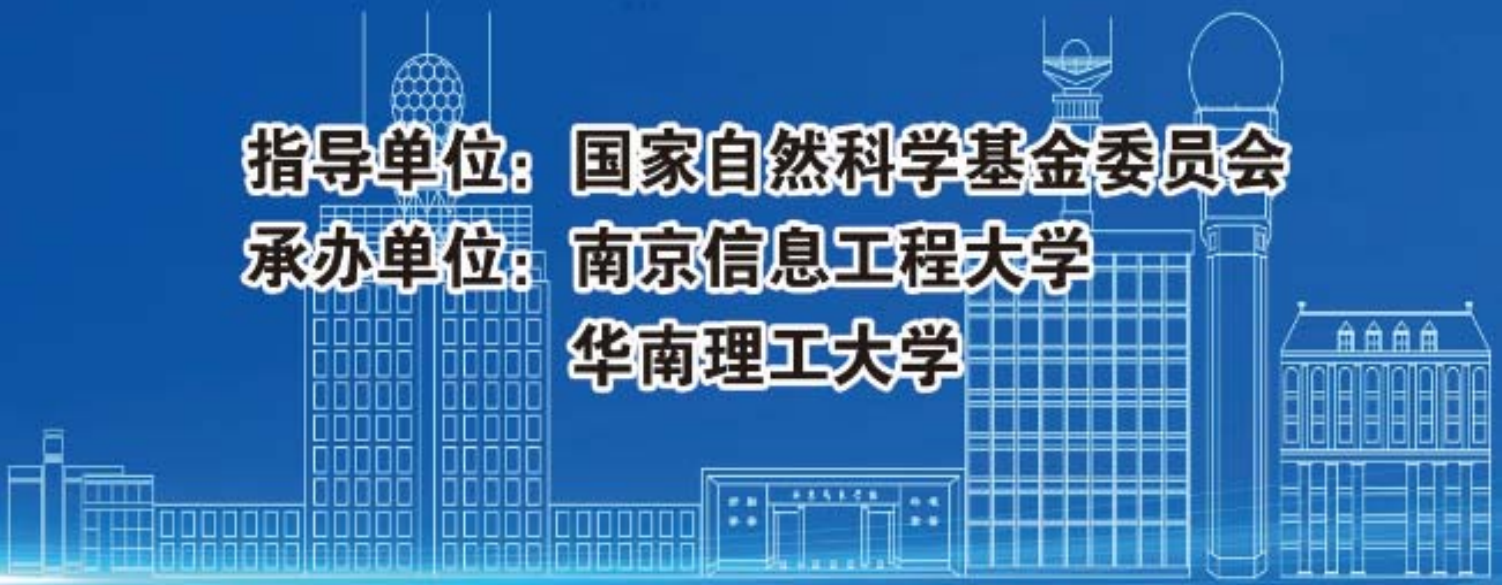
The 2022 International Conference on Information, Cybernetics, and Computational Social Systems
(IEEE ICCSS 2022)

会议手册



指导单位：国家自然科学基金委员会

承办单位：南京信息工程大学

华南理工大学

2022年12月2–4日

中国 · 南京

2022 年第 9 届 IEEE ICCSS 会议日程

时间：2022 年 12 月 2 日-4 日

线下地点：南京 南气宾馆 滨江厅　**线上会议号：**215-749-791（腾讯）

会议名称：IEEE 信息、控制论和计算社会系统国际会议（IEEE ICCSS 2022）

会议日程安排			
12 月 2 日（星期五），南气宾馆，13:00—21:00，报到注册			
12 月 3 日（星期六），大会报告			
上午	**08:00—08:20**	南京信息工程大学李北群校长、会议主席陈俊龙院士欢迎致辞 吴国政 国家自然科学基金委员会信息科学部二处处长 主持人：金自康 副校长	
	08:20—09:00	大会主题报告 1 唐立新 院士 东北大学 **Tile: Systems Optimization for Smart Industry** 主持人：刘　博 副校长	
	09:00—09:40	大会主题报告 2 罗智泉院士 香港中文大学（深圳） **Tile：Efficient and Trustworthy AI and its Applications to 5G networks** 主持人：葛泉波 教 授	
	09:40—10:00	茶　歇	
	10:00—11:00	大会主题报告 3 Imre J. Rudas Obuda University, Budapest, Hungary **Tile：Digital Transformation & Artificial Intelligence：Pillars of the 21st Century** 主持人：戴跃伟 教授	
中午	**12:00—14:00**	午餐	
下午	**14:00—17:40**	特邀报告	
	14:00—14:40	**特邀报告** 1 李少远　教授、副校长 青岛科技大学 上海交通大学教授 Title: Distributed Model Predictive Control for Plant-Wide Engineering Systems	主持人： 邓志良 教授 南京信息工程大学
	14:40—15:20	**特邀报告** 2 孙长银 教授、副校长 安徽大学 Tile: Multi-agent Transfer Reinforcement Learning With Efficient Exploration	

	15:20—15:40	茶歇	
	15:40—16:20	**特邀报告** 3 李肯立 教授、副校长 湖南大学 Tile: The Application of Intelligent Ultrasound Based on End-edge-cloud Collaborative Architecture	主持人： 顾菊萍 教授、校长 苏州科技大学
	16:20—17:00	**特邀报告** 4 苏宏业 教授 浙江大学 Tile: Cooperation and Optimization in Industrial Predictive Control System：Theory and Application	主持人： 康宇 教授 中国科学技术大学
	17:00—17:40	**特邀报告** 5 吴小俊 教授 江南大学 Tile: Visual Fusion for Smart City Based on Deep Learning	主持人： 陈谋 教授 南京航空航天大学
12 月 4 日（星期日）			
特邀报告			
上午	**08:30—09:10**	**特邀报告** 6 郭雷 教授 北京航空航天大学 Tile: Refined Anti-Disturbance Control and Applications for Unmanned Systems: Toward to Safety, Green and Immunity	主持人： 李世华 教授 东南大学
	09:10—09:50	**特邀报告** 7 薛建儒 教授 西安交通大学 Tile: Some Challenging problems of Autonomous Driving	主持人： 曹东璞 教授 清华大学
	09:50—10:10	茶 歇	
	10:10—10:50	**特邀报告** 8 查红彬 教授 北京大学 Tile: Dynamic Vision and SLAM： The Way of Online Learning	主持人： 操晓春 教授 中山大学
	10:50—11:30	**特邀报告** 9 夏元清 教授 北京理工大学 Tile: Workflows Scheduling in Cloud Computing	主持人： 虞文武 教授 东南大学
	11:30—12:10	**特邀报告** 10 耿新 教授 东南大学 Tile: The "Gene" of Machine Learning: Make Machines Learn Like Humans	主持人： 李智军 教授 中国科学技术大学
中午	**12:00—14:00**	午餐	

Keynote Speech 1

Title: Systems Optimization for Smart Industry

Prof. Lixin Tang

Northeastern University

Abstract: Systems optimization is the core basic theory of decision-making in smart industry, as well as the heart and engine of data analytics. This talk will discuss some systems modeling methods and optimization solution methods we have been working on. The systems modeling methods are to quantitatively describe different practical problems with proper formulations, including set-packing model, space-time network model, and continuous-time based model. The optimization solution methods include: 1) Integer optimization to optimally solve typical combinatorial optimization problems based on mathematical programming. According to the structure features of the problems, different methods are designated including branch-and-price, Lagrangian relaxation, Benders decomposition, outer approximation, and branch-and-cut. 2) Convex optimization is the core of machine learning. It is also used to solve practical continuous optimization problem. Major methods are discussed, such as gradient descent, alternative direction, second order cone, and semidefinite. Additionally, duality theories are used to improve their efficiency. 3) Intelligent optimization to solve the large-scale optimization problems with high non-linearity, dynamics, or multi-objectives. Various intelligent optimization algorithms will be discussed, including incremental dynamic DE algorithm, individual-dependent DE algorithm, and MOEA algorithm. 4) Topology optimization is used to scientifically design material layout within a given physical space, so as to maximize the system performance while satisfying a given set of loads and boundary conditions and constraints. It is widely used in lightweight design for mechanical equipment in smart industry. Major topology optimization solution methods to handle discrete structure and continuum structure are discussed. Overall, systems optimization provides the scientific basis for decision-making and data analytics in smart industry.

Professor Lixin Tang is the Vice President of Northeastern University, China, a member of Chinese Academy of Engineering, the Director of Key Laboratory of Data Analytics and Optimization for Smart Industry, Ministry of Education, China, the Director of Center for Artificial Intelligence and Data Science, and the Director and Chair Professor of the National Frontiers Science Center for Industrial Intelligence and Systems Optimization, Northeastern University. He is also a member of the discipline review group of the State Council for Control Science and Engineering, the Deputy Director of Artificial Intelligence Special Committee in Science and Technology Commission, Ministry of Education, China, Chief Expert in optimization algorithms and software decision-making advisory panel of China Association for Science and Technology, the Vice President of Chinese Society for Metals, the Vice President of Operations Research Society of China (ORSC), and the Founding Director of Data

Analytics and Optimization Society for Smart Industry of ORSC.

His research interests cover industrial intelligence and systems optimization theories and methods, covering industrial big data, data analytics and machine learning, deep learning and evolutionary learning, reinforcement learning and dynamic optimization, convex and sparse optimization, integer and combinatorial optimization, and computational intelligence-based optimization. For technologies, he mainly investigates on systems optimization technology for plant-wide production and inventory planning, production and logistics batching and scheduling, process optimization and optimal control; quality analytics technology such as process monitoring, equipment diagnosis, and product quality perception; industrial intelligence technology such as image and speech understanding and visualization. Meanwhile, he applies the above theories and technologies to engineering applications in steel manufacturing industry, equipment/chip manufacturing industry, energy industry, logistics industry and information industry.

He currently serves as an Associate Editor of *IISE Transactions*, *IEEE Transactions on Evolutionary Computation*, *IEEE Transactions on Cybernetics*, *Journal of Scheduling*, *International Journal of Production Research*, and *Journal of the Operational Research Society*. Meanwhile, he is on the Editorial Board of *Annals of Operations Research*, and serves as an Area Editor of the *Asia-Pacific Journal of Operational Research*.

Keynote Speech 2

Title: Efficient and Trustworthy AI and its Applications to 5G networks

Prof. Zhi-Quan Luo

The Chinese University of Hong Kong (Shenzhen)

Abstract: As the main workhorse of artificial intelligence, deep neural networks (DNN) have led to spectacular successes in voice/face recognition applications among other things. However, training a good neural network that can generalize well and is robust to data perturbation is quite challenging. This talk will discuss efficient and trustworthy DNN training methods and their applications in 5G networks. In particular, three fundamental research topics will be discussed: theoretical analysis of the most popular DNN training algorithm called ADAM; efficient distributed DNN training algorithms; and understanding why DNNs are fragile and how to obtain robustness. Applications of DNN in modeling and optimization of the performance of 5G networks will be presented. Potential application of other AI techniques such as reinforcement learning to future communication networks will also be discussed.

Zhi-Quan Luo (Fellow, IEEE) received the B.S. degree in applied mathematics from Peking University, China, and the Ph.D. degree in operations research from MIT in 1989. From 1989 to 2003, he held a faculty position with the ECE Department, McMaster University, Canada. He held a tier-1 Canada Research Chair of information processing, from 2001 to 2003. After that, he was a Full Professor at the ECE Department, University of Minnesota, and an endowed ADC Chair of digital technology. He is currently the Vice President (Academic) at The Chinese University of Hong Kong (Shenzhen) and the Director at the Shenzhen Research Institute of Big Data (SRIBD). He has published over 350 refereed papers, books, and special issues. His research mainly addresses mathematical issues in information sciences, with particular focus on the design, analysis, and applications of large-scale optimization algorithms. He is a fellow of SIAM. He was elected as a fellow of the Royal Society of Canada in 2014 and a foreign member of the Chinese Academy of Engineering (CAE) in 2021. He received the four Best Paper Awards from the IEEE Signal Processing Society, the one Best Paper Award from EUSIPCO, the Farkas Prize from INFORMS and the prize of Paul Y. Tseng Memorial Lectureship in Continuous Optimization, and some best paper awards from international conferences. In 2021, he was awarded 2020 ICCM Best Paper Award by the International Consortium of Chinese Mathematicians. Editor-in-Chief for IEEE Transactions on Signal Processing (2012-2014) and served as the Associate Editor for many internationally recognized journals.

Keynote Speech 3

Title: Digital Transformation & Artificial Intelligence：Pillars of the 21st Century

Prof. Imre J. Rudas

Obuda University, Budapest, Hungary

Abstract: **Digital transformation is a** cultural, organizational and operational change of an organization, industry or ecosystem through a smart integration of digital technologies, processes and competencies across all levels and functions. The speech covers the main streams of digital transformation in industry and business. Detailed parts will be devoted to Artificial Intelligence, Machine Learning, Deep learning, Big Data, Internet of Things, System of Systems, Cyber Physical Systems, and Blockchains.
The last part of the lecture will discuss the questions: How far do we go? What are the expectations and the question of Singularity?

Imre J. Rudas graduated in Budapest in 1971 in Mechanical Engineering, received the Master Degree in Mathematics from the Eötvös Loránd University, Budapest, the Ph.D. in Robotics from the Hungarian Academy of Sciences in 1987, while the Doctor of Science degree from the Hungarian Academy of Sciences in 2004. He is Rudolf Kalman Distinguished Professor, Rector Emeritus and Professor Emeritus of Óbuda University.

He received Doctor Honoris Causa degree from the Technical University of Košice, Slovakia, from “Polytechnica” University of Timisoara, Romania, from Óbuda University, and from Slovak University of Technology in Bratislava. He was awarded by the Honorary Professor title in 2013 and Ambassador Title by Wroclaw University of Science and Technology.

He is a Life Fellow of IEEE and the Junior Past President of IEEE Systems, Man, and Cybernetics Society. He is a Fellow of International Fuzzy systems Association.

His present areas of research activities are Computational Cybernetics, Cyber Physical Control, Robotics, Systems of Systems. He has edited and/or published 22 three books, published more than 850 papers in international scientific journal, conference proceedings and book chapters, and received more than 7000 citations.

Invited Talk I-1

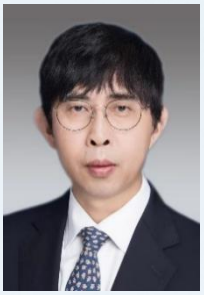
Title：Distributed Model Predictive Control for Plant-Wide Engineering Systems

Prof. Shaoyuan LI

Qingdao University of Science and Technology

Shanghai Jiao Tong University

Abstract: The distributed system framework, where each subsystem is controlled by an independent controller, has the advantages of error-tolerance, less computational effort, and being flexible to system structure. Thus the distributed control framework is usually adopted in this class of system, in spite of the fact that the dynamic performance of centralized framework is better than it. Thus, how to improve global performance under distributed control framework is a valuable problem. This talk systematically will introduce the different distributed predictive control for the plant-wide system, including the system decomposition, classification of distributed predictive control, unconstraint distributed predictive control and the stabilized distributed predictive control with different coordinating strategies for different purposes, as well as the implementation examples of distributed predictive control. The major new contribution of this book is to show how the distributed MPCs can be coordinated efficiently for different control requirements, namely the network connectivity, error tolerance, performance of entire closed-loop system, calculation speed, etc., and how to design distributed MPC.



Shaoyuan Li received his PhD degree in Automatic Control and Applications from Nankai University of China in 1997 and he was a Post Doctor in the Department of Automation in Shanghai Jiao Tong University from March 1998 to March 2000. His research areas include model-predictive control, adaptive control, intelligent control and industrial applications. He has published more than 200 papers in leading journals both at home and abroad. He is the PI of over 20 projects supported by the National Nature Science Foundation of China (NSFC), the High Technology Research and Development Program of China and Shanghai Science and Technology Commission. His main achievements won the First Prize of the 2006 Shanghai Natural Science Award (ranking the first), the Second Prize of the first Yang Jiache Science and Technology Award in 2010, the First Prize of the Natural Science Award of CAA in 2016 (ranking the first), the Second Prize of the 2017 National Natural Science Award (ranking the second), the Outstanding Prize of Shanghai Teaching Achievement Award in 2017 (ranking the first), and the First Prize of National Teaching Award by Ministry of Education in 2018 (ranking the first). In 2008, he was awarded with the National Outstanding Youth Fund by NSFC. Moreover, he was entitled Shanghai Elite Teacher and nominated for Baogang Outstanding Teacher Award. He was also enlisted National Bai-Qian-Wan Talent Plan.

Invited Talk I-2

Title: Multi-agent Transfer Reinforcement Learning With Efficient Exploration

Prof. Changyin Sun

Anhui University

Abstract: The intelligence of multi-agent systems is widely studied in many applications like multi-robot coordination, intelligent transport, and war gaming, etc., which is an important part of distributed artificial intelligence. In the past decade, the trail-and-error-based deep reinforcement learning (DRL) method combines the powerful ability of non-linear function approximation of deep neural networks and the idea of dynamic programming, and has garnered particular attention in the research of artificial intelligence. How to combine the DRL technology and multi-agent systems has become a hot topic of distributed artificial intelligence in recent years. However, because of the problems of environment non-stationarity, credit assignment, sparse reward, and non-monotonic tasks, etc., it is challenging for agents to explore in the environment cooperatively, which makes agents fail to improve the performance of the system. Hence, there still be some challenges when deal with the problems of multi-agent systems with DRL methods. How to solve those problems will be the key breakthrough to stronger artificial intelligence. The exploring ability of the multiple agents will directly influence the quality of the data from environment, as well as the performance of the neural networks. Hence, efficient exploration is the key of policy optimization and performance improvement. Based on the above background, this speech will introduce the multi-agent transfer reinforcement learning method with efficient exploration. By transferring the knowledge from source domain to target domain, the algorithms could take full use of the sampled data, and solve the tasks more quickly. For more details about the background, algorithms design of multi-agent transfer reinforcement learning, welcome to this speech.

Changyin Sun is currently a Professor and a Ph.D. Supervisor, and the Vice President in Anhui University. He is also an (Chinese Association of Automation) CAA Fellow. In 2008, he was selected into the New Century Excellent Talents Program of the Ministry of Education. In 2011, he was awarded the National Science Fund for Distinguished Young Scholars. He was the chief scientist of the national "New Generation Artificial Intelligence" major project, and the leader of the National Innovation Research Group. Currently, he is the executive director and deputy secretary-general of CAA, the chairman of the Artificial Intelligence and Robotics Education Committee, the executive director of the Chinese Association for Artificial Intelligence (CAAI), and the chairman of the Intelligent Control and Intelligent Management Professional Committee. In recent years, he has published 4 academic monographs, more than 300 SCI papers, and more than 6,000 citations.

Invited Talk I-3

Title: The Application of Intelligent Ultrasound Based on End-edge-cloud Collaborative Architecture

Prof. Kenli Li

Hunan University

Abstract: At present, Ultrasound (US) imaging is a widely used screening tool for defects examination and prenatal diagnosis. However, obtaining ultrasound standard plane is labour-intensive and requires operators with a thorough knowledge of fetal anatomy. There exist some problems of poor efficiency, low standardization and technology backward in standard plane obtaining, which leads to a high rate of misdiagnosis in diagnosing fetal malformations. The prenatal intelligent ultrasound system based on deep learning for quality assessment in the cloud, achieves the closed-loop of ultrasound plane quality assessment of the fetus' whole life cycle. Compared with the traditional manual operation, parallel and distributed technology are applied in the system to automatically detect the standard plane in real-time, which improves the model's efficiency for real-time clinical needs. And our system dramatically enhances work efficiency and relieves the work intensity of sonographers in practical clinical application.

Kenli Li, Vice President of Hunan University, Member of CCF, the Principal of the High Performance Computing Discipline Innovation Intelligence Introduction Base of the Ministry of Education, the Director of the Engineering Research Center of the Ministry of Education for High Performance Computing Application Software Technology, Vice Chairman of the National Supercomputing Innovation Alliance, Member of the Expert Committee of the New Generation Artificial Intelligence Industry Technology Innovation Alliance, Member of the General Expert Group of the National Key Research and Development Program of High Performance Computing, Chairman of CCF Changsha, Vice Chairman of Hunan Computer Society, Associate Editor of IEEE-TC/TSUSC/TII, editorial board member of "Computer Research and Development". He hosted more than 30 national, provincial and ministerial projects, including the national key research and development plans, and key projects of the Fund Committee. He won the First Prize of National Science & Technology Progress Award for Innovation Team (ranked 13th). His main research areas are parallel and distributed processing, supercomputing and cloud computing, high-performance computing for big data and artificial intelligence, etc.

Invited Talk I-4

Title: Cooperation and Optimization in Industrial Predictive Control System: Theory and Application

Prof. Hongye Su

Zhejiang University

Abstract: This report briefly reviews the history and current status of research on distributed control and optimization of industrial predictive control systems. The report takes "coupling modeling method—multi-layer and multi-subsystem predictive control cooperation—optimization and control integration" as the main line. First, we will explore the dynamic characteristics of process systems with complex mechanisms and propose the data-driven coupling modeling method based on causal analysis. The proposed method helps to establish a well-designed equipment association and solve the existing problems such as low calculation efficiency in process control. Then, from the perspective of the actual production situation, an online constraints adjustment strategy is designed based on the backoff mechanism to reasonably coordinate and balance the priority of each subsystem. In addition, considering the complex problem of multi-subsystem coordination when global constraints exist, a distributed control strategy based on artificial parameters and singular value decomposition is proposed to achieve cooperative control while ensuring the feasibility of the terminal set. Finally, the uncertain factors affecting process design and control are systematically analyzed from the perspective of optimization, and a method integrating real-time optimization and control based on extreme value search is proposed to compensate for the difference in the period of optimization and control, which improves the flexibility and credibility of integrated design under uncertain environment.

HONGYE SU received his Ph.D. degree from Zhejiang University in 1995. He was appointed as a professor in Dec. 2000 in the Institute of Advanced Control in Zhejiang University and as the deputy director of the Institute of Advanced Control from Oct. 1999 to Aug. 2008. Now, he is the deputy director of the Institute of Cyber-systems and Control in Zhejiang University.

His research interests include Process Control & Optimization Theory and Application. He is the author/coauthor of 100 journal papers, 6 books. Professor Su has undertaken more than ten national and provincial funds and state key projects as the principal investigator (PI), including National Outstanding Youth Science Foundation of China, National Natural Science Foundation of China, Teaching and Research Award Program for Outstanding Young Teachers in Higher Education Institutions of MOE, P.R.C., and projects for National High Technology Research and Development Program of China (863 Program), etc.

Invited Talk I-5

Title：Visual Fusion for Smart City Based on Deep Learning

Prof.Xiaojun Wu

Jiangnan University, China

Abstract: There is a huge amount of visual information in the construction of smart city (SC) in which the visual fusion is a very important topic. Deep Learning (DL) has found very successful applications in numerous different domains with impressive results. Visual Fusion (VisF) algorithms based on DL and their applications will be presented thoroughly in this keynote lecture in the context of SC. Initially, a brief introductory overview of related concepts will be given. Then, VisF employing DL will be presented in terms of pixel, feature, and decision level respectively. A comprehensive analysis of DL models will be offered and their typical applications will be discussed, including **I**mage **Q**uality **E**nhancement, **F**acial **L**andmark **D**etection, **O**bject **T**racking, Multi-**M**odal **I**mage **F**usion, **V**ideo **S**tyle **T**ransformation, and **D**eep **F**ake of **F**acial **I**mages respectively.

Xiao-Jun Wu received his B.S. degree in mathematics from Nanjing Normal University, Nanjing, PR China in 1991 and M.S. degree in 1996, and Ph.D. degree in Pattern Recognition and Intelligent System in 2002, both from Nanjing University of Science and Technology, Nanjing, PR China, respectively. He was a fellow of United Nations University, International Institute for Software Technology (UNU/IIST) from 1999 to 2000. From 1996 to 2006, he taught in the School of Electronics and Information, Jiangsu University of Science and Technology where he was an exceptionally promoted professor. He joined Jiangnan University in 2006 where he is currently a distinguished professor in the School of Artificial Intelligence and Computer Science, Jiangnan University. He won the most outstanding postgraduate award by Nanjing University of Science and Technology. He has published more than 400 papers in his fields of research. He was a visiting postdoctoral researcher in the Centre for Vision, Speech, and Signal Processing (CVSSP), University of Surrey, UK from 2003 to 2004, under the supervision of Professor Josef Kittler. His current research interests are pattern recognition, computer vision, fuzzy systems, and neural networks. He owned several domestic and international awards because of his research achievements. Currently, he is a Fellow of IAPR and AAIA.

Invited Talk II-1

Title：Refined Anti-Disturbance Control and Applications for Unmanned Systems: Toward to Safety, Green and Immunity

Prof. Lei GUO

Beihang University

Abstract: In this presentation, we will provide an overview of the recent theoretical development of the refined anti-disturbance control (RADC) and the composite hierarchical anti-disturbance control (CHADC) methodologies for multiple disturbance systems, and introduce its applications for Unmanned Systems under complex environments. It will be shown how the RADC can realize a safety, “green” and “immune” intelligent control strategy with both less-conservative anti-disturbance capability and energy conservation ability. It will also be shown its effectiveness for many Unmanned Systems to guarantee the safety and “survival” under “extreme” environments.

Prof. Lei GUO was born in Qufu, China. He received his BS and MS degree both from Qufu Normal University, in 1988 and 1991 respectively, and PhD degree from Southeast University, Nanjing, in 1997. From 1998 to 2003, he once worked with Hong Kong University, IRCCyN (France), Loughborough University (UK), and University of Manchester Institute of Science and Technology (UMIST), UK. Currently, he is a distinguished professor at Beihang University (BUAA), China. He is an awardee of both the National Natural Science Award and National Technological Invention Award of China. He has published more than 320 SCI-indexed papers and 6 monographs, and authorized more than 150 patents. His research interests include anti-disturbance control theory and its applications.

Invited Talk II-2

Title：Some Challenging problems of Autonomous Driving

Prof. Jianru Xue

Xi'an Jiaotong University

Abstract: Automated driving may become a reality in 2020s. However, making a self-driving car capable of autonomous intelligence in real traffics still faces many open and challenging problems. In this talk, we focus on three key problems towards autonomous driving: situation understanding and prediction, and driving policy learning. We present the current status and future trends of these two topics. We also report recent research theme undertaken in our research group.

Jianru Xue, PhD，Professor of Xi'an Jiaotong University. His research interests include Computer Vision, Pattern Recognition and Machine Learning, and Autonomous Driving and Hybrid-Augmented Intelligence. He has published 100+ papers in top cited journals and conferences including IEEE Trans on TPAMI/TIP, CVPR, ICCV, ECCV, ICRA,IROS, etc. He and his team won the IEEE ITSS Institute Lead Award in 2014, and the best application paper award in Asian Conference on Computer Vision 2012. He is co-author of the book Statistical Learning and Pattern Analysis approaches to Image and Video Processing，published by Springer-verlag in 2009. He had severed as organization chair or co-chair of 10+ international conferences. He also served on the technical program committee and area chairs of peer-reviewed conferences including CVPR, ICCV,IROS, and so on.

Invited Talk II-3

Title：Dynamic Vision and SLAM：The Way of Online Learning

Prof. Hongbin Zha

Peking University

Abstract: One of the main tasks of three-dimensional vision is to realize the geometric and structural reconstruction of 3D scenes by using the changes of sensor viewpoint and the constraints of imaging geometry. Therefore, the relationship between dynamic vision and three-dimensional vision accompanied by sensor movement is becoming increasingly close, and SLAM (Simultaneous Localization and Mapping) technology has once again become a research hotspot in the field of three-dimensional vision. In order to improve the application ability of dynamic vision system in real complex scenes, we should fully strengthen the environmental adaptability of vision system, and online learning method is an effective way to achieve this goal. This report will introduce some of our recent ideas and attempts around the problem of SLAM based on online learning. The main contents include: sequential confrontation learning method for self-supervised visual odometer and self-supervised SLAM learning with online adaptive capability.。

Zha Hongbin is a professor in the School of Intelligence of Peking University. And he is the director of the Key Laboratory of Machine Perception and Intelligence of the Ministry of Education. He is mainly engaged in the research of computer vision and intelligent human-computer interaction, and has made a series of achievements in 3D visual geometric computing, 3D reconstruction and environmental geometric modeling, and sensor Simultaneous Localization And Mapping. He has published more than 350 academic journals and papers of international conferences, including more than 140 papers of international journals such as IEEE T-PAMI, IJCV, IEEE T-VCG, IEEE T-RA, and international academic conferences such as ICCV, ECCV, CVPR.

Invited Talk II-4

Title：Workflows Scheduling in Cloud Computing

Prof. Yuanqing Xia

Beijing Institute of Technology

Abstract: Cloud computing becomes a promising technology to reduce computation cost by providing users with elastic resources and application-deploying environments as a pay-per- use model. More workflow applications have been moved or are being migrated to the cloud. Scheduling workflows turns to the main bottleneck for increasing resource utilization and quality of service (QoS) for users. In response to these challenges, we propose a Scoring and Dynamic Hierarchy-based NSGA-II (Nondominated Sorting Genetic Algorithm II) to minimize both makespan and cost of workflow execution and design a Multi-swarm Co-evolutionary-based Hybrid Optimization (MCHO) algorithm for multiple-workflow scheduling to minimize total makespan and cost while workflow deadline constraints. Furthermore, a, off-line batch workflows (DIWs) and online stream workflows (DSWs)] hybrid dynamic scheduling problem in cloud container services is considered and a scheduling algorithm (SHWSA) is proposed to minimize the cost and improve resource utilization for scheduling these stochastic hybrid workflows. Finally, we develop a cloud workflow and cloud service management platform to support the implementation and implementation of scheduling algorithms and manage workflow efficiently.

Yuanqing Xia received his Ph.D. degree in control theory and control engineering from Beihang University, Beijing, China, in 2001. He was a research fellow in several academic institutions during 2002 to 2008, including Chinese Academy of Sciences, the National University of Singapore and the University of Glamorgan, UK. From February 2007 to June 2008 he was a guest professor with Innsbruck Medical University, Austria. Since 2004, he has been with Beijing Institute of Technology (BIT), China, where he is currently a chair professor, as well as the Dean of the School of

Automation, BIT. He is currently the director of specialized committee on cloud control and decision of Chinese Institute of Command and Control (CICC), a member of the 8th Disciplinary Review Group of the Academic Degrees Committee of the State Council, a member of the Big Data Expert Committee of the Chinese Computer Society, and the vice chairman of the Internet of Things Working Committee of the Chinese Institute of Instrumentation. He was granted by the National Outstanding Youth Foundation of China in 2012, and was honored as the Yangtze River Scholar Distinguished Professor in 2016 and the Leading Talent of the Chinese Ten Thousand Talents Program. He has published sixteen monographs in Springer, John Wiley, and CRC, and more than 400 papers in international scientific journals, and has been a highly cited scholar since 2014 by Elsevier. He is a deputy editor of the Journal of Beijing Institute of Technology, an associate editor of Gyroscopy and Navigation, Control Theory and Applications, Control and Decision, etc. He obtained the Second National Award for Science and Technology (No. 2) in 2011, He obtained the Second Award of the Beijing Municipal Science and Technology (No. 1) in 2010 and 2015, the Second Natural Science Award of the Ministry of Education (No. 1) in 2012 and 2017, and the Second Wu Wenjun Artificial Intelligence Award in 2018 (No. 1). More than five of his students have obtained the excellent doctoral thesis awards from Chinese Association of Automation or Chinese Institute of Command and Control. His research interests include cloud control systems, networked control systems, robust control and signal processing, active disturbance rejection control, unmanned system control, and flight control.

Invited Talk II-5

Title：The "Gene" of Machine Learning: Make Machines Learn Like Humans

Prof. Xin Geng

Southeast University

Abstract: Development of modern machine learning technology, especially deep learning, is one of the main drivers of this round of AI boom. Deep learning requires a lot of training data and computing resources. On the other hand, humans can learn a new concept quickly with a small number of examples. This is because that the brain of a newborn is not random. The evolution of human beings over thousands of years has initialized the brain through human genes. Inspired by this, we propose the "gene" of machine learning - learngene. A new learning framework based on learngene is proposed, which could be a game-changer in the current deep learning field. Now we only need to perform large-scale training on open-world tasks at a few "model vendors", while a task-specific "client" only needs to buy a learngene from the "model vendor" and initializes his/her own lightweight model. The initialized model can then quickly adapt to the target task with a small number of examples, just like human learning.

Xin Geng is a chair professor of Southeast University, China. His research interests include machine learning, pattern recognition, and computer vision. He has published over 100 refereed papers in these areas. He has been an Associate Editor of IEEE T-MM, FCS and MFC, a Steering Committee Member of PRICAI, a Program Committee Chair for conferences such as PRICAI'18, VALSE'13, etc., an Area Chair for conferences such as IJCAI, CVPR, ACMMM, ICPR, and a Senior Program Committee Member for conferences such as IJCAI, AAAI, ECAI, etc. He is a Distinguished Fellow of IETI and a Senior Member of IEEE.

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