ICC 2023

2023 3rd International Conference on Intelligent Communications and Computing

第三届智能通信与计算国际学术会议

会议手册

CONFERENCE MANUAL

2023年11月24-26日

中国·南昌·南昌前湖酒店

欢迎辞
Welcome Address

On behalf of the organizing committee, it is our great pleasure to extend a warm welcome to all of you to 2023 3rd International Conference on Intelligent Communications and Computing（ICC 2023）, which is held during November 24-26, 2023 in Nanchang, China.

ICC 2023 is to bring together innovative academics and industrial experts in the field of Intelligent Communications and Computing to a common forum. The primary goal of the conference is to promote research and developmental activities in Intelligent Communications and Computing. And another goal is to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working all around the world.

As we gather here, we celebrate the transformative power of technology and its profound impact on society. Throughout the conference, you will have the opportunity to engage in insightful keynote/invited presentations and enlightening technical sessions. This year, the program is highlighted by 4 keynote speakers. We would like to express our heartfelt gratitude to all the speakers, session chairs, authors, reviewers, and volunteers who have contributed to the success of this conference. Your dedication and expertise have been instrumental in shaping an exceptional program that promises to inspire and enlighten.

Lastly, we encourage all of you to make the most of this conference by actively engaging in discussions, sharing your insights, and embracing the spirit of collaboration. Your active participation will undoubtedly contribute to the collective growth and advancement of the computer science and information technology community. Once again, we extend our warmest welcome to all of you. Thank you for being a part of 2023 3rd International Conference on Intelligent Communications and Computing!

参会指引
Conference Guidelines

会议地点 Venue

地点：前湖酒店-3楼多功能厅

Venue: 3F multi-function Hall - Qianhu Hotel

地址：江西省南昌市红谷滩新区学府大道616号

Address: No. 616 Xuexue Avenue, Honggutan New District, Nanchang City, Jiangxi Province

交通指引 Direction

* 距离南昌昌北国际机场：30km，31mins；

* Nanchang Changbei International Airport: 30km, 31mins

*距离南昌站：15km，23mins；

* Nanchang Station: 15km, 23 mins

*距离南昌西站：7km，18mins；

* Nanchang West Railway Station: 7km, 18 mins

线上参会方式 Online Participation

主会场　ZOOM会议号:876 3044 0860　密码: 231125

分会场1　ZOOM会议号:876 3044 0860　密码: 231125

分会场2　ZOOM会议号:898 8263 1471　密码: 231125

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Conference Introduction

会议简介
About ICC 2023

2023 3rd International Conference on Intelligent Communications and Computing（ICC 2023）is held in Nanchang, China during November 24-26, 2023.

ICC is a forum for presenting excellent results and new challenge that facing the field of Intelligent Communications and Computing. The conference was directed by China Institute of Communications, Jiangxi Communications Administration, Jiangxi Association for Science and Technology, IEEE Communications Society and co-sponsored by Nanchang University and Jiangxi Institute of Communications.

It brings together the experts, scholars, researchers and related practitioners from all around the world to communicate their research results and address the open issues in Intelligent Communications and Computing.

On behalf of the Conference Committee, we warmly invite you, Intelligent Communications and Computing scientists, engineers or technicians, graduate students, enterprises, to take part in this unique and innovative conference with your enthusiasm to develop.

02

会议议程

Conference Agenda

会议议程
Conference Agenda

Friday afternoon, Nov. 24, 2023

Registration & Dinner

Venue: Lobby - Qianhu Hotel 签到地点：前湖酒店-大堂签到处	
15:00-18:00	Registration / 签到注册
18:30-20:00	Dinner / 晚餐

Saturday morning, Nov. 25, 2023

Opening Ceremony & Photography

Venue: Lobby - Qianhu Hotel 签到地点：前湖酒店-大堂签到处		
08:10-08:40	Registration / 签到注册	
Venue: 3F multi-function Hall - Qianhu Hotel 会议地点：前湖酒店- 3楼多功能厅 ZOOM Meeting ID: 876 3044 0860（Password: 231125）		
08:40-08:45	Opening Ceremony / 开幕式	主持人： 江西省通信学会 孙兵理事长
08:45-08:55	Welcome Speech / 领导致辞	
08:55-09:00	Photography / 大合照	

Saturday morning, Nov. 25, 2023

Keynote Speech & Lunch

Venue: 3F multi-function Hall - Qianhu Hotel 会议地点：前湖酒店- 3楼多功能厅 ZOOM Meeting ID: 876 3044 0860（Password: 231125）		
09:00-09:40	**Keynote Speech 1 / 主旨报告1** **Prof. Rui Zhang,** Academician of Singapore Academy of Engineering, IEEE Fellow, The Chinese University of Hong Kong, Shenzhen, China 张瑞教授，新加坡工程院院士，IEEE会士，香港中文大学（深圳） **Speech Title:** Intelligent Reflecting Surface (IRS) Empowered Wireless Networks: Recent Advance and Future Trend	主持人： 江西省通信学会 孙兵理事长
09:40-10:20	**Keynote Speech 2 / 主旨报告2** **Prof. Min Chen,** IEEE Fellow, IET Fellow, South China University of Technology, China 陈敏教授，IEEE/IET会士，国家中组部海外高层次人才，华南理工大学 **Speech Title:** Digital Intelligent World Empowered by 6G Fabric Smart Space	
10:20-10:40	Tea Break / 茶歇	
10:40-11:20	**Keynote Speech 3 / 主旨报告3** **Prof. Gexiang Zhang,** Foreign Member of Russian Academy of Natural Sciences, IET Fellow, Chengdu University of Information Technology, China 张葛祥教授，俄罗斯自然科学院外籍院士，IET 会士，成都信息工程大学 **Speech Title:** Spiking neural P systems: a branch of the third generation of neural networks	主持人： 南昌大学 信息工程学院 副院长(主持工作) 刘且根教授
11:20-12:00	**Keynote Speech 4 / 主旨报告4** **Prof. Haijun Zhang,** IEEE Fellow, University of Science and Technology Beijing, China 张海君教授，IEEE会士，国家杰出青年科学基金入选者，北京科技大学 **Title:** 6G Network Optimization	
12:00-14:00	Lunch Break / 午餐	

Saturday afternoon, Nov. 25, 2023

Invited Speech & Oral Presentation

Venue: 3F - Qianhu Hotel 会议地点：前湖酒店- 3楼		
Session	分会场1：306会议室 ZOOM ID:876 3044 0860 Password: 231125	分会场2：308会议室 ZOOM ID:898 8263 1471 Password: 231125
Chair	王正海，南昌大学	王振，南昌大学
14:00-14:20	**Invited Speech 1 / 特邀报告1** **Assoc. Prof. Shuai Ma,** Peng Cheng Laboratory, Shenzhen, China 马帅副教授，鹏城实验室 **Title:** Task-oriented Explainable Semantic Communications	**Invited Speech 2 / 特邀报告2** **Assoc. Prof. Peng Yu,** Beijing University of Posts and Telecommunications, China 喻鹏副教授，北京邮电大学 **Title:** A Digital Twin Driven Service Self-Healing Mechanism with Graph Neural Networks in 6G Edge Networks
14:20-14:30	**Oral Presentation 1** 王懿旭，河海大学 **Title:** BER Evaluation for Parallel-Relayed Underwater Wireless Optical Communication Systems over GGD Oceanic Turbulence	**Oral Presentation 2** 杨朔，哈尔滨工程大学 **Title：** A Hybrid Precoding Design Based on Alternate Minimization
14:30-14:40	**Oral Presentation 3** 温鑫岩，北京邮电大学 **Title：** A Link Quality Based Routing Method for Unstable Networks with Limited Bandwidth and Storage	**Oral Presentation 4** 杨正，福建师范大学 **Title:** Secure Transmission of Joint Radar and Communication Systems Assisted by NOMA
14:40-14:50	**Oral Presentation 5** 薛天奕，南昌大学 **Title：** Performance Analysis of Virtual-Real Synchronization in Digital Twin Network Trade-Offs between TimeLiness, Distortion, and Sustainability	**Oral Presentation 6** 温家进，南昌大学 **Title:** Secure Communication Scheme for IRS-UAV enabled Cognitive Network
14:50-15:00	**Oral Presentation 7** 尚博东，东方理工高等研究院 **Title:** LEO Satellite-Assisted Vehicular Edge Computing	**Oral Presentation 8** 江宇楠，南昌航空大学 **Title：** Overview of Key Node Evaluation in Complex Networks
15:00-15:10	**Oral Presentation 9** 梁梦丹，南昌大学 **Title：** Optimizing the Phase Shifts of RIS by MM algorithm in RIS-aided positioning systems	**Oral Presentation 10** 邹益玲，南昌航空大学 **Title:** Heterogeneous Network Node Classification Based on Graph Neural Networks
15:10-15:25	Tea Break / 茶歇	

Saturday afternoon, Nov. 25, 2023

Invited Speech & Oral Presentation

Venue: 3F - Qianhu Hotel 会议地点：前湖酒店- 3楼		
15:25-15:35	**Oral Presentation 11** 徐思雅，北京邮电大学 **Title:** When Neural Network Architecture Search Meets Federated Learning Parameter Efficient Fine Tuning	**Oral Presentation 12** 喻鹏，北京邮电大学 **Title:** A Link Quality Based Routing Method for Unstable Networks with Limited Bandwidth and Storage
15:35-15:45	**Oral Presentation 13** 赵晴川，重庆理工大学 **Title:** Differential Evolution based on Estimation of Distribution for C-DCOP	**Oral Presentation 14** 陈欢，福建商学院 **Title:** Application of an Improved Convolutional Neural Network-Based Method in Network Intrusion Detection
15:45-15:55	**Oral Presentation 15** 杨照，中国科学院大学 **Title:** Joint user clustering and power allocation for Indoor MIMO-NOMA-VLC Systems	**Oral Presentation 16** 刘俊龙，南昌大学 **Title:** Channel Estimation for STAR-RIS-Aided Communications Based on Deep Iterative Networks
15:55-16:05	**Oral Presentation 17** 尚翠丽，中国移动通信集团宁夏有限公司 **Title:** Application of OXC Technology in Yinchuan OTN Network	**Oral Presentation 18** 贺鹏飞，兰州交通大学 **Title:** Multivariate time series missing value filling based on Trans-GAN model
16:05-16:15	**Oral Presentation 18** 王琮茜，中国移动通信集团宁夏有限公司 **Title:** Application of OXC Technology in Yinchuan OTN Network	**Oral Presentation 19** 李长水，北京中电飞华通信有限公司 **Title:** High Performance Error Correction under Low SNR based on Deep Neural Network
16:15-16:25	**Oral Presentation 20** 温泽北，重庆邮电大学 **Title:** Collaborative filtering recommendation algorithm based on user preference and optimal clustering	**Oral Presentation 21** 张雪，北京印刷学院 **Title:** Fast Algorithm for CU Split in H.266/VVC Intra Based on Texture Information
16:25-16:35	**Oral Presentation 22** 徐静，西安邮电大学 **Title:** Analysis of adjacent frequency interference between Beidou RDSS received signal and 5G signal	**Oral Presentation 23** 张闰美，南昌航空大学 **Title:** Traffic Flow Prediction Based on Graph Convolutional Networks

Saturday afternoon, Nov. 25, 2023

Invited Speech & Oral Presentation

Venue: 3F - Qianhu Hotel 会议地点：前湖酒店- 3楼	
16:35-17:00	**Poster Presentation / 海报交流** • 王雪辉，海南大学 **Title:** Beamforming Design for Hybrid IRS-aided AF Relay Wireless Networks • 吴子君，中国电信 **Title:** End to End Scalable Image Coding for Machines • 董文斌，西安电子科技大学 **Title:** Speech Encoder Recognition Algorithm Based on Deep Learning • 郑佳一，东华大学 **Title:** System Log Anomaly Detection based on Spiking Neural Network Trained with Backpropagation • 余莲杰，南京航空航天大学 **Title:** Indoor Positioning Based on Frequency Fading Characteristics of Wideband Signals • 赵玉青，桂林电子科技大学 **Title:** On the Physical Layer Security of Hybrid PLC/VLC Network • 陈笑笑，华东交通大学 **Title:** Research on obstacle avoidance path planning of power inspection robot based on improved A algorithm and dynamic window algorithm • 蔡杨华，中国南方电网有限责任公司 **Title:** Path Planning Method for Power Inspection Robots Based on the Integration of A* Algorithm and Dynamic Window Approach • 张绪林，中国建筑第八工程局有限公司 **Title:** Improved Personnel Statistics Algorithm for Construction Main Working Face Based on YOLOv5 • 尚博东，东方理工高等研究院 **Title:** Multi-Satellite-Enabled Edge Computing: An Offloading and Computation Integration Approach • 吴思凡，南昌大学 **Title:** RIS-Assisted Indoor Visible Light Positioning Based on Sparse Bayesian Learning
17:00-17:10	Selection / 评选
17:10-17:20	Award / 颁奖
17:20-17:30	Closing Ceremony / 闭幕式

03 组织单位

Organization

组织单位
Organization

指导单位

中国通信学会 CHINA INSTITUTE OF COMMUNICATIONS

江西省通信管理局 Jiangxi Communications Administration

IEEE ComSoc IEEE Communications Society

江西省科学技术协会 JIANGXI ASSOCIATION FOR SCIENCE AND TECHNOLOGY

主办单位

南昌大学 NANCHANG UNIVERSITY

JXIC 江西省通信学会 JIANGXI INSTITUTE OF COMMUNICATIONS

承办单位

南昌大学信息工程学院

南昌大学人工智能工业研究院 Artificial Intelligence Industrial Research Institute, Nanchang University

江西信息通信科技服务站 Jiangxi Information and Communication Technology Service Station

中国通信学会江西科技志愿者分队 Jiangxi Science and Technology Volunteer Team, CIC

联合承办单位

上饶师范学院 ShangRao Normal University

江西省5G产业联合会 JIANGXI 5G INDUSTRY FEDERATION

协办单位

科大讯飞 iFLYTEK | 讯飞·苏州

AEIC

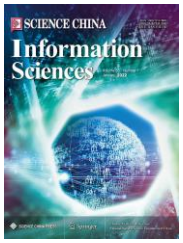
广东省艾思信息化学术交流研究院 Guangdong AiScholar Institute of Academic Exchange

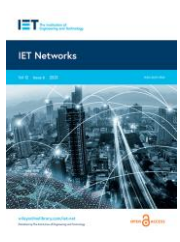
支持单位

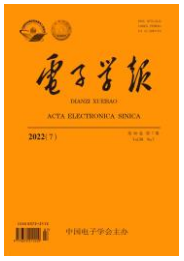
南昌市科学技术协会
NANCHANG ASSOCIATION FOR SCIENCE AND TECHNOLOGY

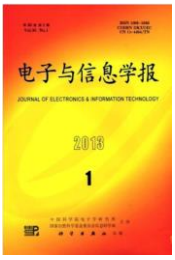
IEEE ComSoc
IEEE Communications Society
IEEE Technical Committee on Cognitive Networks (TCCN)

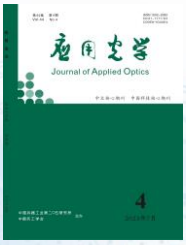
IEEE ComSoc
IEEE Communications Society
Signal Processing and Computing for Communications Technical Committee (SPCC-TC)











04

会议组委

Conference Committee

会议组委
Conference Committee

Steering Committee Chairs

Vice Director Yanchuan Zhang, China Institute of Communications, China

Director Xinggang Peng, Jiangxi Communications Administration, China

Secretary Ping Zeng, Jiangxi Association for Science and Technology, China

Prof. George K. Karagiannidis, IEEE Fellow, Aristotle University of Thessaloniki, Greece

Prof. Shiwen Mao, IEEE Fellow, AAIA Fellow, Auburn University, USA

Director Bing Sun, Jiangxi Institute of Communications, China

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Prof. Yuhao Wang, IET Fellow, IEEE Senior Member, Shangrao Normal University/Nanchang University, China

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Prof. Fuhui Zhou, IEEE Senior Member, Nanjing University of Aeronautics and Astronautics, China

Prof. Qingchun Chen, IEEE Senior Member, Guangzhou University, China

Prof. Dingcheng Yang, Nanchang University, China

Prof. Zhicheng Dong, Tibet University, China

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Prof. Zhenghai Wang, Nanchang University, China

Assoc. Prof. Zilong Liu, IEEE Senior Member, University of Essex, UK

Assoc. Prof. Jinyuan Wang, IEEE Member, Nanjing University of Posts and Telecommunications, China

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Deputy Dean Renping Zhu, Nanchang University, China

Assoc. Secretary-General Xueyan Huang, Jiangxi Institute Of Communications, China

Assoc. Prof. Lisu Yu, Nanchang University, China

Publication Chairs

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Assoc. Prof. Hongliang Zhang, Peking University, China

Assoc. Prof. Zahid Khan, Prince Sultan University, Saudi Arabia

Dr. Zipeng Li, Nanchang University, China

Publicity Chairs

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Prof. Jiawen Kang, Guangdong University of Technology, China

Assoc. Prof. Yong Liu, South China Normal University, China

Assoc. Prof. Donghong Cai, Jinan University, China

Assoc. Prof. Tao Deng, Soochow University, China

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Assoc. Prof. Zhen Wang, Nanchang University, China

Dr. Wufei Wu, Nanchang University, China

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Prof. Hongliang He, Jinan University, China

Prof. Tengfei Cao, Qinghai University, China

Prof. Shaobo Jia, Zhengzhou University, China

Prof. Zhuang Ling, Jilin University, China

Prof. Ziye Jia, Nanjing University of Aeronautics and Astronautics, China

Prof. Minghui Min, China University of Mining and Technology, China

Prof. Ruoguang Li, Southeast University, China

Assoc. Prof. Wei Li, Nanchang University, China

Assoc. Prof. Chaoqun Zhang, Nanchang University, China

Conference Organizing Committees

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Dr. Fahui Wu, Nanchang University, China

Dr. Xianlin Song, Nanchang University, China

Assoc. Prof. Yong Xia, Nanchang University, China

Assoc. Prof. Zhijiang Wan, Nanchang University, China

Assoc. Prof. Rongpei Zhou, Nanchang University, China

Assoc. Prof. Wei Li, Nanchang University, China

05

主旨报告

Keynote Speech

主旨报告
Keynote Speech

Prof. Zhang Rui / 张瑞教授

IEEE Fellow, Academician of Singapore Academy of Engineering

The Chinese University of Hong Kong, Shenzhen, China

Biography:

Dr. Rui Zhang received the B.Eng. (First-Class Hons.) and M.Eng. degrees from National University of Singapore, and the Ph.D. degree from Stanford University, Stanford, CA USA, all in electrical engineering. Since 2022, he has joined the School of Science and Engineering, The Chinese University of Hong Kong, Shenzhen, as a Principal's Diligence Chair Professor. His current research interests include UAV/satellite communication, wireless power transfer, intelligent reflecting surface and reconfigurable MIMO, optimization methods, etc. He has published over 450 papers in the field of wireless communications, which have been cited more than 60,000 times, with the h-index over 120. He is now an editor for the IEEE Transactions on Communications. He served as a member of the Steering Committee of the IEEE Wireless Communications Letters, and a Distinguished Lecturer of IEEE Signal Processing Society and IEEE Communications Society. He is a Fellow of the IEEE and the Academy of Engineering, Singapore.

Speech Title: Intelligent Reflecting Surface (IRS) Empowered Wireless Networks: Recent Advance and Future Trend

Abstract: Intelligent Reflecting Surface (IRS) is a digitally controlled metasurface that can be densely deployed in wireless networks to reconfigure the propagation channels among wireless nodes by dynamically tuning the signal reflection. IRS is able to not only significantly improve the network spectral and energy efficiency for communications, but also greatly enhance the performance for other emerging applications such as wireless power transfer, sensing and localization, etc. The existing research on IRS has mainly considered wireless systems with single-IRS-reflections at the link level, which does not reveal the full potential of IRS for future wireless networks. In this talk, we will focus on the main design challenges in efficiently integrating IRS to wireless networks, including IRS reflection optimization, channel acquisition and optimal deployment, with an emphasis on double-/multi-IRS-reflections. Furthermore, we will present emerging new architectures of IRS and their advantages for future applications. We will conclude the talk by discussing research directions worthy of further investigation in the future.

主旨报告
Keynote Speech

Prof. Zhang Rui / 张瑞教授

IEEE Fellow, Academician of Singapore Academy of Engineering

The Chinese University of Hong Kong, Shenzhen, China

个人简介:

香港中文大学（深圳）理工学院校长学勤讲座教授，新加坡工程院院士，IEEE 会士，IEEE 通信学会和信号处理学会杰出讲师，科睿唯安全球高被引科学家（2015年至今），智能超表面专家委员会主任委员。 2007年在美国斯坦福大学获得博士学位，2007-2010年在新加坡科技局资讯通信研究院担任研究员/高级研究员，2010至2022年在新加坡国立大学担任助理教授/讲座副教授/正教授/校长讲座教授。张瑞院士在国际顶级期刊和会议上总共发表450余篇论文，谷歌学术引用次数超过60000次（H 指数超过120)。获得2011年 IEEE 通信学会亚太最佳青年研究学者奖，2015年新加坡国立大学青年研究学者奖，2020年无线通信技术委员会(WTC）表彰奖以及2021年 IEEE 通信信号处理与计算（SPCC）技术表彰奖。获得14项 IEEE 最佳论文奖，包含 IEEE 马可尼无线通信论文奖（两次），IEEE 通信学会海因里希．赫兹论文奖（三次），IEEE 通信学会斯蒂芬·O·莱斯奖，IEEE 信号处理学会最佳论文奖， IEEE 通信学会亚太最佳论文奖， IEEE信号处理学会唐纳德 · G · 芬克综述论文奖等。先后担任30余次 IEEE 国际会议的程序委员会主席，多个顶级期刊的特邀编委（IEEE JSTSP / JSAC）和常任编委（IEEE TWC / TSP / JSAC / TCOM / TGCN 等）。

研究方向:

长期专注于无线通信领域的开创性研究，研究方向集中在智能通信，无人机/卫星通信，无线信能同传，智能反射面以及可重构MIMO 。

主旨报告
Keynote Speech

Prof. Min Chen / 陈敏教授

IEEE Fellow, IET Fellow

South China University of Technology, China

Biography:

Min Chen is a professor in School of Computer Science and Engineering at South China University of Technology. He was a full professor in School of Computer Science and Technology at Huazhong University of Science and Technology (HUST) since Feb. 2012. He is an IEEE Fellow and IET Fellow. He has 300+ publications, including IEEE JSAC, IEEE TNNLS, AAAI, Advanced Materials、Science, Nature Communications, etc. He has published 12 books, including Big Data Analytics for Cloud/IoT and Cognitive Computing (2017) with Wiley. His Google Scholar Citations reached 41,000+ with an h-index of 96. His top paper was cited 4,300+ times. He was selected as ESI Highly Cited Researcher from 2018 to 2022. He got IEEE ICC Best Paper Award in 2012, IEEE Communications Society Fred W. Ellersick Prize in 2017, the IEEE Jack Neubauer Memorial Award in 2019, and IEEE ComSoc APB Oustanding Paper Award in 2022. His research focuses on cognitive computing, 5G Networks, wearable computing, big data analytics, robotics, fabric computing, deep learning, emotion detection, and mobile edge computing, etc.

Speech Title: Digital Intelligent World Empowered by 6G Fabric Smart Space

Abstract: In future network, the provisioning of ultra-low latency, non-intrusive and immersive service experience creates various challenges, among which continuously obtaining multi-modal information without disturbing user is critical. This talk introduces the development of various functional fabrics, based on which large-scale non-disturbance sensory data can support a data-information-knowledge-intelligence model in the digital intelligent world. This talk also introduces various application examples for human activity capturing and healthcare in 6G fabric smart space.

主旨报告
Keynote Speech

Prof. Min Chen / 陈敏教授

IEEE Fellow, IET Fellow

South China University of Technology, China

个人简介:

陈敏，现任华南理工大学计算机科学与工程学院教授，博导；国家中组部海外高层次人才，IEEE Fellow (国际电气电子工程师学会会士) , IET Fellow （英国工程技术学会会士），谷歌学术引用超过3.95万次，H-index=94，获2018，2019，2020 , 2021及2022 科睿唯安全球高被引学者，23岁博士毕业于华南理工大学电子与通信工程学院，先后于韩国首尔大学、加拿大英属哥伦比亚大学任博士后；09年在首尔大学任教；12年海外高层次人才回国，并创立华中科大嵌入与普适计算实验室；现任华工计算机学院教授、博导。在IEEE JSAC、IEEE TNNLS、IEEE TPDS、IEEE TWC、IEEE TSC、INFOCOM、Science、Nature Communications等国际权威期刊及知名学术会议上发表论文200余篇，授权国家发明专利20余项。出版专著与教材12本，其中全美英文教材《大数据分析应用》已被哈佛、斯坦福等40所名校采用。在16个国际学术会议上受邀做报告，多篇论文获得最佳会议论文，并获IEEE通信学会Fred W. Ellersick Prize （2017），IEEE车载技术学会Jack Neubauer Memorial Award （2019），以及IEEE ComSoc亚太地区的最佳论文奖（2022）。

研究方向:

认知计算与深度学习、6G网络与边缘计算、大数据分析、无人机强化学习、健康智能感知

主旨报告
Keynote Speech

Prof. Gexiang Zhang / 张葛祥教授

IET Fellow, IEEE Senior Member, Foreign Member of Russian Academy of Natural Sciences

Chengdu University of Information Technology, China

Biography:

Prof. Zhang received his Ph.D. degree in 2005 from Southwest Jiaotong University, Chengdu, China. Now he is a full professor and the Dean of School of Automation, Chengdu University of Information Technology, Chengdu, China. He was a visiting professor in Department of Computer Science, The University of Sheffield, UK, a senior visiting professor at the Department of Computer Science and Artificial Intelligence, Universidad de Sevilla, Spain, and a visiting professor in Department of Chemistry, New York University, USA. He is the President of International Membrane Computing Society (IMCS), an editorial board member of Axioms and International Journal of Parallel, Emergent and Distributed Systems. He is the co-winner of Grigore Moisil Prize of the Romanian Academy in 2019. He is listed in World's Top 2% Scientists and in Highly Cited Chinese Researchers by Elsevier. He is the author/co-author of more than 200 publications, three monographs, and (lead) guest editor/co-editor of more than 10 volumes/proceedings. His research interests include artificial intelligence, Intelligent robots, smart grid and intelligent control.

Speech Title: Spiking Neural P Systems: a Branch of the Third Generation of Neural Networks

Abstract: Artificial neural networks (ANN) can be regarded as the engine of artificial intelligence (AI), which is always leading the development with disruptive innovation. ANN has undergone three generations with different computational units. The first generation is characterized by only giving digital outputs like Hopfield nets. The second generation is able to compute functions with analog input and output such as BP network. The third generation encodes analog variables by time differences between pulses. Except for spiking neural networks, spiking neural P systems are also important branch of the third generation of ANN. This talk emphasizes the standard definition, the computing process, information encoding, theoretical results with respect to Turing completeness, application results and simulation implementation.

主旨报告
Keynote Speech

Prof. Gexiang Zhang / 张葛祥教授

IET Fellow, IEEE Senior Member, Foreign Member of Russian Academy of Natural Sciences

Chengdu University of Information Technology, China

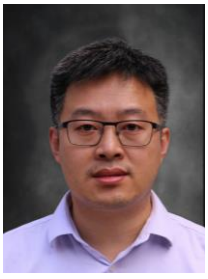
个人简介:

成都信息工程大学二级教授、博士生导师，担任自动化学院院长、党委副书记、自主智能技术与系统研究院院长、国际膜计算学会主席，入选俄罗斯自然科学院外籍院士、Elsevier中国高被引学者和全球前2%顶尖科学家榜单、四川省学术和技术带头人、IET Fellow、教育部新世纪优秀人才。2019年获罗马尼亚科学院Grigore Moisil奖（中国科技部网站专页报道：首位以第一作者获得罗马尼亚科学院奖的中国人，也是首位获得莫伊西尔奖的中国人）。主持国家自然科学基金5项、省部级及企业委托项目数十项；出版英文专著2部和中文专著1部，发表高水平论文100余篇；获得美国授权发明专利2项和中国授权发明专利60余项。研究成果还获得四川省自然科学二等奖、中国科技产业化促进会科技创新一等奖和卓越贡献奖、四川省科技进步二等和三等奖等。担任Springer国际期刊JMC执行主编、国际期刊IJPEDS和Axioms编委、IJNS和IJUC等国际期刊客座主编或编委、《交通信息与安全》编委、国际会议主席、国际会议筹划委员会、程序委员会主席或共主席或委员。先进船舶通信与信息技术工业和信息化部重点实验室、电力物联网四川省重点实验室学术委员会委员，中国电工技术学会人工智能与电气应用专委会委员，四川省电机工程学会常务理事，四川省教指委委员。科技部国家重点研发计划重点专项网评和会评专家，国家自然科学基金委、教育部、四川、江苏、重庆、河北、福建、浙江等科技奖励或科技项目评审专家，教育部学位论文评审专家等。

研究方向:

主要从事人工智能、智能电网、智能机器人和智能控制研究工作。

主旨报告
Keynote Speech



Prof. Haijun Zhang / 张海君教授

IEEE Fellow, IET Fellow

University of Science and Technology Beijing, China

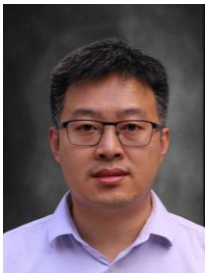
Biography:

Haijun Zhang (F'23) is currently a Full Professor and Associate Dean in School of Computer and Communications Engineering at University of Science and Technology Beijing, China. He was a Postdoctoral Research Fellow in Department of Electrical and Computer Engineering, the University of British Columbia (UBC), Canada. He serves/served as Track Co-Chair of VTC Fall 2022 and WCNC 2020/2021, Symposium Chair of Globecom'19, TPC Co-Chair of INFOCOM 2018 Workshop on Integrating Edge Computing, Caching, and Offloading in Next Generation Networks, and General Co-Chair of GameNets'16. He serves/served as an Editor of IEEE Transactions on Communications, and IEEE Transactions on Network Science and Engineering. He received the IEEE CSIM Technical Committee Best Journal Paper Award in 2018, IEEE ComSoc Young Author Best Paper Award in 2017, IEEE ComSoc Asia-Pacific Best Young Researcher Award in 2019, IEEE ComSoc Distinguished Lecturer. He is a Fellow of IEEE.

Speech Title: 6G Network Optimization

Abstract: This talk will identify and discuss technical challenges and recent results related to 6G mobile network optimization. The talk is mainly divided into four parts. The first part will introduce 6G mobile networks, discuss about the 6G mobile networks architecture, and provide some main technical challenges in 6G mobile networks. The second part will focus on the issue of resource management in 6G networks and provide different recent research findings that help to develop engineering insights. The third part will address the machine learning and deep learning method based future 6G networks and address some key research problems. The last part will summarize by providing a future outlook of 6G mobile network optimization.

主旨报告
Keynote Speech



Prof. Haijun Zhang / 张海君教授

IEEE Fellow, IET Fellow

University of Science and Technology Beijing, China

个人简介:

张海君，国家杰出青年科学基金入选者、IEEE/IET Fellow、北京科技大学卓越工程师学院常务副院长、计算机与通信工程学院副院长、教授、博士生导师、中国通信学会物联网委员会副主任委员、中国通信学会青年工作委员会副主任委员。加拿大不列颠哥伦比亚大学（UBC）博士后。主持国家杰出青年科学基金项目、国家自然科学基金联合重点项目、国家重点研发项目课题、JWKJW项目等多个项目。发表IEEE权威期刊1区/2区SCI论文100余篇；任/曾任IEEE TIFS、IEEE TCOM、IEEE TNSE等IEEE期刊编委、IEEE绿色通信与计算技术委员会主席、第六届博弈论与网络国际会议大会主席，获IEEE通信学会最佳青年作者论文奖、 IEEE通信学会亚太最杰出青年研究员、国际无线电科学联盟青年科学家奖、中国通信学会青年科技奖、IEEE杰出讲师、2021年中国通信学会自然科学一等奖。

研究方向:

6G移动通信、 B5G行业应用、 卫星网络、 数字孪生、人工智能

06

特邀报告

Invited Speech

特邀报告
Invited Speech

Assoc. Prof. Shuai Ma / 马帅副教授

Peng Cheng Laboratory, Shenzhen, China

Biography:

Shuai Ma received the B.S. and Ph.D. degrees in communication and information systems from Xidian University, Xi'an, China, in 2009 and 2016, respectively. From 2014 to 2015, he was a Visiting Scholar with the Department of Electrical and Computer Engineering, Texas A&M University, College Station, TX, USA. From 2016 to 2019, he has been an associate Professor with the School of Information and Control Engineering, at the China University of Mining and Technology, Xuzhou, China. From 2019 to 2022, he worked as a Postdoctoral Fellow with Telecom Paris, France. Since 2023, he has been an Associate Researcher at Peng Cheng Laboratory, Shenzhen, China. His research interests include semantic communications, visible light communications, and network information theory.

Speech Title: Task-oriented Explainable Semantic Communications

Abstract: Semantic communications utilize the transceiver computing resources to alleviate scarce transmission resources, such as bandwidth and energy. Although the conventional deep learning (DL) based designs may achieve certain transmission efficiency, the uninterpretability issue of extracted features is the major challenge in the development of semantic communications. In this talk, I will introduce an explainable and robust semantic communication framework by incorporating the well-established bit-level communication system, which not only extracts and disentangles features into independent and semantically interpretable features, but also only selects task-relevant features for transmission, instead of all extracted features. Based on this framework, we derive both lower and upper bounds on the semantic channel capacity. Furthermore, based on the \beta_-variational autoencoder (\beta -VAE), we propose a practical explainable semantic communication system design, which simultaneously achieves semantic features selection and is robust against semantic channel noise. We further design a real-time wireless mobile semantic communication proof-of-concept prototype. Our simulations and experiments demonstrate that our propose explainable semantic communications system can significantly improve transmission efficiency, and also verify the effectivenessof our proposed robust semantic transmission scheme.

特邀报告
Invited Speech

Assoc. Prof. Peng Yu / 喻鹏副教授

Beijing University of Posts and Telecommunications, China

Biography:

Yu Peng Received his Ph.D. degree from Beijing University of Posts and Telecommunications in 2013. He is currently the vice dean of the School of Future, Beijing University of Posts and Telecommunications, and also associate professor of the State Key Laboratory of Network and Switching Technology He is a Senior member of IEEE/EAI/CIC. His current research interests include B5G/6G network management and optimization, network intelligent management and control, green communication, smart grid communication network, etc. He has published more than 30 journal papers, such as IEEE JSAC/TSC/TBC, IEEE Wireless Communications, and won the science and Technology award for 5 times and win best paper award of international journal/conferences for 4 times.

Speech Title: A Digital Twin Driven Service Self-Healing Mechanism with Graph Neural Networks in 6G Edge Networks

Abstract: 6G edge networks strive to offer ubiquitous intelligent services, requiring a greater emphasis on network stability and reliability. However, current networks present a low automation degree of the OAM process. These conditions underscore the urgency for an innovative service self-healing mechanism for 6G edge networks. Digital twin (DT) technology uses modeling to represent physical entities, thereby facilitating lifecycle management. However, the application of DT technology in networks is still a burgeoning field of study. We design a DT-based architecture for service self-healing. Subsequently, we construct a performance prediction mechanism leveraging graph neural networks (GNNs) to devise an efficient prediction model, which aims to accurately infer network performance and promptly detect abnormal network conditions. To maintain fine-grained service stability amidst potential network anomalies, we propose a DT-driven service redeployment mechanism enhanced by GNNs. Comprehensive experimental results reveal that our proposed mechanism takes on good performance.

07

口头报告节选

Selected Oral Presentation

口头报告
Oral Presentation

Yixu Wang, Hohai University, China

Title: BER Evaluation for Parallel-Relayed Underwater Wireless Optical Communication Systems over GGD Oceanic Turbulence

Abstract: In this paper, the average bit-error-rate (BER) performances of a two-hop parallel-relayed underwater wireless optical communication (UWOC) systems with on-off keying (OOK) are analyzed in generalized gamma distribution (GGD) ocean-ic turbulence. First, a hybrid fading channel model that in-cludes GGD oceanic turbulence, and fading free impulse re-sponse (FFIR) implicit path loss plus multipath effect is pro-posed; Subsequently, the mathematical closed-form expres-sions of the average BERs of the parallel-relayed UWOC sys-tems with equal gain combining (EGC) at the destination node under the proposed hybrid fading are derived by using the higher transcendental Fox-H function. Theoretical analysis and numerical simulation results show that the introduction of parallel relaying nodes and combining receiving can effec-tively improve the BER performance of the UWOC systems especially in a long-distance communication environment. Moreover, the average end-to-end BERs of the UWOC sys-tems calculated by the derived closed-form expressions have nearly the same changing trends and little performance gap compared with that obtained through Monte Carlo computer simulations.

Shuo Yang, Harbin Engineering University, China

Title: Hybrid Precoding Design Based on Alternate Minimization

Abstract: In order to address the high power consumption issue caused by a large number of phase shifters in millimeter-wave Multiple Input Multiple Output (MIMO) systems, we propose a hybrid precoder design algorithm based on alternating minimization. This algorithm treats the non-convex design problem of the hybrid precoder as a matrix factorization problem and adopts two different approaches based on distinct matrix properties. For the optimization of the phase matrix in the analog precoder, it is transformed into a subproblem of the number of radio frequency (RF) chains. A novel algorithm based on Riemannian manifold optimization is proposed by temporarily relaxing the hardware constraints on phase shifters. Regarding the optimization of the switch matrix and digital precoder in the analog precoder, the unitary properties of the phase matrix and digital precoder are leveraged to transform the minimization of the Euclidean distance problem for hybrid precoder design into an upper-bound problem, significantly reducing the algorithm's complexity. Additionally, unlike existing fixed phase shifter architectures, the algorithm considers a variable phase shifter architecture, where the phase is variable and subject to hardware constraints, allowing optimization of the phase based on channel state information. Simulation results demonstrate that the algorithm outperforms existing typical precoding algorithms in terms of energy efficiency and spectral efficiency. Moreover, the algorithm exhibits lower complexity compared to algorithms with the same architecture and is more suitable for large-scale antenna systems.

口头报告
Oral Presentation

Xinyan Wen, Beijing University of Posts and Telecommunications, China

Title: When Neural Network Architecture Search Meets Federated Learning Parameter Efficient Fine Tuning

Abstract: With the increasing concerns regarding data privacy, federated learning has emerged as a promising approach for collaborative training of deep learning models while preserving local data. Fine tune pre-trained models for downstream tasks has proven to be effective in the field of deep learning. However, the implementation of federated fine tuning encounters various obstacles including extensive communication overhead, high computational expenses, and potential privacy leakage. To address these challenges, our study integrates existing Parameter Efficient fine Tuning (PET) methods with Neural Architecture Search (Nas) under the context of federated learning(FL) to achieve high performance at a cost-effective level. Our proposed algorithm, FedNasPET, can effectively identify PET structures with low resource requirements for diverse tasks or datasets, while maintaining privacy protection. Experimental results demonstrate that the structure discovered by FedNasPET remarkably achieves low communication costs (less than 0.016%) compared to the manually designed structure, while maintaining over 98.1% of the federated full fine tuning performance. Additionally, FedNasPET also enhances the privacy protection capability by up to 81.5%. These findings emphasize the notable potential of the FedNasPET structure in academic research.

Zheng Yang, Fujian Normal University, China

Title: Secure Transmission of Joint Radar and Communication Systems Assisted by NOMA

Abstract: In this paper, we investigate a dual-function radar and communication (DFRC) system assisted by non-orthogonal multiple access (NOMA) with mixed multicast-unicast messages for simultaneously communicating and sensing. The dual-function base station (BS) is communicating with the communication-centric user (C-user) and radar-centric user (Ruser) by the mixed messages, while simultaneously sensing the R-user. The multicast signal is aimed at both C-user and R-user, while the unicast signal is aimed at C-user only. Furthermore, the R-user is regarded as a potential eavesdropper that wants to intercept the unicast message received by C-user. The goal of this paper is for maximizing the secrecy rate of unicast signal by jointly designing the multicast beamforming vector and unicast beamforming vector from the BS. Due to the mutual coupling between the variables, a non-convex optimization problem is arised. For this non-convex optimization problem, a low-complexity iterative algorithm based on successive convex approximation (SCA) and semidefinite programming (SDP) is proposed for obtaining the transmit beamformings. Simulation results show that the confidentiality performance of proposed scheme outperforms the existing schemes.

口头报告
Oral Presentation

Jiajin Wen, Nanchang University, China

Title: Secure Communication Scheme for IRS-UAV enabled Cognitive Network

Abstract: In this paper, the secure communication model is considered in cognitive relay network. An intelligent reflecting surface (IRS) which is deployed on unmanned aerial vehicle (UAV) is applied to cognitive relay of communication link between secondary internet of things (SIoT) devices and secondary user (SU). However, the presence of secondary eavesdropper (SE) causes security issue for cognitive communication network. Therefore, the problem of average secrecy rate maximization is formulated through the joint design of UAV trajectory, SIoT signal transmission power and IRS passive beamforming without affecting the communication quality among primary users (PUs). Nevertheless, it is infeasible to obtain optimal solution directly for original problem which is non-convex. An efficient algorithm is proposed to solve complex and non-convex problem. Simulation result demonstrates that the proposed algorithm can enhance the average secrecy rate more effectively, and can maximally rise by approximately 108% in comparison with other schemes.

Tianyi Xue, Nanchang University, China

Title: Performance Analysis of Virtual-Real Synchronization in Digital Twin Network Trade-Offs between TimeLiness, Distortion, and Sustainability

Abstract: A great challenge for digital twin network (DTN) is status synchronization between the physical entity and corresponding digital twin, which is referred to as virtual-real synchronization. In this paper, the virtual-real synchronization performance in DTN is comprehensively investigated from the perspective of timeliness, distortion, and sustainability, respectively, where the synchronization timeliness and sustainability are characterized by the age of information and energy consumption, respectively. The closed-form expressions of the synchronization timeliness, distortion and sustainability are derived. Simulation results validate the theoretical analysis and reveal the trade-offs among synchronization timeliness, distortion and sustainability.

口头报告
Oral Presentation

Bodong Shang, Eastern Institute for Advanced Study, China

Title: LEO Satellite-Assisted Vehicular Edge Computing

Abstract: In the Internet of Vehicles (IoV) applications, vehicle and in-vehicle users need to process computation-intensive and latency-sensitive tasks. Offloading tasks to satellite edge servers can alleviate the computational burden and reduce vehicular users' energy consumption, especially in remote areas. In this paper, we study a low earth orbit (LEO) satellite-assisted vehicular edge computing system. We jointly consider user association variable, task allocation, power control, and bandwidth allocation to minimize weighted sum-energy consumption in the system. Specifically, we design an iterative optimization algorithm, which decomposes the original non-convex problem into several sub-problems. We solve each sub-problem efficiently using variable substitutions, and the Karush-Kuhn-Tucke (KKT) condition. Simulation results show that the proposed algorithm has a good convergence performance and effectively reduces system weighted sum-energy consumption compared to benchmarks.

Yunan Jiang, Nanchang Hangkong University, China

Title: Overview of Key Node Evaluation in Complex Networks

Abstract: Complex network is a network obtained throughhighly abstracting real-world complex systems, which can be used to assist in solving complex problems in complex systems. Homogeneous network is a complex network that only has one type of node and one type of edge. Key nodes are nodes that can impact the overall stability and functionality of a network, and they help us better comprehend and manipulate complex networks. This paper focuses on the study of key nodes in homogeneous networks and provides a comprehensive review of existing methods for evaluating key nodes in such networks. In this paper, we provide a description of homogeneous networks and key nodes; We summarize the existing evaluation methods for key nodes in homogeneous networks and categorize them into five major classes for discussion; We emphasize some of the challenges faced in this field and outline potential directions forfuture research to further explore.

口头报告
Oral Presentation

Mengdan Liang, Nanchang university, China

Title: Optimizing the Phase Shifts of RIS by MM algorithm in RIS-aided positioning systems

Abstract: In Reconfigurable intelligent surface (RIS)-aided positioning systems, a proper design of RIS phase profile is important to fully explore the potential of RIS. Generally, theposition error bound (PEB) is used as a metric of positioningperformance, and the phase shifts of RIS are optimized to minimize the PEB. However, the optimization for PEB is very complex and time-consuming, because (1) the expression of PEB is complex and not compact, (2) the phase shifts of RIS are usually time-variant to enable the parameter estimation, (3) the numberof RIS units is large. To ensure a real-time positioning system,it is essential to develop a low-complex optimization scheme.Thus, in this paper, we transform the minimization of PEB into the maximization of signal-to-noise ratio (SNR) and proposeto optimize RIS phase shifts by the majorization-maximization(MM) algorithm. It is shown that optimizing the SNR can achievethe purpose of reducing the PEB, and the optimization complexityis significantly reduced at the cost of negligible performance loss. Moreover, the superiority of the proposed optimization schemebecomes pronounced when the time slots and RIS units are numerous.

Yiling Zou, Nanchang Hangkong University, China

Title: Heterogeneous Network Node Classification Based on Graph Neural Networks

Abstract: With the rapid development of modern science and technology, a large amount of data has been generated and accumulated in reality, forming heterogeneous networks with complex interaction relationships. Early data mining methods face problems such as insufficiently rich aggregated information when dealing with node classification in heterogeneous networks. To address this issue, this paper proposes a Heterogeneous Network Node Classification based on Graph Neural Networks model (HNNC-GNN), which utilizes the advantages of graph neural networks in extracting rich feature information to classify nodes in heterogeneous networks. In order to obtain rich semantic information in the heterogeneous network, the heterogeneous network is represented as a multi-layer network according to the node type and the multi-layer network is transformed into multiple semantic graphs based on meta-paths. For each semantic graph, Topology Adaptive Graph Convolutional Networks (TAGCN) is used for node feature aggregation and attention mechanisms is introduced to calculate the weights of each meta-path-based semantic graph and fuse different semantic features to obtain node embedding vectors. The node embedding vectors are input into a multi-layer perceptron for classification. Experimental results on three real network datasets demonstrate that HNNC-GNN can effectively extract semantic information from heterogeneous networks and improve node classification performance.

口头报告
Oral Presentation

Siya Xu, Beijing University of Posts and Telecommunications, China

Title: When Neural Network Architecture Search Meets Federated Learning Parameter Efficient Fine Tuning

Abstract: With the increasing concerns regarding data privacy, federated learning has emerged as a promising approach for collaborative training of deep learning models while preserving local data. Fine tune pre-trained models for downstream tasks has proven to be effective in the field of deep learning. However, the implementation of federated fine tuning encounters various obstacles including extensive communication overhead, high computational expenses, and potential privacy leakage. To address these challenges, our study integrates existing Parameter Efficient fine Tuning (PET) methods with Neural Architecture Search under the context of federated learning to achieve high performance at a cost-effective level. Our proposed algorithm, FedNasPET, can effectively identify PET structures with low resource requirements for diverse tasks or datasets, while maintaining privacy protection. Experimental results demonstrate that the structure discovered by FedNasPET remarkably achieves low communication costs (less than 0.016%) compared to the manually designed structure, while maintaining over 98.1% of the fine tuning performance. Additionally, FedNasPET also enhances the privacy protection capability by up to 81.5%. These findings emphasize the notable potential of the FedNasPET structure in academic research.

Peng Yu, Beijing University of Posts and Telecommunications, China

Title: A Link Quality Based Routing Method for Unstable Networks with Limited Bandwidth and Storage

Abstract: In some extreme environments, such as military network and post-disaster communication, establishing end-to-end deterministic paths can be challenging due to the sparsity of network nodes and intermittent connections between nodes. Traditional network protocols are difficult to work in such environments due to the need for deterministic paths in transmitting messages. The “store-carry-forward” approach presented by delay tolerant network, which forwards carried messages only when a connection can be established, is an effective way to improve packet delivery ratio. Current routing approaches for network connectivity usually focus on the selection of better forwarding nodes without considering the resource constraints in extreme environments. In this paper we first model the routing problem in bandwidth and storage limited unstable network under resource constraints. After that, we propose a routing method which defines the inter-node link quality in terms of node encounter probability, connection time and available storage capacity, and further determines the path quality to the destination node, according to which the packets are sorted and forwarded. Simulation results verify the effectiveness of the method.

口头报告
Oral Presentation

Qingchuan Zhao, Chongqing University of Technology, China

Title: Differential Evolution based on Estimation of Distribution for C-DCOP

Abstract: Aiming at the shortcomings of the existing Continuous Distributed Constraint Optimization Problems (C-DCOP) solving algorithms, such as the weak search ability, the inability to guarantee convergence, and the solution quality to be improved, Differential Evolution based on Estimation of Distribution for C-DCOP (DEED) is proposed, and the elite strategy and the reservation strategy guarantee the the convergence of DEED, the solution quality is effectively improved by introducing the estimation of distribution, in addition, the adaptive crossover probability enhances the search ability. Finally, the experimental results on four types of benchmark problems show that compared with the state-of-the-art C-DCOP solving algorithms, DEED exhibits excellent performance in terms of solution quality.

Huan Chen, Fujian Business University, China

Title: Application of an Improved Convolutional Neural Network-Based Method in Network Intrusion Detection

Abstract: This study investigates the use of convolutional neural network (CNN) technology to solve the problem of network intrusion detection, specifically studying the impact of convolutional layer count. Experiments revealed that two convolutional layers yield optimal results. An AdaBoost+CNN model was proposed using this CNN with optimization strategies such as ensemble learning. Eight classical learning algorithms were compared with the proposed methods, and the results were evaluated using parameters such as accuracy, precision, and F-measurement.Compared with traditional machine learning, deep learning, and other methods, the method proposed in this study achieved higher classification accuracy and successful results in detecting network attacks.

Zhao Yang, University of Chinese Academy of Sciences, China

Title: Joint user clustering and power allocation for Indoor MIMO-NOMA-VLC Systems

Abstract: This paper investigates the joint problem of user association and power allocation for the downlink of non-orthogonal multiple access (NOMA)-visible light communication (VLC) systems. We propose a novel user association (UA) method for MIMO-NOMA-VLC, which takes into account both user channel gain and channel correlation comprehensively to enhance multiplexing efficiency. Additionally, we introduce a novel optimized power allocation scheme based on the UA method to optimize the system throughput while meeting the lighting requirements, quality of service (QoS) requirements, and transmission power constraints for each user. Finally, we demonstrate the superiority of our proposed scheme compared to traditional user grouping schemes and power allocation schemes in terms of network capacity.

口头报告
Oral Presentation

Junlong Liu, Nanchang University, China

Title: Channel Estimation for STAR-RIS-Aided Communications Based on Deep Iterative Networks

Abstract: With the development of 6G communication, the reconfigurable intelligent surfaces (RIS) is proposed to be deployed in 6G systems to assist communications. RIS is composed of multiple passive units with no signal storage or processing capabilities, which is a low-power and low-cost emerging technology. However, it can only serve users on one side, thus the simultaneously transmitting and reflecting RIS (STAR-RIS) is proposed. Compared with the traditional RIS, STAR-RIS can serve users in the whole space through transmitting and reflecting signals. In order to obtain a high-quality communication effect, accurate channel state information (CSI) is indispensable. However, due to the passive characteristics of RIS and the larger channel dimension caused by the deployment of RIS, the pilot cost and computational complexity of channel estimation rise sharply, so efficient and accurate estimation algorithms need to be proposed. In this paper, one deep learning algorithm based on gradient-descent-based deep-iterative-unrolling network (GD-Net) is proposed, and the superiority of this algorithm is verified by the simulation results.

Cuili Shang, China Mobile Communications Corporation Ningxia Co.,Ltd, China

Title: Application of OXC Technology in Yinchuan OTN Network

Abstract: Traditional OTN entirely relies on board stacking and manual fiber connection to build an optical switching ROADM system. As the dimensions increasing, the system becomes increaseingly complex, and lower efficiency in deployment convenience and O&M. OXC technology is a technology that carries optical layer services through optical tributary boards, optical crossover backplanes, and optical line boards. It has high energy efficiency, simple operation and maintenance, complete protection, and stability. Analysis of OXC equipment energy consumption, computer room space utilization, and intelligent operation and maintenance, put forward the application and implementation plan of OXC technology in Yinchuan OTN network, and analyze the energy saving and cost reduction and benefits of introducing OXC, explaining the application of OXC technology in Yinchuan The necessity of OTN network application.

口头报告
Oral Presentation

Pengfei He, Lanzhou Jiaotong University, China

Title: Multivariate time series missing value filling based on Trans-GAN model

Abstract: To address challenges in handling missing values in multivariate time series data, such as low efficiency, insufficient utilization of temporal features, and inadequate reasoning capability under high missing rates, this study proposes the Trans-GAN network model. The model is a fusion of the Transformer and Generative Adversarial Network, incorporating the QS sparse attention module to replace the self-attention matrix in the Transformer. This replacement reduces algorithmic complexity and enhances inference performance. Additionally, to improve training stability, Trans-GAN introduces the W-GAN loss function, overcoming the issue of mode collapse observed in traditional GAN networks. Experimental results demonstrate that Trans-GAN achieves outstanding imputation performance on multiple datasets, showcasing robust generalization capabilities and offering a promising solution for imputing missing values in multivariate time series data.

Congqian Wang, Northwest University, China

Title: An Improved Sine Cosine Algorithm

Abstract: Addressing the challenges associated with the sine cosine algorithm (SCA), including slow convergence, low optimization accuracy, and easy to fall into the local optimum in optimizing high-dimensional functions for SCA, this paper introduces an improved sine cosine algorithm (ISCA). This innovative approach combines the strengths of the differential evolution (DE) algorithm and the SCA. To tackle these challenges, the whale optimization algorithm's (WOA) spiral update strategy is integrated to refine the SCA's results, enhancing its local search capabilities. The ISCA strategically employs the SCA in its initial phase, followed by the later stages' implementation of DE. This strategic combination ensures a well-balanced utilization of the global search and local development capabilities of both algorithms. Simulation experiments on 23 benchmark functions illustrate that the proposed improved algorithm (ISCA) has a high optimization performance.

口头报告
Oral Presentation

Changshui Li, Beijing Fibrlink Communications Co., Ltd., China

Title: High Performance Error Correction under Low SNR based on Deep Neural Network

Abstract: Due to the low signal-to-noise ratio (SNR) and the difficulty of error correction, more complex error correction algorithms, longer code words or higher iterations are generally chosen to achieve the highest error correction efficiency as possible. However, this will greatly reduce the high-speed real-time performance of the error correction process. Therefore, it is of great significance to reduce the complexity of error correction process while ensuring the efficiency of error correction. Considering that the process of information transmission in artificial neural network is similar to that of information transmission in the iterative process of LDPC code decoding, a high-performance error correction algorithm based on deep neural network is proposed. In the case of low signal-to-noise ratio, the error correction performance of this method is better than that of the classical LLR-BP algorithm for high-speed short codes. At the same time, the number of hidden layers and neurons were adjusted according to the coding length, and the generalization performance of the model was improved. This experiment can provide a certain reference for further experiments in the future.

Zebei Wen, Chongqing University of Posts and Telecommunications, China

Title: Collaborative filtering recommendation algorithm based on user preference and optimal clustering

Abstract: In response to the issues of data sparsity and sensitivity to cluster centroids in traditional collaborative filtering recommendation algorithms, we propose a collaborative filtering recommendation algorithm based on user preferences and optimized clustering. Firstly, we construct a user-item type preference matrix based on the user-item rating matrix and item type matrix, which to some extent alleviates the data sparsity. Secondly, we employ a sparrow optimization-based fuzzy clustering algorithm to cluster this preference matrix. By selecting the nearest neighbors of the target user from clusters with higher membership degrees, we enhance the accuracy of nearest neighbor selection. Experimental results indicate that the proposed algorithm significantly improves the accuracy of the recommendation algorithm, providing a feasible approach for enhancing the performance of recommendation systems.

Jing Xu, Xi'an University of Posts & Telecommunications, China

Title: Analysis of adjacent frequency interference between Beidou RDSS received signal and 5G signal

Abstract: In recent years, with the development and wide application of Beidou navigation satellite system (BDS) and the rapid popularization of the 5th generation mobile communication technology (5G), the adjacent frequency interference between satellite navigation receivers and 5G signals has attracted wide attention. In this paper, two pre-positioning methods of RF link receiver are analyzed theoretically and verified by ADS simulation software. Finally, in the simulation results, we can see that the RF receiver link can output Beidou signal completely.

口头报告
Oral Presentation

Xue Zhang, Beijing Institute of Graphic Communication, China

Title: Fast Algorithm for CU Split in H.266/VVC Intra Based on Texture Information

Abstract: In order to improve the coding performance, the H.266/VVC video coding standard adds binary tree split and ternary tree split to complement quadtree split. It also expands the number of angle prediction modes from 33 to 65 in H.265/HEVC, and utilizes new techniques such as wide angle intra prediction. Although the addition of these new technologies improves the encoding performance, it greatly increases the computational complexity of encoding. In this paper, Sobel operator is used to extract the texture information of the coding unit (CU) and exclude the impossible split methods according to the current texture direction of the CU to reduce the computational complexity of the system encoding. The experimental results show that the proposed algorithm can save 15.14% of encoding time compared with the standard model of VTM19.0 while only increasing the Bjontegaard delta bit rate by 0.01%.

Runmei Zhang, Nanchang Hangkong University, China

Title: Traffic Flow Prediction Based on Graph Convolutional Networks

Abstract: In order to accurately extract the temporal and spatial correlations of nodes, a traffic flow prediction model based on graph convolutional networks is proposed. The graph convolution network is used to model the spatial structure of traffic flow, and the Convolutional neural network is used to capture the time characteristics of traffic flow; On this basis, add a spatiotemporal attention mechanism to adaptively capture the temporal and spatial correlations of traffic flow; Weighted fusion is performed on recent time periods, daily time periods, and weekly time periods to obtain the final prediction results, in order to achieve traffic prediction for specific time windows. Experiments were carried out on four real data sets of PEMS, using Mean absolute error, Root-mean-square deviation, and average ab-solute percentage error as evaluation indicators. By comparing with other types of traffic flow prediction models, this model performs better on all three evaluation indicators and has better prediction performance.

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