



ICFTIC 2023

**2023 5th International Conference on
Frontier Technology of Information and Computer**

第五届信息与计算机前沿技术国际学术会议

会议手册

CONFERENCE BROCHURE

- 丨 主办单位：中国石油大学（华东）、山东省人工智能学会、山东计算机学会
- 丨 承办单位：中国石油大学（华东）青岛软件学院、计算机科学与技术学院
- 丨 协办单位：University of Malaya
- 丨 支持单位：IEEE SMC、CCF青岛分部

2023年11月17日-19日 | 中国·青岛

November 17-19, 2023 | Qingdao, China



线下参会指引 Guidelines for Offline Participation

酒店地点 | Hotel Venue

Hotel: 青岛康大豪生大酒店-Howard Johnson Qingdao Kangda Hotel

Address: 青岛黄岛区长江西路159号-No. 159 Changjiang west road, Huangdao district, Qingdao.

酒店交通指引 | Traffic Guide

- * 青岛胶东国际机场: 62km; 63mins
- * 青岛西站: 27km; 47mins
- * Qingdao Jiaodong International Airport: 62km; 63mins
- * Qingdao West Railway Station: 27km; 47mins

学校地图 | School Map



① 主会场 - 逸夫礼堂 (二楼)

③ 餐厅 - 学苑餐厅

② 大合照 - 创造太阳

④ 分会场 - 图书馆 (东馆)



线下参会指引 *Guidelines for Offline Participation*

会议地点 | Conference Venue

中国石油大学（华东） - China University Of Petroleum (East China)

- * 主会场（上午） - Main Session (A.M.): 逸夫礼堂（二楼）
- * 主会场（下午） - Main Session (P.M.): 图书馆（东馆）第一会议室
- * 分会场1 - Session I: 图书馆（东馆）第一会议室
- * 分会场2 - Session II: 图书馆（东馆）第二会议室
- * 分会场3 - Session III: 图书馆（东馆）第四会议室
- * 分会场4 - Session IV: Online

会议交通指引 | Traffic Guide

1. 青岛胶东国际机场

方式 1: 乘坐机场大巴（西海岸新区线）至瑞源繁花里站下车，步行 2 公里或打车至青岛康大豪生大酒店（报到处）。

方式 2: 地铁 8 号线至青岛北站换乘 1 号线至石油大学地铁站 B 出口，出站到达青岛康大豪生大酒店（报到处）。

2. 青岛火车站

方式 1: 乘坐地铁 1 号线至石油大学地铁站 B 出口，出站到达青岛康大豪生大酒店（报到处）。

方式 2: 隧道 6 路公交站至石油大学站（无人售票，票价 2 元），到达青岛康大豪生大酒店（报到处）。

3. 青岛北火车站

方式 1: 乘坐地铁 1 号线至石油大学地铁站 B 出口，出站到达青岛康大豪生大酒店（报到处）。

方式 2: 乘坐跨海公交车到西海岸汽车东站（原黄岛汽车总站，火车站广场售票厅购票，票价25元，可欣赏跨海大桥及周边景色），步行或打车至青岛康大豪生大酒店（报到处）。

4. 青岛西火车站

乘K21路公交车至石油大学公交站（无人售票，票价2元），到达青岛康大豪生大酒店（报到处）。



线上参会指引 Guidelines for Online Participation

会场-Session	ZOOM ID	密码-PASSWORD
主会场 - Main Session	871 1388 8832	231118
分会场2 - Session II	864 7929 9362	231118
分会场3 - Session III	871 1388 8832	231118
分会场4 - Session IV	889 2806 4728	231118

1. 线上参会：需提前下载并安装“ZOOM”云会议程序。

【“ZOOM”下载链接：<https://zoom.us/download>，支持电脑端以及移动端使用】

2. 点击加入会议后，输入会议ID号和密码，参会姓名以“**ICFTIC+参会者英文名**”的形式即可参会，例如：“**ICFTIC+Yining Xie**”。

3. Zoom下载链接：<https://zoom.us/download>

4. 示例如下：





目 录

CONTENTS

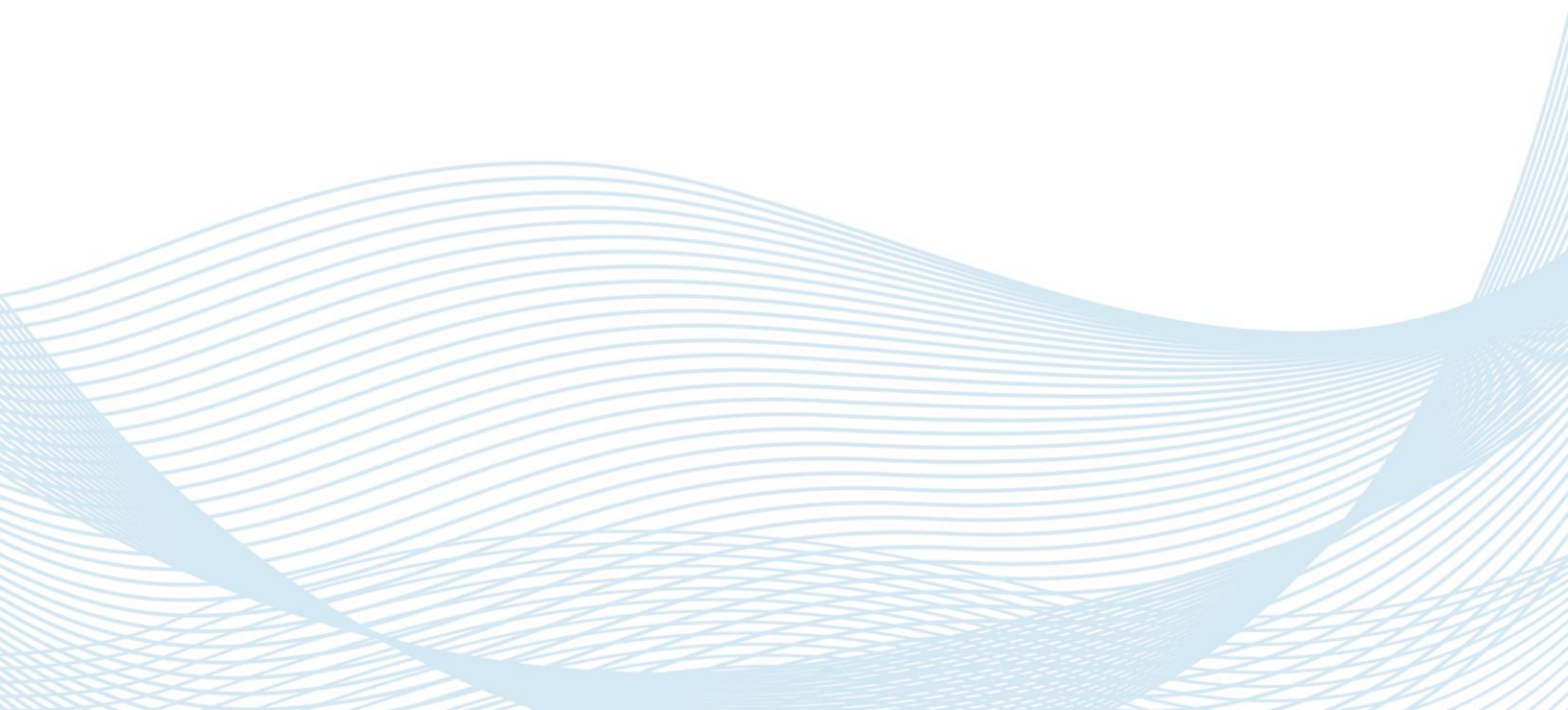
- 01. 大会简介 | About ICFTIC
- 02. 大会议程 | Agenda
- 03. 组织单位 | Organization
- 04. 大会组委 | Committee
- 05. 主讲报告 | Keynote Speech
- 06. 口头汇报 | Oral Presentation
- 07. 海报展示 | Poster



01

会议介绍

Conference Introduction





会议介绍 *Conference Introduction*



第五届信息与计算机前沿技术国际学术会议 (ICFTIC 2023) 定于2023年11月17-19日在中国青岛举行。本届大会由中国石油大学（华东）、山东省人工智能学会、山东计算机学会联合主办，中国石油大学（华东）青岛软件学院、计算机科学与技术学院承办，University of Malaya协办，以及IEEE SMC、CCF青岛分部作为支持单位。

大会安排主旨报告，特邀报告，以及数个专题讨论会（形式包括口头报告，海报报告，视频报告，以及在线报告等），将在会上共同探讨工业软件、计算机新技术、人工智能、工业互联网等新一代信息技术相关研究领域各方向的学术动态及发展趋势，就目前的热点问题展开研讨，共享研究成果，助力特色化示范性软件学院建设及学科高质量发展，推动相关研究与应用的繁荣与进步。

2023 5th International Conference on Frontier Technology of Information and Computer (ICFTIC 2023) will be held on November 17-19, 2023, in Qingdao, China. The conference is sponsored by the China University of Petroleum (East China), Shandong Association of Artificial Intelligence, and Shandong Computer Federation, and organized by the Qingdao Institute of Software, College of Computer Science and Technology, China University of Petroleum (East China), and also supported by IEEE SMC and CCF Qingdao Branch.

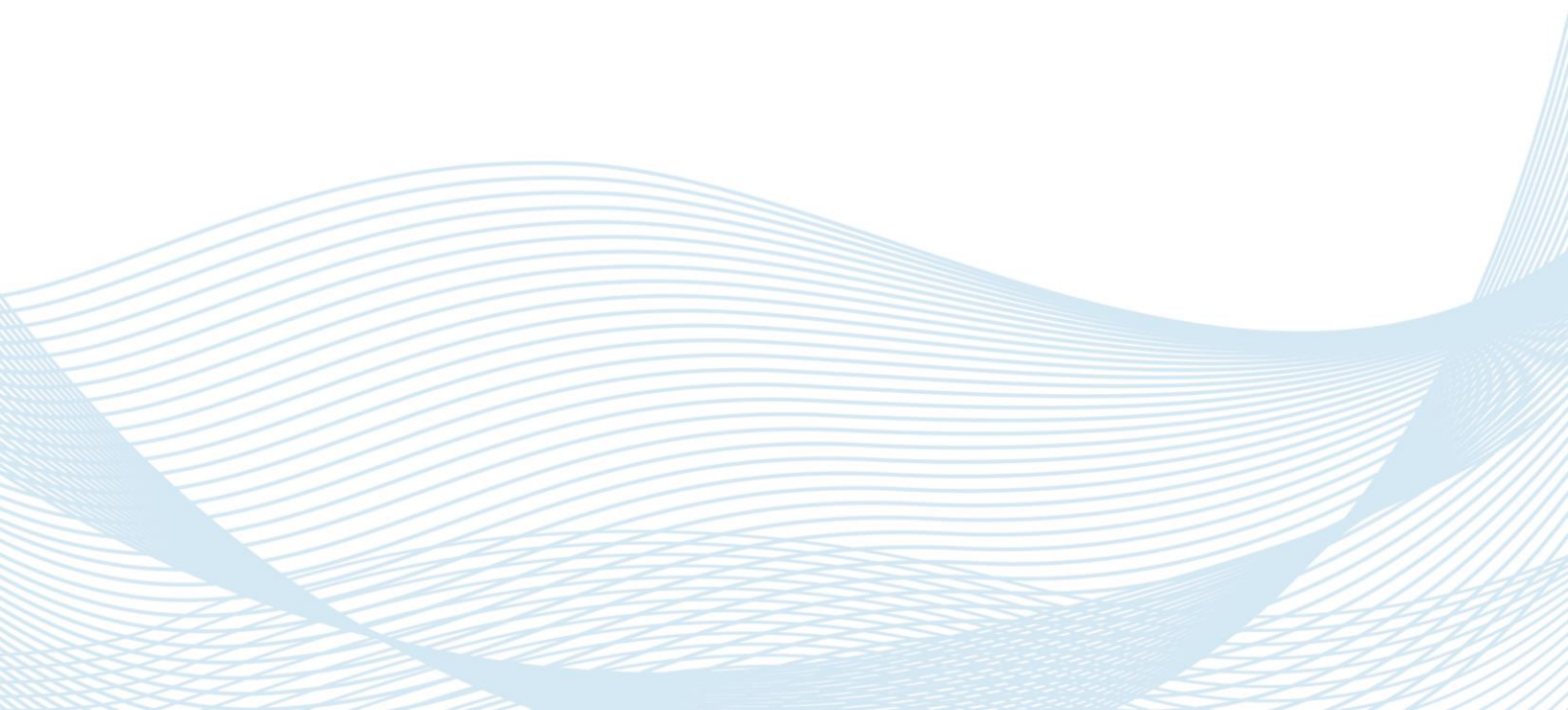
The conference arranges keynote speeches, invited speeches, and several symposiums (in the form of oral presentations, poster presentations, video presentations, and online presentations, etc.), where we will discuss the academic dynamics and development trends of the new generation of information technology related research fields, such as industrial software, new computer technologies, artificial intelligence, and industrial Internet, and discuss the current hot topics, share the results of the research, and help the construction of the specialization of the demonstration of the institute and the high quality of the subject development, and promote the prosperity and progress of the related research and application.



02

大会议程

Agenda





Conference Agenda

November 17, 2023 (Friday) 15:00-20:00 (GMT+8)

Venue: Howard Johnson Qingdao Kangda Hotel

Time-时间	Activity-活动
15:00-18:00	Test & Registration-测试 & 签到
18:00-20:00	Banquet-晚餐

November 18, 2023 (Saturday) 09:00-20:00 (GMT+8)

Venue: China University Of Petroleum (East China) - Conference Center

线上会议 ZOOM ID: 871 1388 8832 密码-Password: 231118

08:30-13:30: Main Session

地点: 逸夫礼堂 (二楼)

08:30-09:00	Registration-中国石油大学 (华东) 逸夫楼签到
09:00-09:15	Opening Ceremony & Welcome Speech - 开幕式 & 致辞 Prof. Shanchen Pang - 庞善臣 教授, 中国石油大学 (华东) Prof. Haibin Zhu - 朱海滨 教授, Nipissing University
09:15-09:30	Group Photo-会议大合照
09:30-10:10	Keynote Speech 1: Prof. Xiuzhen Cheng , IEEE Fellow, CSEE Fellow, AAIA Fellow, Shandong University, China 成秀珍 教授, 山东大学 Speech Title: <i>Decentralized Storage Networks</i>
10:10-10:30	Break - 茶歇
10:30-11:10	Keynote Speech 2: Prof. Zuqing Zhu , IEEE Fellow, Director of INFINITE LAB, School of Information Science and Technology, University of Science and Technology of China (USTC), China 朱祖勍 教授, 中国科学技术大学 Speech Title: <i>Machine Learning in and for Optical Data-Center Networks</i>
11:10-11:50	Keynote Speech 3: Prof. Guangjie Han , IEEE Fellow, AAIA Fellow, Hohai University, China 韩光洁 教授, 河海大学 Speech Title: <i>Multi-Dimensional Dynamic Trust Management Mechanism in Underwater Acoustic Sensor Networks</i>
11:50-13:30	Lunch-午休

13:30-15:00: Main Session

下午主会场会议地点: 图书馆 (东馆) 第一会议室

13:30-14:10	Keynote Speech 4: Prof. Xiangjian (Sean) He , University of Nottingham Ningbo, China 何祥健 教授, 宁波诺丁汉大学 Speech Title: <i>Big Data, Machine Learning and Computer Vision</i>
14:10-14:50	Keynote Speech 5: Prof. Carlos Artemio Coello Coello , IEEE Fellow, Department of Computer Science CINVESTAV-IPN, Mexico Speech Title: <i>What is Missing in Evolutionary Optimization?</i>
14:50-15:00	Break - 茶歇



ICFTIC 2023 第五届信息与计算机前沿技术国际学术会议

2023 5th International Conference on Frontier Technology of Information and Computer

November 18, 2023 (Saturday) 15:00-18:00 (GMT+8)

Session Report – 分会场报告

Time-时间	Activity-活动			
	Session 1: 地点：图书馆（东馆） 第一会议室	Session 2: 地点：图书馆（东馆） 第二会议室	Session 3: 地点：图书馆（东馆） 第四会议室	Session 4: 线上-Online
15:00-15:10				Oral Speaker 1 Mingjie Li, College of Computing and Information Technologies , National University, Philippines 李明杰, 菲律宾国家大学
15:10-15:20	Invited Speaker 1 Assoc. Prof. Pavel Loskot, IEEE Senior Member, Zhejiang University- University of Illinois at Urbana-Champaign Institute (ZJUI), China Speech Title: <u>Mathematical</u> <u>Models in Network</u>	Invited Speaker 1 Assoc. Prof. Por Lip Yee, IEEE Senior Member, University of Malaya, Malaysia Speech Title: <u>Recognition-</u> <u>Based Graphical Passwords</u> <u>(RBGPs): Navigating the</u> <u>Challenges of Shoulder-</u> <u>Surfing Attacks</u>	Invited Speaker 1 Prof. Yanguo Jing, Leeds Trinity University, UK Speech Title: <u>The use of</u> <u>machine learning to predict</u> <u>technical skills in youth</u> <u>grassroots soccer</u>	Oral Speaker 2 Wenjing Yin, China University Of Petroleum (East China) 尹文静, 中国石油大学（华 东）
15:20-15:30	<u>Molecular Biology</u>			Oral Speaker 3 Yuxue Qiu, Beijing Institute of Spacecraft Environment Engineering 仇玉雪, 北京卫星环境工程 研究所
15:30-15:40				Oral Speaker 4 Wenfei Xiong, Wuhan Institute of Technology 熊文菲, 武汉工程大学
15:40-15:50		Oral Speaker 1 Wenhao Wu, China University Of Petroleum 吴文浩 中国石油大学（华东）		Oral Speaker 5 Hongying Zhao, Zhengzhou University of Light Industry 赵红英, 郑州轻工业大学
15:50-16:00	Invited Speaker 2 Assoc. Prof. Ata Jahangir Moshayedi, Jiangxi University of Science and Technology, China Speech Title: <u>Revolutionizing AGV</u> <u>Service Robots: Enhancing</u> <u>Missions, Overcoming</u> <u>Obstacles, and Empowering</u> <u>Vision</u>	Oral Speaker 2 Qingwei Pang, China University Of Petroleum (East China) 庞庆威 中国石油大学（华东）	Invited Speaker 2 Assit. Prof. Xiaohao Cai, University of Southampton ,UK Speech Title: <u>Segmentation</u> <u>and Classification using</u> <u>Deep Learning</u> <u>Technologies</u>	Oral Speaker 6 Zhennan Kang, Changchun University of Science and Technology 康镇南, 长春理工大学
16:00-16:10		Oral Speaker 3 Hengxiao Li, China University Of Petroleum (East China) 李恒霄 中国石油大学（华东）		Oral Speaker 7 Ailin Du, Changchun University of Science and Technology 杜爱林, 长春理工大学
16:10-16:20		Oral Speaker 4 Huan Zhang, China University Of Petroleum (East China) 张欢 中国石油大学（华东）		Oral Speaker 8 Xiaofeng Yan, Shanghai University of Electric Power 晏晓峰, 上海电力大学
16:20-16:30	Oral Speaker 1 Xunhua Cai, Xiangsihu College GuangXi for Nationalities 蔡迅华 广西民族大学相思湖学院	Oral Speaker 5 Nuanlai Wang, China University Of Petroleum (East China) 王暖来 中国石油大学（华东）	Oral Speaker 1 Kuijie Zhang, China University Of Petroleum (East China) 张魁杰 中国石油大学（华东）	Oral Speaker 9 Fangzheng Yuan, China Mobile Group Shandong Company Limited Qingdao Branch, 袁方正, 中国移动通信集团 山东分公司青岛分公司



ICFTIC 2023 第五届信息与计算机前沿技术国际学术会议

2023 5th International Conference on Frontier Technology of Information and Computer

November 18, 2023 (Saturday) 16:30-18:00 (GMT+8)

Session Report – 分会场报告

	Session 1: 地点：图书馆（东馆） 第一会议室	Session 2: 地点：图书馆（东馆） 第二会议室	Session 3: 地点：图书馆（东馆） 第四会议室	Session 4: 线上-Online
16:30-16:40	Oral Speaker 2 Zhicheng Pang, Shandong University Of Technology 庞志程 山东理工大学	Oral Speaker 6 Haiyuan Gui, China University Of Petroleum (East China) 桂海源 中国石油大学（华东）	Oral Speaker 2 Yunyin Li, China University Of Petroleum (East China) 李韵音 中国石油大学（华东）	Oral Speaker 10 Wei Liu, Changchun University of Science and Technology 刘威，长春理工大学
16:40-16:50	Oral Speaker 3 Hanlin Yang, Harbin Institute of Technology, Weihai 杨翰霖 哈尔滨工业大学（威海）	Oral Speaker 7 Tiyao Liu, China University Of Petroleum (East China) 刘体耀 中国石油大学（华东）	Oral Speaker 3 Bin Wang (Hongbo Dou) , China University Of Petroleum (East China) 王斌（豆鸿博） 中国石油大学（华东）	Oral Speaker 11 Jiarui Zhang, Dongguan University of Technology 张家瑞，东莞理工学院
16:50-17:00	Oral Speaker 4 Lei Zhang, Beijing University Of Civil Engineering And Architecture 张蕾，北京建筑大学	Oral Speaker 8 Xiao He, China University Of Petroleum (East China) 贺晓，中国石油大学（华东）	Oral Speaker 4 Chuanru Ren, China University Of Petroleum 任传儒 中国石油大学（华东）	Oral Speaker 12 Tu Hu, Kunming University of Science and Technology 胡途，昆明理工大学
17:00-17:10	Oral Speaker 5 Hao Fu, Nanjing Tech University 付豪，南京工业大学	Oral Speaker 9 Guangyue Zhou, China University Of Petroleum (East China), China 周广悦 中国石油大学（华东）	Oral Speaker 5 Wendong Huang, China University Of Petroleum (East China), China 黄文栋 中国石油大学（华东）	Oral Speaker 13 Yuyi Zou, Fuzhou University 邹玉熠，福州大学
17:10-17:20	Oral Speaker 6 Wenzhe Wu, Xizang Minzu University 武文哲，西藏民族大学	Oral Speaker 10 Zijun Zhan, China University Of Petroleum (East China), China 詹子俊 中国石油大学（华东）	Oral Speaker 6 Chenyang Xu, China University Of Petroleum (East China), China 徐晨阳 中国石油大学（华东）	Oral Presentation
17:20-17:30	Oral Speaker 7 Jiaqi Ren, National University of Defense Technology 任加祺，国防科技大学	Oral Speaker 11 Xuemei Huang, Chongqing Jiaotong University 黄雪梅，重庆交通大学	Oral Speaker 7 Shuaipeng Gao, China University Of Petroleum, China 高帅鹏 中国石油大学（华东）	
17:30-17:40	Oral Speaker 8 Min Li, China Mobile Research Institute, China 李敏，中国移动通信有限公司研究院	Oral Presentation	Oral Speaker 8 Xue Zhai, China University Of Petroleum (East China), China 翟雪，中国石油大学（华东）	
17:40-17:50	Oral Speaker 9 Feiyang Feng, Xizang Minzu University, China 冯飞杨，西藏民族大学		Oral Presentation	
17:50-18:00	Best Oral Presentation Award- 口头报告评选			

November 18, 2023 (Saturday) 18:30-20:30 (GMT+8)

Banquet (Venue: Howard Johnson Qingdao Kangda Hotel) - 晚宴 (地点: 青岛康大豪生大酒店)

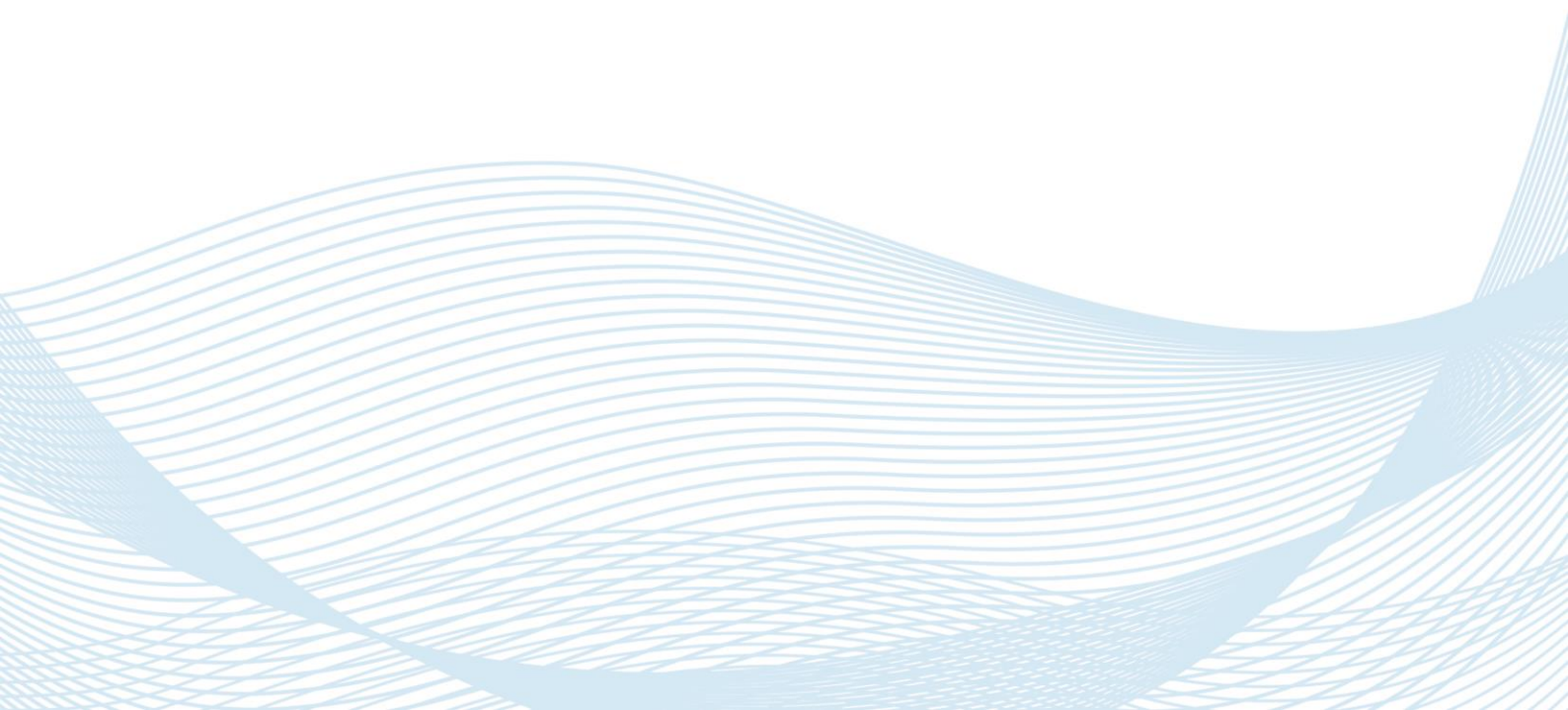
18:30-18:40	Message from Chair-大会主席总结
18:40-18:50	Award-评优颁奖
18:50-19:00	Closing Ceremony-闭幕式致辞
19:00-20:30	Banquet-晚宴



03

组织单位

Organization





ICFTIC 2023 第五届信息与计算机前沿技术国际学术会议
2023 5th International Conference on Frontier Technology of Information and Computer

主办单位 Sponsor



中国石油大学 (华东)
CHINA UNIVERSITY OF PETROLEUM

中国石油大学（华东）是教育部直属全国重点大学，是国家“211工程”重点建设和开展“985工程优势学科创新平台”建设并建有研究生院的高校之一。学校是教育部和五大能源企业集团公司、教育部和山东省人民政府共建的高校，是石油石化高层次人才培养的重要基地，被誉为“石油科技、管理人才的摇篮”，现已成为一所以工为主、石油石化特色鲜明、多学科协调发展的大学。2017年、2022年均进入国家“双一流”建设高校行列。





山东省人工智能学会

Shandong Association of Artificial Intelligence

山东省人工智能学会成立于2018年8月，由山东省内从事人工智能理论与技术应用的科技工作者、研究单位、企业等自愿组成的学术性、专业性、非营利性社会组织。学会的业务主管部门为山东省科学技术协会，挂靠单位为山东大学。2019-2020年，学会连续两年被省科协评为“年度学会工作先进单位”，2020年学会被省科协评为“争先创新学会”、“区域性学术交流活动典型学会”及“脱贫攻坚工作典型学会”。2021年学会主办的第四届山东省人工智能大会与第二届泰山人工智能产业大会暨第四届山东省新旧动能转换国家战略创新峰会两项活动被省科协评为“2021年度学会工作典型案例”。2021年学会被省科协评为“第十三届山东省大学生科技节优秀组织单位”。2022年入选省科协“头雁工程”学会，并被省民政厅评为“5A级社会组织”。

学会秉持“品牌立会 服务强会 汇智赋能 开放共赢”的办会理念，旨在搭建开放的专业平台，推动我省人工智能科学研究、产业研发与应用、人才培养、科学普及等工作的开展，促进政产学研的深度交叉融合，提升山东省人工智能学术研究水平，增强人工智能科技创新能力，推动人工智能技术深度应用，服务山东省新旧动能转换，为我省经济发展、社会进步、政府决策提供智能化技术服务和支持。

学会业务范围：调查研究、学术交流、科技咨询、标准制定、业务培训、会议服务、编辑出版期刊、承接政府购买服务、科普等。

学会现有个人会员5000余人，单位会员100余家。理事、监事专家群不仅涵盖了全省人工智能领域的大部分优秀学者，包括一大批国家级杰出人才、省级杰出人才，还拥有以吕雪岭、王春涛、刘利达、郑飞、张睿、冯政、高文飞、王建新等为代表的一批人工智能领域的优秀产业界领军人才。学会设有学术工作委员会、组织工作委员会、智能产业促进与发展委员会、科普工作委员会和标准化工作委员会，已组建了视觉应用与智能技术、职业教育、职业健康智能服务、智能安全管理、高等教育、智慧建造、青少年教育、青年科学家、计算智能和智能制造等专业委员会。

学会成立以来，积极履行社会责任，组织和参与了双百扶贫、乡村振兴等多项社会公益活动。充分发挥自身优势，设立了系列品牌活动，包括山东省人工智能大会、泰山人工智能产业大会、产业高峰论坛、科普论坛、青年科技工作者论坛、人工智能大赛等，取得良好社会效益。

学会将孜孜不倦、开拓创新，紧密围绕国家和我省人工智能相关战略部署，团结省内外人工智能领域的相关力量，积极开创新形势下我省人工智能发展的新篇章。



山东计算机学会成立于1987年，是山东计算机科学技术工作者自愿结成的群众性学术团体，非盈利性社会组织，接受业务主管单位山东省科学技术协会和社团登记管理机关山东省民政厅的业务指导和监督管理，挂靠在山东大学和山东省科学院。学会现下设3个工作委员会（党建与科技创新工作委员会、青年工作委员会、企业工作委员会），9个专业委员会（网络空间安全、大数据与智能计算、数字媒体技术与艺术、工业大数据与智能制造、职业教育发展、智能科学与技术、高性能计算、海洋交叉信息技术、农业信息化），拥有山东大学、齐鲁工业大学（山东省科学院）、中国海洋大学、中国石油大学（华东）、山东师范大学、山东财经大学、山东科技大学、济南大学、青岛大学、临沂大学、青岛农业大学、济南市高新区齐鲁软件园发展中心、山东省电子产品监督检验院、浪潮集团、中创公司等近百家团体会员单位，会员千余人。

习近平总书记指出，社会团体要坚持为科技工作者服务、为创新驱动发展服务、为提高全民科学素质服务、为党和政府科学决策服务的“四个服务”职责定位，团结和引领广大科技工作者积极进军科技创新，组织开展创新争先行动，促进科技繁荣发展，促进科学普及和推广。学会通过召开大型学术年会、学术论坛、组织省重点实验室联合开放基金评选、出版学术论文集、参与省科协助力创新驱动发展工程、举办“泰山科技论坛”、YOCSEF（济南）论坛、专家进校园、专家进企业、组织全国青少年信息学奥赛（山东赛区）、山东省ACM大学生程序设计大赛、山东省大学生数字媒体创意大赛、山东省大学生移动互联创新创业大赛、山东省大学生网络技术大赛等活动，推动了学术交流，活跃了学术氛围，提高了学术水平，发掘了一大批年轻的优秀人才，在业界引起强烈反响，得到社会广泛认可和赞誉。学会现具备省民政厅认证的承接政府职能转移资格，是山东省科协首批能力提升示范学会，连年被山东省科学技术协会评为学会工作先进单位，党建和科技创新创新工作在省级学会中发挥了引领作用。

山东计算机学会将在山东省科协的引领下，以突出政治性、先进性和群众性组织建设为主线，以“四服务”为着力点，以改革提升为动力，以担当进取为追求，一心一意谋发展，聚精会神抓落实，打造党和政府信任、科技工作者满意、社会公众支持、自身发展有活力，能负责、能问责的现代科技社团。



承办单位 Organizer



青 岛 软 件 学 院
QINGDAO INSTITUTE OF SOFTWARE
计算机科学与技术学院
COLLEGE OF COMPUTER SCIENCE AND TECHNOLOGY

计算机科学与技术学院创建于1984年，前身为石油勘探系计算机研究室。2020年，为深入贯彻国家软件发展战略，满足国家能源安全战略及青岛市经济社会发展对高端人才的需求，中国石油大学（华东）与青岛市政府、中国石油集团东方地球物理勘探有限责任公司、东软集团有限公司、海信集团有限公司共建青岛软件学院，并于2021年12月获批国家特色化示范性软件学院，从此开启高质量内涵发展新阶段。

近些年学院学科发展迅速，计算机科学进入ESI全球排名第307名（2023年9月），排名前4.15‰。设有先进科学与工程计算、油气人工智能2个交叉学科博士点，计算机技术与资源信息工程二级博士点，计算机科学与技术、软件工程2个硕士学位授权一级学科，拥有资源信息工程博士专业学位授权领域，计算机技术、软件工程2个硕士专业学位授权领域。学院参与共建化学品安全全国重点实验室、深层油气全国重点实验室，建有海洋物探及勘探开发装备国家工程研究中心综合环境数字化与模拟分中心、智能油田教育部工程研究中心、山东省石油工业软件智能技术高校重点实验室、山东省能源工业大数据发展创新实验室等多层次、体系化的高端科研平台。近五年，承担国家重点研发计划、国家基础工作专项、国家创新工程等科研项目239项，到位科研经费超过1亿元，获省部级以上奖励15项。

学院拥有一支高水平、经验丰富的师资队伍。现有教职工121人，其中教授21人，博士生导师16人，拥有国家级人才4人、省部级人才4人。设有计算机科学与技术、软件工程、智能科学与技术三个本科专业，其中计算机科学与技术专业入选国家级一流专业建设点，为山东省特色专业；软件工程专业入选国家级一流本科专业建设点，为山东省“卓越工程师教育培养计划”建设专业。学院始终以立德树人为根本，通过持续综合改革不断提升人才培养质量，为国家输送了8000余名具有较高科学素养、较强创新意识和实践能力的复合型高级工程技术人才。

“格物计算，致知力行”。学院正致力于打造特色化的发展和育人文化，打造“三支队伍”，落实科教、产教和学科三个融合，建设“五大平台”，持续探索信息与计算的科学世界，培养高端人才，服务国家战略需求、行业与区域发展需要，推动社会发展。

04

大会组委

Committee



组 委 会 *Committee*

Conference General Chairs

- Prof. Shanchen Pang, Dean of College of Computer Science and Technology, China University of Petroleum (East China), China
- Prof. Yang Xiao, IEEE Fellow, IET Fellow, AAIA Fellow, The University of Alabama, USA

Technical Program Committee Chairs

- Prof. Yilong Yin, IET Fellow, Director of Shandong Association of Artificial Intelligence, Shandong University, China
- Prof. Bing Shi, Director of Shandong Computer Federation, China
- Prof. Tao Song, IEEE Senior Member, Vice dean of College of Computer Science and Technology, China University of Petroleum (East China), China
- Prof. Haibin Zhu, Vice President SSE, IEEE SMC Society, Chair, SSE Technical Activity Committee, IEEE SMC Society, Editor in Chief, IEEE SMC Magazine, Fellow of I2CICC, Nipissing University, Canada

Organizing Committee Chairs

- Prof. Faming Gong, China University of Petroleum (East China), China
- Prof. Peiguang Lin, Vice Director of Shandong Association of Artificial Intelligence, Shandong University of Finance and Economics, China
- Prof. Jiguo Yu, IEEE Fellow, Executive director of Shandong Computer Federation, Qilu University of Technology, China
- Prof. Jianli Zhao, President of Qingdao CCF, Shandong University of Science and Technology, China



组 委 会 *Committee*

Publication Chairs

- Prof. Chunlei Wu, IEEE Member, Vice Dean of College of Computer Science and Technology, China University of Petroleum (East China), China
- Prof. Jian Wang, China University of Petroleum (East China), China

Organizing Committee Members

- Prof. Chenglizhao Chen, China University of Petroleum (East China), China
- Prof. Lin Lv, Shandong University, China
- Prof. Jia Yu, Qingdao University, China
- Prof. Guoqiang Zhong, Ocean University of China, China
- Prof. Lianyong Qi, China University of Petroleum (East China), China
- Prof. Wenjuan Gong, China University of Petroleum (East China), China

Technical Program Committee Members

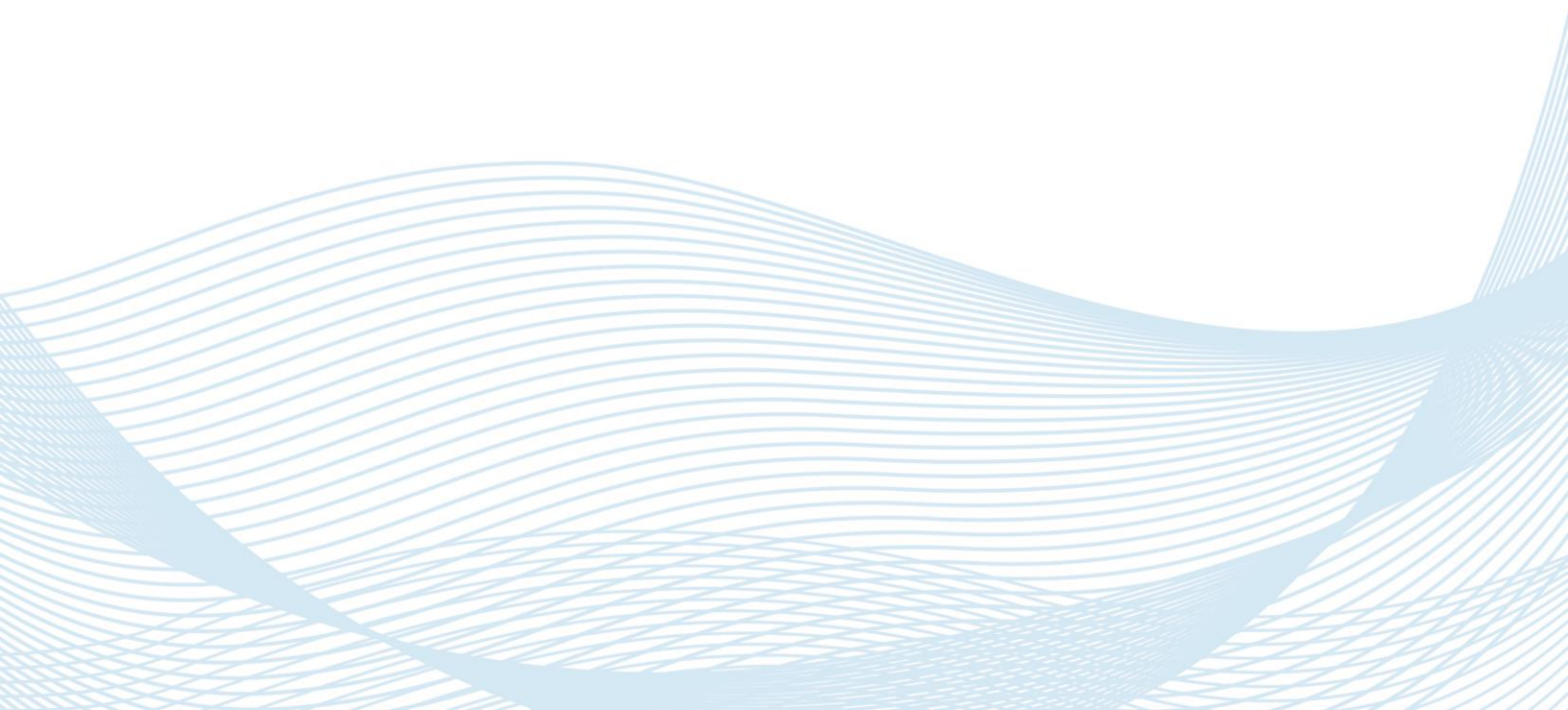
- Yanwei Yu, Ocean University of China, China
- Xiushan Nie, Shandong Jianzhu University, China
- Zhongying Zhao, Shandong University of Science and Technology, China
- Peng Ren, China University of Petroleum (East China), China
- Ali Kashif Bashir, Manchester Metropolitan University, UK
- Anna Maria Vegni, Roma Tre University, Rome, Italy
- Btissam Er-Rahmadi, Huawei Edinburgh Research Centre, UK
- Bouziane Brik, Burgundy University, France
- Carlos Tavares Calafate, Technical University of Valencia (UPV), Spain
- Enrico Natalizio, Abu Dhabi, UAE and Full Professor, LORIA, Université de Lorraine, France
- Fayaz Ali Dharejo, Computer Network Information Center, Chinese Academy of Sciences, Pakistan
- Fabio Poiesi, Fondazione Bruno Kessler, Italy
- Joel J. P. C. Rodrigues, Federal University of Piau  (UFPI), Brazil



05

主讲报告

Keynote Speech





主讲嘉宾 I Keynote Speaker I



Prof. Xiuzhen Cheng | 成秀珍 教授

IEEE Fellow, CSEE Fellow, AAIA Fellow

Shandong University, China | 山东大学

Biography:

Dr. Xiuzhen Cheng is a Professor of Computer Science at Shandong University. Her research focuses on the broad area of distributed and trusted computing, particularly in blockchain computing, edge computing, and IoT security. Dr. Cheng is the founder and steering committee chair of the International Conference on Wireless Algorithms, Systems, and Applications (WASA, launched in 2006), and the founding EiC of the High-Confidence Computing Journal (launched in 2021). She also chaired several international conferences (e.g. ACM Mobihoc'14). Dr. Cheng is a Fellow of IEEE, a Fellow of CSEE (Chinese Society for Electrical Engineering), and a Fellow of AAIA (Asia-Pacific Artificial Intelligence Association). Her current H-Index is 65, and the total number of Google Citations is 18,000+.

Speech Title: *Decentralized Storage Networks*

Abstract:

Decentralized Storage Networks (DSNs) can gather storage resources from mutually untrusted providers and form worldwide decentralized file systems. Compared to traditional storage networks, DSNs are built on top of blockchains, which can incentivize service providers to contribute their unused storage spaces and ensure strong security. However, pioneering DSNs still face challenges in many aspects such as data privacy, proof of storage complexity, multi-version file management, and file indexing. In this talk, we will report two of our recent works, namely FileDAG and FileDES, which intend to overcome the above problems in designing DSNs. Specifically, FileDAG is built on a DAG-based blockchain to support file-level deduplication in storing multi-versioned files while relying on a two-layer DAG-based blockchain ledger to provide flexible and storage-saving file indexing; FileDES (Decentralized Encrypted Storage) extends FileDAG from multiple aspects, incorporating data security, system scalability, and proof succinctness respectively with file encryption, a lightweight proof of encrypted storage algorithm (PoES), and a succinct multi-version verification method. Open research challenges and future research directions will also be discussed.



主讲嘉宾 II Keynote Speaker II



Prof. Zuqing Zhu | 朱祖勍 教授

IEEE Fellow, Director of INFINITE LAB,
University of Science and Technology of China
(USTC), China | 中国科学技术大学

Biography:

Zuqing Zhu received his Ph.D. degree from the Department of Electrical and Computer Engineering, University of California, Davis, in 2007. From 2007 to 2011, he worked in the Service Provider Technology Group of Cisco Systems, San Jose, California, as a Senior Engineer. In January 2011, he joined the University of Science and Technology of China, where he currently is a Full Professor in the School of Information Science and Technology. He has published 360+ papers in peer-reviewed journals and conferences. He is the Steering Committee Chair of the IEEE International Conference on High Performance Switching and Routing (HPSR), and the Chair of the Technical Committee on Optical Networking (ONTN) in ComSoc. He has received the Best Paper Awards from ICC 2013, GLOBECOM 2013, ICNC 2014, ICC 2015, and ONDM 2018. He is a Fellow of IEEE and a Senior Member of Optica (formerly OSA).

Speech Title: *Machine Learning in and for Optical Data-Center Networks*

Abstract:

In the first part of this talk, we will first discuss the challenges on scalability, energy and manageability of data-center network (DCN) systems, and then explain why all-optical inter-connection can be a promising solution for future DCN systems. Next, we describe a novel all-optical inter-connection architecture based on arrayed waveguide grating router (AWGR) and wavelength-selective switches (WSS'), namely, Hyper-Flex-LION, explain its operation principle, and show experimental results of running distributed machine learning (DML) in a DCN in Hyper-Flex-LION. In the second part of this talk, we will explain how machine learning can be leveraged to realized knowledge-defined networking (KDN) and facilitate network automation in DCNs. Experimental results demonstrate that KDN can automatically reduce task completion time.



主讲嘉宾 III Keynote Speaker III



Prof. Guangjie Han | 韩光洁 教授

IEEE Fellow, IET/IEE Fellow, AAIA Fellow

Hohai University, China | 河海大学

Biography:

Guangjie Han (Fellow, IEEE) is currently a Professor with the Department of Internet of Things Engineering, Hohai University, Changzhou, China. His current research interests include Internet of Things, Industrial Internet, Machine Learning and Artificial Intelligence, Mobile Computing, Security and Privacy. Dr. Han has over 500 peer-reviewed journal and conference papers, in addition to 160 granted and pending patents. Currently, his H-index is 60 and i10-index is 257 in Google Citation (Google Scholar). The total citation count of his papers raises above 13600+ times. Dr. Han is a Fellow of the UK Institution of Engineering and Technology (FIET). He has served on the Editorial Boards of up to 10 international journals, including the IEEE TII, IEEE TCCN, IEEE Systems, IEEE/CCA JAS, IEEE Network, etc. He has guest-edited several special issues in IEEE Journals and Magazines, including the IEEE JSAC, IEEE Communications, IEEE Wireless Communications, Computer Networks, etc.

Speech Title: Multi-Dimensional Dynamic Trust Management Mechanism in Underwater Acoustic Sensor Networks

Abstract:

The underwater acoustic sensor network (UASN) is the core module to realize the "smart ocean". At present, the UASN has not yet fully played its role in the complex water environment. The fundamental reason lies in the lack of effective methods to ensure network security and reliable data transmission. This report mainly introduces the team's research work on the trust management mechanism of UASNs. The main research contents include: 1) Intrusion detection algorithm based on energy consumption prediction model; 2) Multi-dimensional trust calculation algorithm based on fuzzy theory; 3) Trust evaluation algorithm based on cloud theory; 4) Trust cloud migration mechanism based on AUV; 5) Trust update mechanism based on reinforcement learning; 6) Anomaly-resilient trust model based on isolation forest. The research results have important theoretical value and practical significance for exploring the security technology and application of UASNs.



主讲嘉宾 IV Keynote Speaker IV



Prof. Xiangjian (Sean) He | 何祥健 教授

University of Nottingham Ningbo, China

宁波诺丁汉大学

Biography:

Professor Xiangjian (Sean) He is a National Talent of China with a Chair Professor title. He is currently the Faculty's Research Groups Lead, a Deputy Head of Computer Science School and the Director of Computer Vision and Intelligent Perception Laboratory at the University of Nottingham Ningbo China (UNNC). He is in list of the 'World Top 2% Scientists' reported by Stanford University in 2022 and 2023. He has been carrying out research mainly in the areas of computer vision, data analytics and machine learning in the previous years. He has recently been leading his research teams for deep-learning-based research for various applications. He is currently an Associate Editor of three journals and has played various chair roles in many international conferences such as ACM MM, MMM, ICDAR, IEEE BigDataSE, IEEE BigDataService, IEEE TrustCom, IEEE CIT, IEEE AVSS, IEEE ICPR and IEEE ICARCV.

Speech Title: *Big Data, Machine Learning and Computer Vision*

Abstract:

Big data are in all science and engineering domains. Analysis of them requires novel learning techniques to address the various challenges. This talk will briefly introduce the basic concepts of machine learning and give a brief survey of the research on machine learning for big data processing. Some promising learning methods in recent studies will be highlighted. Then, the challenges and possible solutions of machine learning for big data will be presented. Following that, the applications in computer vision, image and signal processing, Internet of Things, etc. will be investigated and various deep learning network models will be demonstrated for various applications such as crowd counting, image segmentation, traffic prediction, object tracking, etc.



主讲嘉宾 V Keynote Speaker V



Prof. Carlos Artemio Coello Coello

IEEE Fellow, Editor-in-Chief, IEEE Transactions on Evolutionary Computation

Department of Computer Science CINVESTAV-IPN, Mexico

Biography:

Professor Carlos Artemio Coello Coello received a PhD in Computer Science from Tulane University (USA) in 1996. He is currently full professor with distinction at CINVESTAV-IPN in Mexico City, Mexico. He has published over 380 papers in international peer-reviewed journals, book chapters, and conferences. He has also co-authored the book *Evolutionary Algorithms for Solving Multi-Objective Problems*, which is now in its Second Edition (Springer, 2007) and has co-edited the book *Applications of Multi-Objective Evolutionary Algorithms* (World Scientific, 2004). His publications currently report over 23,000 citations, according to Google Scholar (his h-index is 61).

He received the 2007 National Research Award (granted by the Mexican Academy of Science) in the area of exact sciences and, since January 2011, he is an IEEE Fellow for "contributions to multi-objective optimization and constraint-handling techniques."

He is also the recipient of the prestigious 2013 IEEE Kiyo Tomiyasu Award and of the 2012 National Medal of Science and Arts in the area of Physical, Mathematical and Natural Sciences (this is the highest award that a scientist can receive in Mexico). He also serves as associate editor of the journals *Evolutionary Computation*, *IEEE Transactions on Evolutionary Computation*, *Computational Optimization and Applications* and *Applied Soft Computing*.

Speech Title: *What is Missing in Evolutionary Optimization?*

Abstract:

In this talk, I'll provide some thoughts about my view of a field in which I have worked during almost 30 years. Besides mentioning some relevant research topics related to both single- and multi-objective optimization that are worth exploring in the next few years (e.g., dynamic problems, high dimensionality, expensive objective functions, etc.), I'll provide a more general view of the field, sharing my views about the sort of research work which I believe that is needed today so that we can start switching from producing to understanding.



特邀嘉宾 I *Invited Speaker I*



Assoc. Prof. Pavel Loskot

IEEE Senior Member

Zhejiang University-University of Illinois at
Urbana-Champaign Institute (ZJUI), China

浙江大学伊利诺伊大学厄巴纳香槟校区联合学院

Biography:

Pavel Loskot joined the ZJU-UIUC Institute in January 2021 as the Associate Professor after being nearly 14 years with Swansea University in the UK. He is the Senior Member of the IEEE, Fellow of the Higher Education Academy in the UK, and the Recognized Research Supervisor of the UK Council for Graduate Education. His current research interest focuses on problems involving statistical signal processing and importing methods from Telecommunication Engineering and Computer Science to other disciplines in order to improve the efficiency and the information power of system modeling and analysis.

Speech Title: *Mathematical Models in Network Molecular Biology*

Abstract:

Network molecular biology studies molecular interactions that are involved in various cellular processes. These interactions are often represented by complex networks that can be analyzed to identify the key components as well as to predict the unknown components including biochemically important species, reactions and pathways in cellular systems. This can be achieved by forming and analyzing static structures of, for example, protein-to-protein interaction networks and metabolic networks, which is dependent on our biological knowledge, availability of experimental data, and often also on the hypothesis to be tested. However, static network models are usually only good when larger spatio-temporal scales can be considered. At smaller scales, more accurate modeling requires capturing the dynamical responses of molecular systems to the internal and external perturbations. The dynamic models in molecular biology are often represented by various forms of differential equations, and they are referred to as kinetic models. The properties of these models can be studied in terms of the underlying stochastic processes, and observability and controllability of the dynamical systems. These models have many practical applications from designing biological circuits, discovering drugs, controlling biochemical reactors to understanding disease spreading.



特邀嘉宾 II *Invited Speaker II*



Assoc. Prof. Ata Jahangir Moshayedi

Jiangxi University of Science and Technology,
China | 江西理工大学

Biography:

Dr Ata Jahangir Moshayedi, Associate professor at Jiangxi University of Science and Technology, China, PhD. In Electronic Science from Savitribai Phule Pune University, India. IEEE member, Instrument Society of India as a Life Member, Lifetime Member of Speed Society of India, member of the editorial team of various conferences and journals like; International Journal of Robotics and Control, JSME, Bulletin of Electrical Engineering and Informatics, International Journal of Physics and Robotics Applied Electronics, etc., 80 papers published in national journals and conferences, 3 books published, Owns 2 patent, 9 copyright. His research interest includes: Robotics and Automation/ Sensor modelling /Bio-inspired robot, Mobile Robot Olfaction/Plume Tracking, Embedded Systems / Machine vision-based Systems/Virtual reality, Machine vision/Artificial Intelligence.

Speech Title: *Revolutionizing AGV Service Robots: Enhancing Missions, Overcoming Obstacles, and Empowering Vision*

Abstract:

Service robots play a crucial role in enhancing human life, spanning from healthcare to industrial applications. These robots not only have the potential to save lives but also assist with labor-intensive tasks, ensuring precision and efficiency. According to ISO 8373:2012, service robots can be categorized into personal service robots designed for non-manufacturing settings, and professional service robots utilized by both non-commercial individuals and commercial professionals. Whether semi-autonomous or fully autonomous, service robots have gained acceptance as valuable human assistants, finding applications in diverse industries, particularly as integral components of production lines. As we progress through the stages of industrial revolution, with mechanization, electric power, and the advent of Industry 4.0 combining digital and internet technologies, service robots are at the forefront of technological innovation. In this comprehensive discourse, we delve into the realm of AGV service robots, elucidating the intricacies of their modeling steps and simulation techniques while introducing an innovative approach known as fusion. Our primary objective is to empower researchers with invaluable insights into the seamless implementation of diverse control systems on meticulously modeled service robot systems.



特邀嘉宾 III *Invited Speaker III*



Prof. Yanguo Jing

Leeds Trinity University, UK | 利兹三一大学

Biography:

Professor Dr Yanguo Jing is the Dean of the Faculty of Business, Computer Science and Digital Industries, Leeds Trinity University. He is a Professor of Artificial Intelligence. Prof. Jing' s prime research interests are AI and big data. His recent research work focuses on the use of machine-learning methods to capture interaction and user behaviour patterns that can be used to develop intelligent applications. This research has been applied in applications such as business analytics, sports analytics, and user behaviour pattern recognition in social networks and extra-care/ Assisted Living settings. He participated in several research, KTP and consultancy projects with sponsors and clients such as Cadent Gas, Pfizer, Welsh Government, KPIT, UK' s Comic Relief charity and JISC in the UK.

Speech Title: *The Use of Machine Learning to Predict Technical Skills in Youth Grassroots Soccer*

Abstract:

The aim of this study was to determine the contributors to football technical skill in grassroots youth football players using a machine learning approach. Machine learning models are used to predict technical skill. A recursive feature elimination method was used to eliminate the worst performing features using linear regression and ridge regression. Five machine learning models (linear, ridge, lasso, random forest and boosted trees) were used in the study. Results from the machine learning analysis indicated that total Fundamental Movement Skills (FMS) score (0-50) was the most important feature in predicting technical soccer skill closely followed by coach rating of child skill for their age, years playing experience and Age at Peak Height Velocity (APHV). Using a random forest, technical skill could be predicted with 99% accuracy in boys who play grassroots soccer, with FMS being the most important contributor. Coaches at grassroots level, should therefore be mindful of the importance of FMS for technical skill in youth players.



特邀嘉宾 IV *Invited Speaker IV*



Assit. Prof. Xiaohao Cai

University of Southampton, UK | 南安普顿大学

Biography:

Xiaohao Cai is a lecturer (Assistant Professor equivalent) in the School of Electronics and Computer Science at the University of Southampton. He is Fellow of Advance HE in the UK. He has broad multi-disciplinary research interests in applied mathematics, statistics, and computer science, with main focus and applications in image signal/data processing, optimisation, machine learning and computer vision.

Speech Title: *Segmentation and Classification using Deep Learning Technologies*

Abstract:

Deep learning technologies have revolutionised many fields including computer vision and image processing. Their success generally relies on big data. However, for the data scarcity scenarios like in medical imaging, their performance could drop significantly. Moreover, in many cases, they also lack generalisation (e.g. the cross-domain adaptation problem) and explanation (e.g. explainable AI). In this presentation, I will introduce some of our recent work on segmentation and classification targeting those challenges, such as subspace feature representations for few-shot learning, cross-domain adaptation in point clouds, multilevel explainable AI, etc.



特邀嘉宾 V *Invited Speaker V*



Assoc. Prof. Por Lip Yee

IEEE Senior Member

University of Malaya, Malaysia | 马来亚大学

Biography:

Lip Yee received his Ph.D. from University of Malaya, Malaysia under the supervision of Prof. Abdullah bin Gani in 2012. Currently, he is an Assoc. Professor at the Department of System and Computer Technology, Faculty of Computer Science and Information Technology, University of Malaya, Malaysia. He is also a senior member of IEEE.

Speech Title: Recognition-Based Graphical Passwords (RBGPs): Navigating the Challenges of Shoulder-Surfing Attacks

Abstract:

In the ever-evolving landscape of digital security, the quest for robust and user-friendly authentication methods is paramount. This presentation delves into the intricate world of recognition-based graphic passwords (RBGPs), a promising alternative to traditional alphanumeric passwords, addressing their unique strengths and vulnerabilities, particularly against shoulder-surfing attacks (SSAs).

We begin with an introduction to the criticality of computer security and the fundamental role of authentication in safeguarding digital assets. The presentation outlines the transition from conventional knowledge-based methods, such as passwords and PINs, to more sophisticated techniques like RBGPs, highlighting their reliance on the human ability to better recall visual information.

Central to our discussion is the exploration of various RBGP methods and their susceptibility to different forms of SSAs: direct observation, multi-observation, and video-recorded attacks. We provide a comprehensive analysis of the types of pass-objects used in these methods and their implications for security. The strengths and weaknesses of selected RBGP systems are scrutinized, offering insights into their resistance to the aforementioned SSA forms.

Furthermore, the presentation evaluates the balance between security and usability in these methods, considering factors such as login time and password space estimation. This analysis not only reflects the current state of RBGPs in combating SSAs but also underscores the challenges and potential strategies for enhancing their efficacy and user experience.

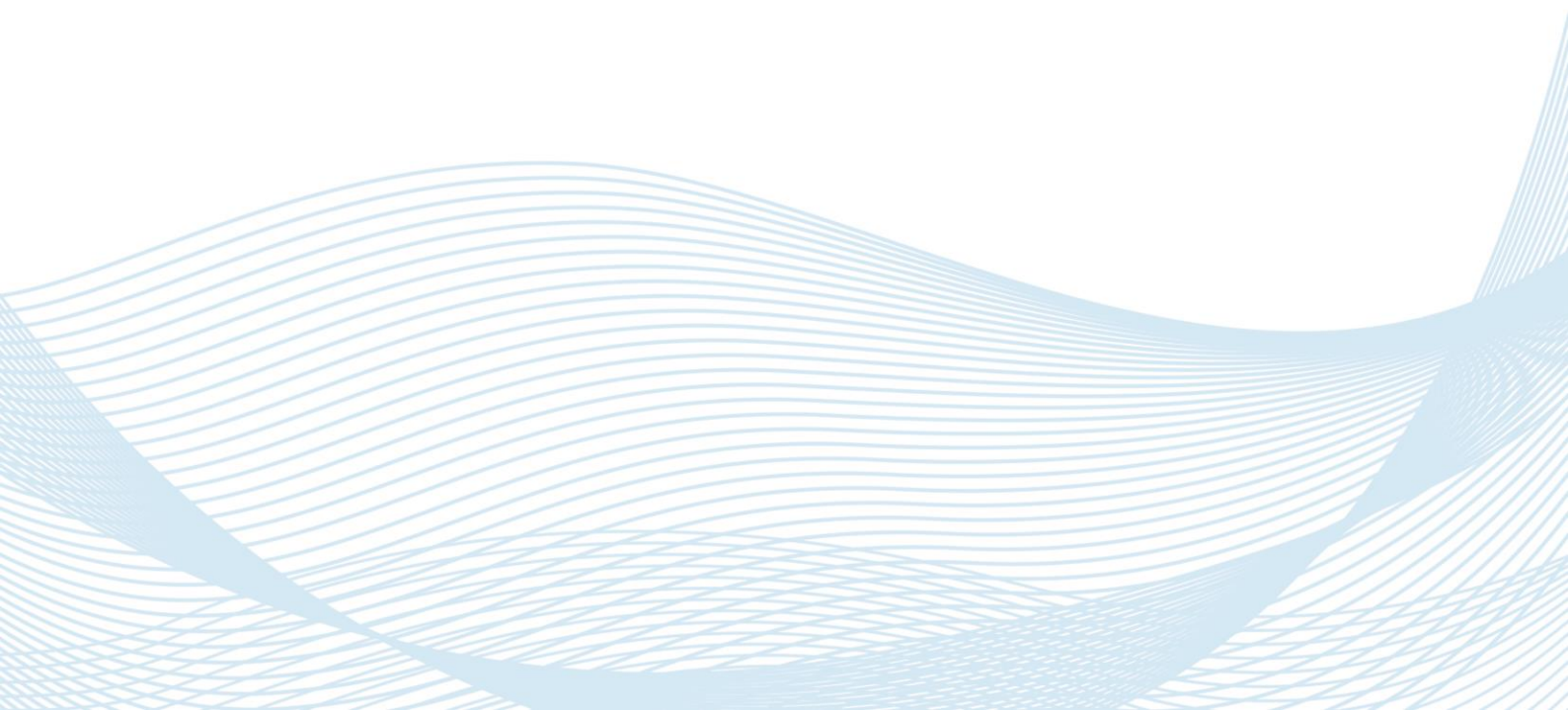
Concluding with a synthesis of our findings, the presentation aims to shed light on the future trajectory of RBGPs in digital security. It invites the audience to reflect on the delicate balance between innovation in authentication methods and the imperatives of cybersecurity, paving the way for further research and development in this vital field.



06

口头汇报

Oral Presentation





口头报告 I *Oral Presentation I*

Xunhua Cai | 蔡迅华

Xiangsihu College of GuangXi Minzu University, China

广西民族大学相思湖学院

Speech Title: Research on obstacle crossing of Biped Robot

Abstract:

With the progress of science and technology, the application field of intelligent robot is more and more extensive, in which biped robot will be applied to special working scenes, such as terrain survey, strong earthquake relief and so on. Compared with wheeled robot and multi legged robot, the balance difficulty coefficient of biped robot walking on unstable road is greater. Compared with the traditional Proportion Integration Differentiation (PID) algorithm, the environmental factors have a great influence in the special working scene, so it cannot better control the balance of the biped robot; The fuzzy PID algorithm proposed in this paper can make the biped robot fast and stable in walking and can achieve the purpose of crossing obstacles.

Notes & Questions:



口头报告 II Oral Presentation II

Zhicheng Pang | 庞志程

Shandong University of Technology, China | 山东理工大学

Speech Title: *The Influence of Airflow on Corona Discharge on Overhead Ground Wire of UHVDC Transmission Line During Lightning*

Abstract:

Corona discharge phenomenon around the overhead ground wires produces large amount of ions that can prevent the onset of upward leader on overhead ground wire during thunderstorms. In the present study, simulations on corona discharge on overhead ground wires have been conducted in detail with a two-dimensional geometrical model. During simulation, only positive ions and negative ions are considered with ionization process, recombination process, diffusion and migration movement. A composite electric field has also been applied by thundercloud, downward leader charge and operation voltage of UHVDC transmission lines. Besides, the influence of airflow on corona has also been studied in detail. Simulation results indicate that there' s significant difference of corona discharge between the left and right overhead ground wire and the influence of airflow on corona discharge tend to be less significant as downward lightning leader propagates to some certain extent.

Notes & Questions:



Notes & Questions:



口头报告 V Oral Presentation V

Hao Fu | 付豪

Nanjing Tech University, China | 南京工业大学

Speech Title: Classification of stellar spectral data based on improved ConvNeXt-V2

Abstract:

The evolving landscape of astronomy necessitates the continuous development of novel methodologies to dissect astronomical data, with a particular emphasis on star spectral classification. In the initial phase of this study, we procured representative spectral data belonging to F5, G5, and K5 spectral types from the Large Sky Area Multi-Object Fiber Spectroscopic Telescope's Data Release 9(LAMOST DR9). We then broadened our datasets to encompass five distinct stellar spectra classifications, specifically B, A, F, G, and K. This extension aligns more closely with the requirements of practical tasks within the field. The approach undertaken here commences with the application of one-dimensional convolution processing to the spectral data obtained from LAMOST, further enhancing its salience through the utilization of the short-time Fourier transform. This study primarily uses the improved ConvNeXt-V2 and conducts a comparative analysis with multiple excellent deep learning models. The findings indicate that ConvNeXt-V2 exhibits notable advantages in both experiments.

Notes & Questions:



口头报告 VI Oral Presentation VI

WenZhe Wu | 武文哲

Xizang Minzu University, China | 西藏民族大学

Speech Title: Micro-expression recognition method based on Dual Path Network and STSTNet feature fusion

Abstract:

Micro-expressions are generated when a person tries to hide or suppress his or her true emotions, and such emotions are characterized by short duration and small movement amplitude, so their recognition accuracy is constrained. To cope with these challenges, this paper proposes a recognition method based on the fusion of optical flow features and face features, in which a specific fusion of Dual Path Networks (DPNs) and 3-Dimensional Neural Networks (3DCNN-STSTNet) is used to recognize micro-expressions. Firstly, the optical flow and optical strain features from the start frame (Onset) to the apex frame (Apex) in each micro-expression segment are extracted, and the vertical optical flow, horizontal optical flow and optical strain are input into the shallow 3DCNN to extract the optical flow features; then, the DPN is used as a migration model for the face feature extraction; and finally, the obtained optical flow and face feature vectors are spliced together for the classification of emotions. The experimental results show that the unweighted average recall (UAR/%) of this method for three types of micro-expressions classification on SAMM, CASME II, and CASME3 micro-expressions datasets are 77.95, 87.51, and 40.95, respectively, and the unweighted F1 values (UF1/%) are 77.24, 85.22, and 41.01, respectively. As a result of the experiments, the proposed method is superior to traditional manual methods and existing methods in the micro-expression recognition outperforms traditional manual methods and other existing deep learning methods.

Notes & Questions:



口头报告 VII Oral Presentation VII

Jiaqi Ren | 任加祺

National University of Defense Technology, China | 国防科技大学

Speech Title: An Attack and Defense Game Model with Constrained Strategies Based on Difficulty Levels

Abstract:

Recently, there has been a growing research interest in the field of infrastructure protection regarding the integration of complex networks and game theory. However, most studies have overlooked the varying difficulty levels when choosing different strategies, which does not align with scenarios in reality. Therefore, we propose a novel approach to analyze the interactions between attackers and defenders in infrastructure protection by imposing constraints on their strategies. Initially, we evaluate the difficulties of implementing strategies by considering the node degree in the network. Subsequently, we define three types of strategies: difficult strategies, moderate strategies, and easy strategies. Then we impose practical constraints on different types of strategies. Finally, we present a solution based on the strategy constraints and conduct experiments on a target network. The results highlight the unique characteristics displayed by decision-makers when establishing various constraints, as these constraints influence decision-makers selecting diverse strategies. By introducing strategy constraints into the defense and attack game model, we provide a realistic game perspective and offer new insights for studying the protection of infrastructure networks.

Notes & Questions:



口头报告Ⅳ *Oral Presentation Ⅳ*

Xuemei Huang | 黄雪梅

Chongqing Jiaotong University, China | 重庆交通大学

Speech Title: *A Multi-scale Features Fusion Method for Concrete Crack Segmentation*

Abstract:

Cracks are a major defect in concrete bridges, and accurate segmentation is crucial for their detection. The complex topology, low contrast, and noisy background make crack detection discontinuous and insufficient in detecting small branches. Thus, crack detection remains a challenging task. This paper proposes a model that integrates semantic and detail features, specifically designed for multi-branch cracks. The model consists of two components: the high-level semantic extraction part and the shallow detail fusion part. The semantic extraction part is based on the U-Net, and optimized with the Efficient Channel Attention (ECA). We introduce a Max-pooling Efficient Channel Attention Block between the encoder and decoder to aggregate larger spatial information and preserve more texture information of cracks. Subsequently, we establish the detail part to enhance the detection accuracy of small branches. This is achieved by connecting shallow multi-scale features, which retain important detail information from different global morphologies, thereby better constraining the topological continuity of the segmentation. Experimental results on our custom dataset, our method has surpassed the state-of-the-art TransUNet model. Compared to the baseline model. Our approach achieved improvements of 0.009 and 0.147 in F1 scores on both datasets.

Notes & Questions:



口头报告 IX *Oral Presentation IX*

Min Li | 李敏

China Mobile Research Institute, China | 中国移动通信有限公司研究院

Speech Title: *A Secure and Efficient Cross-Chain Model Based on Credentials*

Abstract:

With the growth of business interaction requirements, the limitations caused by blockchain isolation are becoming more and more obviously, and cross-chain technology is the main method to address this issue. However, due to independent construction in the early stage, it is now difficult for blockchain systems to interact directly in terms of technology and security. The relay chain technology can circumvent some technical differences and has become one of the popular cross-chain solutions, but its construction complexity, cross-chain efficiency, and privacy protection still need to be improved. For this reason, we propose a credential-based cross-chain model, which can effectively reduce the difficulty of transaction processing implementation and improve cross-chain efficiency. In this model, we design a couple of credentials as the trust anchor between different blockchains, and transmit transaction proof and business data in separate paths, avoiding the security risks faced by current relay chain solution. The experimental evaluation shows that the proposed model has better performance compared to the traditional relay mode.

Notes & Questions:



口头报告 IX Oral Presentation IX

Feiyang Feng | 冯飞杨

Xizang Minzu University, China | 西藏民族大学

Speech Title: Micro-expression recognition method based on Dual Path Network and STSTNet feature fusion

Abstract:

Abstract-Micro-expressions are generated when a person tries to hide or suppress his or her true emotions, and such emotions are characterized by short duration and small movement amplitude, so their recognition accuracy is constrained. To cope with these challenges, this paper proposes a recognition method based on the fusion of optical flow features and face features, in which a specific fusion of Dual Path Networks (DPNs) and 3-Dimensional Neural Networks (3DCNN-STSTNet) is used to recognize micro-expressions. Firstly, the optical flow and optical strain features from the start frame (Onset) to the apex frame (Apex) in each micro-expression segment are extracted, and the vertical optical flow, horizontal optical flow and optical strain are input into the shallow 3DCNN to extract the optical flow features; then, the DPN is used as a migration model for the face feature extraction; and finally, the obtained optical flow and face feature vectors are spliced together for the classification of emotions. The experimental results show that the unweighted average recall (UAR/%) of this method for three types of micro-expressions classification on SAMM, CASME II, and CASME3 micro-expressions datasets are 77.95, 87.51, and 40.95, respectively, and the unweighted F1 values (UF1/%) are 77.24, 85.22, and 41.01, respectively. As a result of the experiments, the proposed method is superior to traditional manual methods and existing methods in the micro-expression recognition outperforms traditional manual methods and other existing deep learning methods.

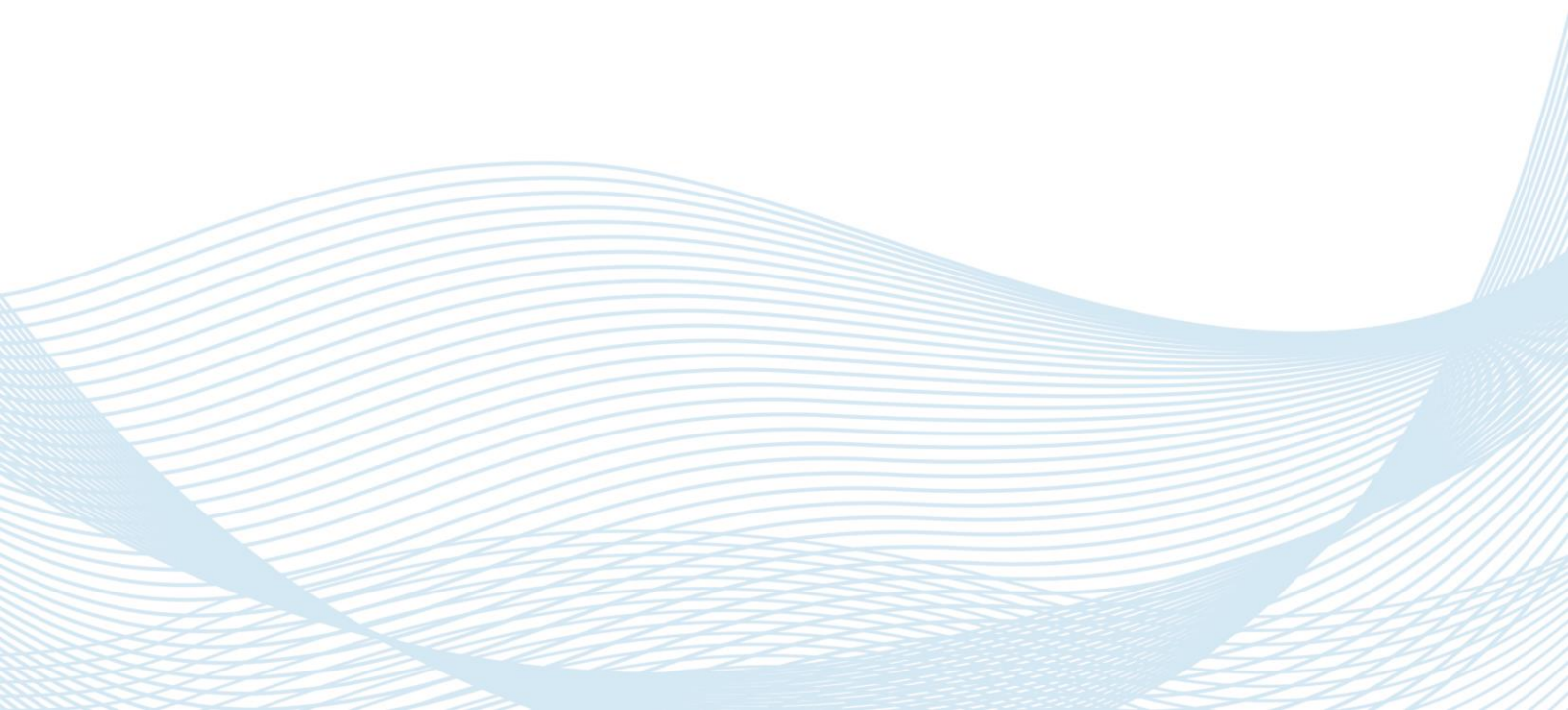
Notes & Questions:



07

海报展示

Poster





海报展示

Poster Presentation

2023 5th International Conference on Frontier Technology of Information and Computer (ICFTIC 2023)
November 17-19, 2023, Shandong, China

Research on optimization selection of radar high-resolution range target recognition features

Zhaofeng Zhang¹, Yimin Zhu^{1*}, Zhixia Li¹, Jiaojiao Zhou¹, Baohua Li¹
¹ School of Electronic Science and Technology, Beijing University of Aeronautics and Astronautics, Beijing 100083, China
*Corresponding author: zhaofengzhang@buaa.edu.cn

INTRODUCTION

High-resolution range profile (HRRP) is the projection of the target's range scattering center onto the radar line of sight, reflecting the physical characteristics of the target structure. The target recognition cross based on high-resolution range profiles involves two main steps: feature extraction and classification recognition. Feature extraction aims to reduce the dimensionality of high-dimensional data, thereby reducing the algorithm's storage requirements, and also improves the speed and accuracy of target recognition. The effectiveness and robustness of feature extraction directly determine the accuracy of target recognition.

PROBLEMS

At present, the dimension of the existing recognition features is too high, the recognition efficiency is low, and the recognition features have low sensitivity and attitude sensitivity. Too high feature dimension leads to dimension disaster, overfitting and so on.

At present, the existing recognition methods require a large amount of computation and are difficult to achieve lightweight, and the recognition effect is not good on small platforms with relatively weak computing power.

METHODS

In this study, we extract and select features for the recognition of vehicle targets and corner reflectors and utilize the KL divergence method for feature selection. Using measured data of ground target HRRPs, we state the proposed feature combination in a neural network classifier recognition. The optimal feature combination is determined.

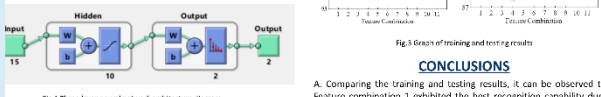


Fig.1 Three-layer neural network architecture diagram

analyzing the characteristics of the recognition target, this paper puts forward 15 recognition characteristics: Number of Strong Scattering Centers, Number of Strong Scattering Center Distance Units, Variance of Positions of Strong Scattering Centers, Variance of the Amplitude of Strong Scattering Centers, Radial Length of Distance Images, Mean of Distance Images, Variance of Distance Images, Skewness of Distance Images, Entropy of Distance Images, Steepness of Distance Images, Minimum Cross-correlation Value, Standard Deviation of Energy Spectrum Feature, Differential Feature, Total Energy of Distance Image. The KL divergence of these 15 features is calculated to determine the contribution rate of the features to the correct recognition of the target.

RESULTS

KL divergence of 15 features can be obtained through calculation, and the graph is drawn as follows:

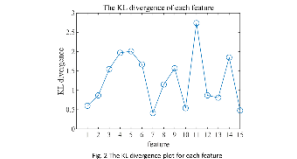


Fig.2 The KL divergence plot for each feature

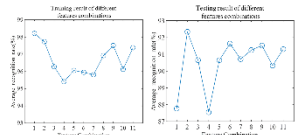


Fig.3 Graph of training and testing results

CONCLUSIONS

A. Comparing the training and testing results, it can be observed that Feature combination 1 exhibited the best recognition capability during the training phase. However, its performance significantly decreased during the testing phase, which is caused by overfitting. As the number of features increases, it becomes more likely for the trained model to perform well on the training data but poorly on unknown data.

B. Aiming at the problem of radar high-resolution one-dimensional distance image target recognition, this paper summarizes 15 one-dimensional distance image features.

C. The feature combination proposed in this paper achieves 97.7 accuracy in the training stage and 92.34% accuracy in the test stage.

CONTACT

e-mail: 997434323@qq.com

2023 5th International Conference on Frontier Technology of Information and Computer (ICFTIC 2023)
November 17-19, 2023, Shandong, China

Design of Factory Environmental Monitoring System based on ESP32

Wenze Song, Xuezheng Wang, Tianqiang Wang, Zhixuan Li, Zening Zhang, Lishan Yang^{*}
Liaocheng University
*yanglishan@lcu.edu.cn

INTRODUCTION

With the rapid population of embedded devices, Industrial Internet of Things (IIoT) has provided a promising opportunity to enhance intelligent industrial systems by leveraging the growing ubiquity of wireless sensor and actuator networks, which is crucial to ensure the reliable operation of the industrial system and benefit the manufacturing process. In this paper, an efficient factory environmental monitoring system is designed for real-time data acquisition, which is based on ESP32-S3 and network database, enabling autonomous data collection, analysis and visualization via signal processing method, which reduces transmission volume and saves network bandwidth. The experimental results show that the designed monitoring system with low cost, convenient operation and strong adaptability, which provides a practical solution to collect and analyze the data gained by the industrial wireless sector.



Fig.1 System Block Diagram of the Data Acquisition System



Fig.2 The Local UI Design

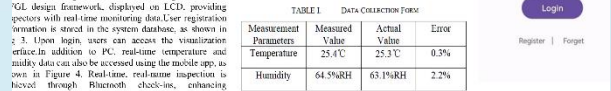


Fig.3 The Data Visualization Interface

RESULTS

As shown in Fig.2, the UI interface design utilizes the HTML design framework, displayed on LCD, providing operators with real-time monitoring data. User registration information is stored in the system database, as shown in Table 1. When login, users can access the visualization interface. In addition to PC, real-time temperature and humidity data can also be accessed using the mobile app, as shown in Fig.4. Real-time, real-time inspection is realized through Bluetooth check-in, enhancing transparency in work.

CONCLUSION

This paper has designed a water plant workshop data collection system based on the ESP32. Leveraging a database and JS framework, an upper-level computer data visualization UI interface was developed. Utilizing the ESP32-S3 as the main control device, the system successfully accomplished the majority of data processing functions. The system can monitor workshop environmental data such as temperature, humidity. The system can control sensor switches through relay circuitry, effectively reducing the overall power consumption of the system. Experimental testing has shown that the system can effectively meet the requirements, accomplishing stable and reliable data collection and organization in the water plant workshop. This achievement serves as a significant contribution to the development of intelligent water management.

TABLE 1. DATA COLLECTION FORM			
Measurement Parameters	Measured Value	Actual Value	Error
Temperature	25.4°C	25.3°C	0.3%
Humidity	64.5%RH	63.1%RH	2.2%

Fig.4 Mobile App Login Interface

2023 5th International Conference on Frontier Technology of Information and Computer (ICFTIC 2023)
November 17-19, 2023, Shandong, China

Maintenance Personnel Scheduling in Printed Circuit Board Manufacturing Workshops Based on Improved Firefly Algorithm

Zhaofeng Zhang¹, Yimin Zhu^{1*}, Zhixia Li¹, Jiaojiao Zhou¹, Baohua Li¹
¹ School of Electronic Science and Technology, Beijing University of Aeronautics and Astronautics, Beijing 100083, China
*Corresponding author: zhaofengzhang@buaa.edu.cn

Abstract

Aiming at the problems of printed circuit board (PCB) workshop maintenance relying on manual scheduling and low utilization efficiency of maintenance personnel, a maintenance personnel scheduling model with the optimization objective of minimizing the maximum maintenance time is established based on the maintenance personnel skill setting and maintenance task sequence constraints. An improved firefly algorithm solution model is developed, and a variable neighborhood search is introduced to enhance the local search capability. Compared with the original algorithm, the proposed model is validated in a PCB manufacturing enterprise. The experimental results show that the established maintenance time is shortened by 19.4% compared with the original scheme. The average utilization rate of maintenance skills is increased by 13.4%, effectively alleviating the problems of lengthy manual scheduling and low personnel utilization rate.

Background

PCB manufacturing operates under strict process requirements. The equipment in these workshops deteriorated as they worked under extreme pH values and working pressures. The company adopts a periodic shutdown maintenance strategy to minimize risks and ensure workshop reliability. Compared with the original maintenance plans on a shop floor basis, which leads to subjectivity in manual scheduling, potentially impacting the utilization of maintenance personnel resources and overall maintenance efficiency. Maintenance personnel require significant expertise and operational skills, making them a scarce resource for maintenance scheduling. Therefore, rational scheduling strategies are key to enhancing maintenance efficiency.

Model and Algorithm

The PCB manufacturing workshop maintenance personnel unified scheduling, considering the maintenance personnel skill sets and task sequence constraints, to minimize the maximum maintenance time as the goal builds the PCB manufacturing workshop maintenance personnel scheduling model.

The firefly algorithm (FA) is a heuristic algorithm proposed by the brightness attraction behavior of firefly populations [1]. Based on FA, this paper develops an improved firefly algorithm (IFA) based on the characteristics of the PCB workshop maintenance personnel scheduling model. A hierarchical strategy is used to initialize the firefly population in the initialization stage, a variable neighborhood local search strategy is introduced in the firefly brightness search stage, and the positional reconfiguration of the population is reconstructed after the search stage.

Examples Illustration

This paper takes the workshop maintenance personnel scheduling of a PCB manufacturing enterprise in Ganzhou, Jiangxi, as the validation object. Based on actual maintenance data, the model is formulated and solved using IFA. In this case, the equipment department has 15 maintenance workers with different skills, and a total of 5 maintenance tasks are defined, covering 17 workshops and a total of 202 maintenance tasks.

FA, gray wolf optimizer (GWO) algorithm, and sparrow search algorithm (SSA) were selected to solve the model, to compare the solution performance of the algorithms. Each algorithm was run 20 times with the best parameter combinations, and the experimental results are shown in Figure 1. Table 1 records the maximum (max), minimum (min), (mean), and standard deviation (std) corresponding to the 20 results obtained by the four algorithms. The population iteration convergence curves for the optimal solutions of the four algorithms are shown in Figure 2.

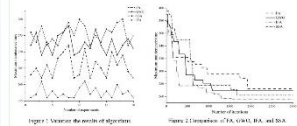


Figure 1: Comparison of maximum maintenance time for different algorithms

The scheduling scheme obtained by the IFA solver model shortens the overall maintenance time by 19.4% compared with FA. At the same time, the utilization rate of various types of skilled engineers is significantly improved. The comparison of maintenance personnel utilization rate is shown in Table II, which shows that the average utilization rate has increased by 13.4%.

CONCLUSIONS

This paper focuses on the maintenance personnel scheduling problem in PCB manufacturing workshops. A maintenance personnel scheduling model is established by considering maintenance personnel skill setting and maintenance task sequence constraints, minimizing the maximum maintenance time as the optimization objective. An IFA solver model is developed, which introduces a hierarchical strategy in the population initialization stage, a variable neighborhood search in the brightness search stage. After verifying actual cases in the enterprise, it has better results in shortening the maintenance time, improving the utilization rate of maintenance personnel and aspect effects.

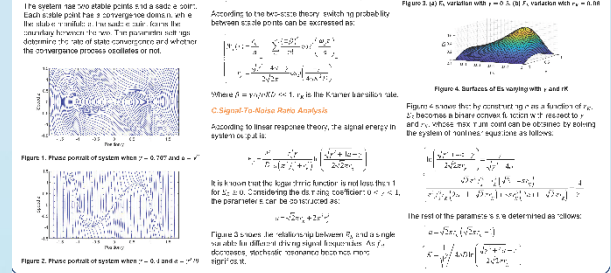
2023 5th International Conference on Frontier Technology of Information and Computer (ICFTIC 2023)
November 17-19, 2023, Shandong, China

Matching Parameter Design For Second-Order Stochastic Resonance

Yun Wang¹, Jianchun Li^{1*}
Beijing Aerospace Control Design Institute

BACKGROUND

Stochastic resonance improves the signal-to-noise ratio by adding the transformation of noise energy into signal. Second-order stochastic resonance (SSR) achieves higher noise reduction than first-order stochastic resonance (FSR). This paper characterizes the nonlinear model of second-order stochastic resonance, finding the best noise power spectrum density (PSD) for signal-to-noise ratio (SNR) optimization. The optimal noise power spectrum density is selected to obtain the maximum SNR. The signal-to-noise ratio is analyzed using the Fourier transform. The signal-to-noise ratio is analyzed using the Fourier transform. The signal-to-noise ratio is analyzed using the Fourier transform.



RESULTS

To ensure the stability of the SSR system, we tested it on a bearing fault signal. The results show that the SSR system can effectively improve the SNR of the bearing fault signal. The results show that the SSR system can effectively improve the SNR of the bearing fault signal. The results show that the SSR system can effectively improve the SNR of the bearing fault signal.

CONCLUSION

The results show that the SSR system can effectively improve the SNR of the bearing fault signal. The results show that the SSR system can effectively improve the SNR of the bearing fault signal. The results show that the SSR system can effectively improve the SNR of the bearing fault signal.

REFERENCES

[1] J. Wang, Y. Wang, "Stochastic Resonance for Signal Processing," *IEEE Transactions on Signal Processing*, vol. 61, no. 1, pp. 1-10, 2013.



海报展示

Poster Presentation

Multi-domain Landslide and Sandstorm Target Detection

Shunhang Lv, Dabo Guo*, LuBo Wang
School of Information and Software Engineering
University of Jinan
Jinan 250000, China
dabo.guo@unij.cn, lvshunhang@unij.cn

INTRODUCTION

Considering the rapid evolution of the socioeconomic landscape and the sustained amelioration of living standards, tourism has evolved into an indispensable avenue for leisure and recreation. Nonetheless, recent years have witnessed recurrent natural disasters that have adversely impacted tourism development in specific regions.

Notably, abrupt natural disasters have been a focal point within this discourse. The ramifications of adverse natural disasters encompass the deleterious effects they wreak upon tourism infrastructure and resources, the hampering of tourism destination appeal, the severance of supply and demand chains within the tourism industry.

KEYWORDS

Landslide detection; Sandstorm detection; Target detection; Naive convolutional network; Landslide live video; Dynamic detection head; Enhanced sensing.

METHODS

The dataset is divided into two parts: river and live video frame extraction images, and UAV remote sensing data, including 4741 images.

RESULT

Ablation experiment results after replacing the head

Improving accuracy	mIoU@0.5	mAP@0.5	mAP@0.5-S
YOLOv5-7B	16.4	6.60	6.74
D-Head 2 Blocks	16.4	6.64	6.86
D-Head 4 Blocks	16.4	6.71	6.91
D-Head 8 Blocks	16.4	6.81	6.94

CONCLUSIONS

Within the confines of this research endeavor, we have amalgamated two distinct linear scenarios: namely, landslide and sandstorm, to create a multi-domain dataset. Subsequently, we levered our fully object detection model, building on the foundation of a naive convolutional network, further bolstered by a multi-head dynamic attention mechanism. Our empirical findings substantiate noteworthy enhancement across a spectrum of performance metrics. Additionally, our model exhibits a proficiency for efficient deployment on mobile terminals and embedded devices, thus offering significant practical utility.

REFERENCE

- Chen Yang, et al., Xiang, et al., "A Novel Multi-Modal Fusion Network for Multi-Modal Data Fusion", *IEEE Transactions on Multimedia*, vol. 23, pp. 1-12, 2021.
- Li, et al., "A Novel Multi-Modal Fusion Network for Multi-Modal Data Fusion", *IEEE Transactions on Multimedia*, vol. 23, pp. 1-12, 2021.
- Li, et al., "A Novel Multi-Modal Fusion Network for Multi-Modal Data Fusion", *IEEE Transactions on Multimedia*, vol. 23, pp. 1-12, 2021.
- Li, et al., "A Novel Multi-Modal Fusion Network for Multi-Modal Data Fusion", *IEEE Transactions on Multimedia*, vol. 23, pp. 1-12, 2021.
- Li, et al., "A Novel Multi-Modal Fusion Network for Multi-Modal Data Fusion", *IEEE Transactions on Multimedia*, vol. 23, pp. 1-12, 2021.
- Li, et al., "A Novel Multi-Modal Fusion Network for Multi-Modal Data Fusion", *IEEE Transactions on Multimedia*, vol. 23, pp. 1-12, 2021.

Research on arrhythmia classification and detection based on multiple machine learning algorithms

Yu Zekai
Qingdao University of Science and Technology

Abstract

Arrhythmia is a common manifestation of cardiovascular disease (CVD) occurrence, and manual detection of arrhythmia is inefficient and subject to large uncertainty. In order to quickly and accurately identify arrhythmia so that doctors can make timely treatment for arrhythmia, an automatic classification and detection model for arrhythmia based on clustering algorithm, artificial neural network, and genetic algorithm is proposed. Based on the results, it can be concluded that the classification accuracy of the model constructed using the clustering algorithm is low. On the other hand, the overall classification accuracy of the artificial neural network is 83.93%. Furthermore, the overall classification accuracy of the neural network model, which was optimized by the genetic algorithm, is 87.93%. This is a significant improvement and has increased the classification accuracy by 4.02%. Additionally, the model has been successful in detecting cardiac arrhythmia with high accuracy. The proposed scheme can detect clearly and warn of cardiac arrhythmia in real time and assist doctors in completing treatment.

Introduction

ECG is an important tool for detecting cardiac-type diseases and plays an important role as a reference for the diagnosis of cardiac arrhythmia, which is the gold standard for clinicians to judge cardiac arrhythmia. Therefore, this paper utilizes the existing data, starting from the power spectrum of ECG signals, and uses machine learning algorithms such as cluster analysis and neural networks to diagnose abnormal ECG signals and establish an arrhythmia classification and detection model, which enhances the accuracy of arrhythmia detection, and it is also more convenient for the efficiency of rescue and treatment, and assists doctors in completing clinical treatment.

Method

ECG signals → Signal preprocessing → Feature extraction and optimization → Classification diagnosis

Results

Signal preprocessing Results

Assuming that a time-constrained time-domain signal is detected as well as the power spectral density of the ECG waveform was calculated using the formula shown in Figure 1. By observing the graph, it can be seen that the power spectral density of the ECG waveform is mainly concentrated below 50 Hz, so the frequency below 50 Hz is chosen as the existing frequency.

Feature extraction Results

Analysis of extracted features using Spearman's correlation coefficient.

The peak, maximum, number of peaks, average interval, cycle-to-cycle-in peak ratio, and functional frequency were used as the final metrics.

Classification diagnosis Results

Three methods: cluster analysis, artificial neural network and neural network optimized by genetic algorithm, were used to classify the ECG signals, and the classification results are shown in Fig. 2.

Results

The four classes of trained data clustered out were validated separately, counting the true lines of each class. The results are shown in Fig. 3. By looking at Fig. 3, it is clear that it is difficult to differentiate the categories through cluster analysis and the model is less accurate.

The constructed neural network model is shown in Fig. 4. The number of neurons in the hidden layer is obtained according to the empirical formula.

For arrhythmia classification, the neural network with 8 neurons in the hidden layer and Bayesian regularization training function performs well with high accuracy. You can refer to Fig. 5 for the confusion matrix obtained from the optimized neural network, and genetic algorithm to classify the test set.

Conclusion

With the known power spectral density of ECG signals, cluster analysis, artificial neural networks, and neural networks optimized by genetic algorithms are used for classification prediction. The results show that the classification effect of cluster analysis is poor, and the neural network optimized by genetic algorithm has the best classification effect, with a classification accuracy of 87.93%, compared with the traditional neural network, classification accuracy is still improved of 4.02%, the classification accuracy is higher. The model can be imported into the detection device, which can detect, categorize, and alarm heart rhythm in real time, improving the efficiency of doctors' treatment and reducing the risk of death from high-risk arrhythmias.

A Real-time Semantic Segmentation based on Self-attention and Contextual Information

Xiaoxuan Cao, Ansheng Deng, Zheng Zhang
College of Information Science and Technology, Dalian Maritime University

Introduction

Semantic segmentation methods use the backbone which does not have enough receptive field to deal with the image problem or has no contextual information to solve the blurred edge of images. Focusing on the problem and reducing parameters and computations, we improve a lightweight semantic segmentation method. In our network model, we use an improved D-block as the backbone. It utilizes a pair of parallel convolutional layers with varying dilation rates to expand the receptive field, all the while incorporating an MCF block to maintain local details. The introduction of the Channel Context Module (CCM) aims to capture the enduring semantic relationships between channels and the mapping of semantic features. Subsequently, the Spatial Context Module (SCM) is employed to uncover the spatial context connections among pixels, by investigating the correlations between pixels and classes. Finally, the final result is obtained by multi-scale feature fusion. Our model gets good results on two datasets and achieves 76.1 mIoU on Cityscapes and 82.9 mIoU on CamVid without ImageNet pre-training.

Method

Experiment

We compare with other real-time models in mIoU, FPS, parameters, and FLOPs. We show the results of the Cityscapes dataset, as well as the comparison of accuracy and speed. Our model showed better mIoU with smaller parameters than the other models. Our model reaches 82.9 mIoU on the CamVid test set. It is the best mIoU more than other models.

Dataset validation set results comparison on Cityscapes is shown in Fig. 3.

Conclusion

In our research, we have enhanced network results to achieve real-time performance. We have introduced a novel type of Dilated that expands the field of view without sacrificing local detail, and we have adjusted the dilation rate in the backbone. We have also extracted feature context information from the decoder. Our network exhibits superior real-time performance in semantic segmentation tasks on datasets like Cityscapes and CamVid, all without relying on ImageNet pre-training.

References

- [1] R. Guo, "Refining Dilated Revolution for Real-time Semantic Segmentation," 2023 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW).
- [2] Z. Li, Y. Sun, L. Zhang and J. Tang, "CTNet: Context Based Feature Fusion for Semantic Segmentation," in IEEE Transactions on Pattern Analysis and Machine Intelligence.

based on millimeter-wave radar

Zhengjie Wang*, Zhaolei Dong, Jianhang Li, Qingwei Zhang, Wenchao Wang, Yinying Guo
College of Electronic and Information Engineering, Shandong University of Science and Technology

Introduction

Due to the rapid development of human-computer interaction, human activity recognition has become a hot research topic. Millimeter-wave radar is an advanced device for collecting high-quality data. In this paper, we propose a human activity recognition system utilizing millimeter-wave radar. Firstly, we collect spectrograms caused by human motion using millimeter-wave radar. Then, we adopt residual neural networks to process data and complete the classification task. Based on our proposed system, we classify four activities and achieve an average recognition accuracy of 91.75%. In the end, we discuss some factors that influence the experimental results, and provide the future development of this research field.

Contributions

1. We propose a human activity recognition system utilizing millimeter-wave radar.
2. Based on residual neural networks, we construct a neural network model that effectively extracts features from data, and classifies various human activities using four features.
3. Our system can classify four different activities with an average recognition accuracy of 91.75%.

Methods

1. Data collection: We select the millimeter-wave radar (IWR1843BOOST) and the data acquisition board (DCA1000EVM) to capture data.

Results

We summarize our experimental results in the above confusion matrix. The recognition accuracy of left squat with flat arms is 87%, the recognition accuracy of boxing pose is 95%, the recognition accuracy of standing with flat arms is 89%, and the recognition accuracy of sitting on a chair with flat arms is 90%. The average recognition accuracy of four activities is about 91.75%.

Discussions

We analyze two factors that may exert an influence on experimental results.

1. Participants with different heights and weights: It has little effect on the experimental results.
2. Similar activities: The selected similar activities are half squat with flat arms and standing with flat arms. The recognition accuracy of similar activities are significantly lower than that of other activities. We present the future development of this research field.
1. Experimental scenario: Outdoor scenarios.
2. Participants: More experimental participants with different physical characteristics.
3. Complex activity: More complex activities.
4. Multi-person activity recognition.

Conclusions

We apply millimeter-wave radar to collect data and adopt ResNet50 to construct a neural network model. We realize the accurate classification of the four daily activities, and the average recognition accuracy could reach 91.75%. In the end, we discuss the factors that influence the experimental results, and provide the future development of this research field.

Acknowledgement



海报展示

Poster Presentation

Research on information tracing method of wind turbine full life cycle based on trusted identification

ICFTIC 2023 5th

Leifeng Xiao, Wenlei Sun*, Cheng Lu and Saikhe Chang
Smart Manufacturing Modern Industrial College
Xinjiang University

Frontiers Technology of Information and Computer

INTRODUCTION

Due to the wind turbine whole industrial chain is long, industrial manufacturing process is extremely complex, resulting in its product quality control is relatively weak, especially in the product unit components and components at all levels of quality traceability difficulties. When a product fails, it is also difficult to identify the specific part of the problem. Aiming at the problems of complexity of each link in the whole life cycle of wind turbine, insecurity of data transmission, low transparency of information and information islands, a set of trusted identification method for the traceability of the whole life cycle of wind turbine is proposed. An identification data model centered on key components is constructed. An identification data storage scheme based on blockchain technology was designed. Adopting the method of combining private blockchain and consortium blockchain, the full life cycle information traceability model of wind turbine is established. Thus, the whole life cycle of wind turbines can be traced, and the links can be traced accurately, so that potential problems can be detected in time and corresponding measures can be taken.

Methods

Evaluation of Key Components of Wind Turbine Based on Analytic Hierarchy Process

In order to determine the importance of key components of wind turbines, the paper adopts analytic hierarchy process to evaluate the importance of key components of wind turbines. Based on the analytic hierarchy process, the study takes the gearbox, generator, blades, main shaft bearings, main control system, converter, and pitch system as the key components of the wind turbine.

Wind turbine full life cycle critical information analysis and identification modeling

Figure 1: Layout of the full life cycle of wind turbine information analysis and identification modeling

Identification resolution data storage scheme based on blockchain technology

With the help of blockchain (a kind of distributed database) to store identification data, forming a full life cycle information traceability system, the wind turbine with the characteristics of decentralization, de-centralization and non-centralization.

Traceability model of wind turbine full life cycle information based on trusted identification and blockchain

After the complete trust application for identification in the identification resolution application process, the key and non-key data of the whole life cycle of the wind turbine will be uploaded and stored, and the transaction link value will be generated. Then the identification of the key data, the key data can be traced, the non-key data can be traced, and the non-key data can be traced. The transaction link value will be generated. Then the identification of the key data, the key data can be traced, the non-key data can be traced, and the non-key data can be traced.

Wind turbine full life cycle information tracing process and system architecture

Figure 2: Information tracing process of the whole life cycle of wind turbine based on trusted identification

System realization

Figure 3: Wind turbine full life cycle information tracing process and system architecture

CONCLUSIONS

The full life cycle information traceability model of wind turbine based on trusted identification proposed in this paper realizes the full life cycle information traceability of wind turbine, accurately traces the links, and provides effective guarantee for the full life cycle management of wind turbines.

References:

1. Xiao L, Sun W, Xie S, et al. Key components evaluation of wind turbine based on analytic hierarchy process. Journal of Southwest Jiaotong University, 2020, 55(1): 1-10.
2. Feng Z, Peng Z, Guo Y, et al. Status and Prospects of China's wind power development. 2022, 1-10.
3. Xiao L, Sun W, Xie S, et al. Key components evaluation of wind turbine based on analytic hierarchy process. Journal of Southwest Jiaotong University, 2020, 55(1): 1-10.

Research on Target Positioning and Tracking Method of Land-based Flight Test Monitoring PTZ

ICFTIC 2023 5th

Xiao-Dong Ma*, Yu-Wen Fu, Yan-Shi Shun
Chinese Flight Test Establishment

Introduction

In response to the demand for accurate position and attitude measurement during internal weapons separation flight testing, we propose a photogrammetric solution based on high-speed imaging. To capture the high-speed visual data of the entire store separation process occurring within the constrained internal weapons bay, we integrated the high-speed camera array equipped with curved lenses onto the bulkhead of the bay. Then use a combination of advanced technologies to achieve several key functions. The accuracy of the position solving error in this method has been confirmed through rigorous ground testing, demonstrating that it does not exceed 5mm. This level of accuracy satisfies the precision requirements for flight testing.

Approach

These technologies include the solving of camera extrinsic parameters combined with the uncertainty of airborne spatial reference points, the use of YOLOV8-based marker intelligent detection, the automatic extraction of crosshair center coordinates based on the edge gray gradient orthogonal iteration, and the application of multi-view non-overlapping photogrammetric measurement under the constraints of straight lines. These techniques enable the following capabilities: a step-by-step fast calibration of airborne high-speed cameras, the automatic extraction of sub-pixel coordinates of marker points on the surface of the store in a small field-of-view imaging, the dynamic correction of extrinsic parameters in the presence of jitter in the airborne high-speed cameras, and the measurement of the relative positions and attitudes of the separate store.

Result

By constructing a simple weapon separation test rig, a ground simulation test of weapon separation was conducted to simulate the process of airborne internal weapons separation, as shown in Figure 12. Afterwards, the relative position and attitude parameters of the store during the weapon separation process were calculated using the photogrammetric solution based on high-speed imaging proposed in this study. The results are shown in Figure 13. The five trajectories shown in the Figure 13 represent the markers on the surface of the store that can be observed throughout the entire separation process. By performing coordinate transformation and calculations, the three-axis trajectory and attitude curve of the store can be obtained as shown in Figure 14.

Conclusions

This paper proposes a photogrammetric solution based on high speed imaging, which aims to address the requirement of measuring the relative position and attitude of separate weapon during the performance qualification flight tests of intern weapons. The accuracy of the position solving error in this method has been confirmed through rigorous ground test demonstrating that it does not exceed 5mm. This level of accuracy satisfies the precision requirements for flight testing.

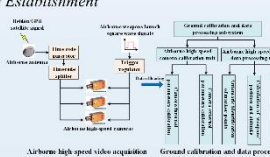


Figure 1: Composition of the photogrammetric system.

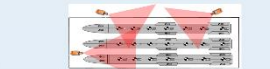


Figure 2: Layout of airborne high-speed cameras.

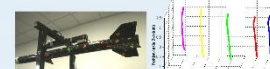


Figure 3: Ground experimental verification scene.

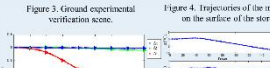


Figure 4: Trajectories of the mark on the surface of the store.



Figure 5: Three-axis trajectory and attitude curve of the store during weapon separation.

Research on Target Positioning and Tracking Method of Land-based Flight Test Monitoring PTZ

ICFTIC 2023 5th

Xiao-Dong Ma*, Yu-Wen Fu, Yan-Shi Shun
Chinese Flight Test Establishment

Introduction

In response to the demand for accurate position and attitude measurement during internal weapons separation flight testing, we propose a photogrammetric solution based on high-speed imaging. To capture the high-speed visual data of the entire store separation process occurring within the constrained internal weapons bay, we integrated the high-speed camera array equipped with curved lenses onto the bulkhead of the bay. Then use a combination of advanced technologies to achieve several key functions. The accuracy of the position solving error in this method has been confirmed through rigorous ground testing, demonstrating that it does not exceed 5mm. This level of accuracy satisfies the precision requirements for flight testing.

Approach

These technologies include the solving of camera extrinsic parameters combined with the uncertainty of airborne spatial reference points, the use of YOLOV8-based marker intelligent detection, the automatic extraction of crosshair center coordinates based on the edge gray gradient orthogonal iteration, and the application of multi-view non-overlapping photogrammetric measurement under the constraints of straight lines. These techniques enable the following capabilities: a step-by-step fast calibration of airborne high-speed cameras, the automatic extraction of sub-pixel coordinates of marker points on the surface of the store in a small field-of-view imaging, the dynamic correction of extrinsic parameters in the presence of jitter in the airborne high-speed cameras, and the measurement of the relative positions and attitudes of the separate store.

Result

By constructing a simple weapon separation test rig, a ground simulation test of weapon separation was conducted to simulate the process of airborne internal weapons separation, as shown in Figure 12. Afterwards, the relative position and attitude parameters of the store during the weapon separation process were calculated using the photogrammetric solution based on high-speed imaging proposed in this study. The results are shown in Figure 13. The five trajectories shown in the Figure 13 represent the markers on the surface of the store that can be observed throughout the entire separation process. By performing coordinate transformation and calculations, the three-axis trajectory and attitude curve of the store can be obtained as shown in Figure 14.

Conclusions

This paper proposes a photogrammetric solution based on high speed imaging, which aims to address the requirement of measuring the relative position and attitude of separate weapon during the performance qualification flight tests of intern weapons. The accuracy of the position solving error in this method has been confirmed through rigorous ground test demonstrating that it does not exceed 5mm. This level of accuracy satisfies the precision requirements for flight testing.

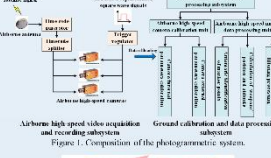


Figure 1: Composition of the photogrammetric system.

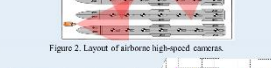


Figure 2: Layout of airborne high-speed cameras.

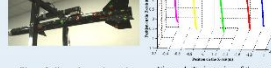


Figure 3: Ground experimental verification scene.

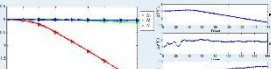


Figure 4: Trajectories of the mark on the surface of the store.



Figure 5: Three-axis trajectory and attitude curve of the store during weapon separation.

Research on Knowledge Enhancement Recommendation Methods

ICFTIC 2023 5th

Feng Wang, XueBing Wu, Yuxia Lei
Qufu Normal University - School of Computer Science

Introduction

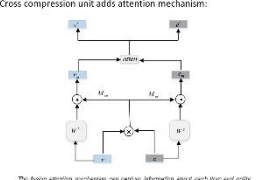
Traditional recommendation algorithms have the problems of data sparsity and cold start. Researchers solve these problems by introducing external information. Because of its high order connectivity and sufficient prior knowledge, the knowledge graph is integrated into the recommendation system. In this paper, knowledge graph is used as the source of edge information. A multi-task recommendation method EGAKR, which combines attribute classification and attention, is proposed. Through feature extraction of users and items attributes, other types of attributes are treated as inputs to the knowledge graph embedding unit. The feature extraction unit and recommendation unit of the knowledge graph are linked by cross compression sector for alternate training. The cross compression sector combines the attention mechanism to enhance the recommendation performance. A large number of experiments have been carried out on real datasets, and we have proved that the proposed model is superior to some of the most advanced baselines.

Methods

Recommendation module, KGE module, cross-concern fusion module and feature extraction module constitute the model of this paper. The cross module is responsible for connecting the recommendation section and the KGE section for alternate learning. This alternate section is improved through attention mechanism to enable more efficient fusion of information between projects and entities. All user attributes must pass MLP operation in the feature extraction unit. It is necessary to train, research and integrate all attributes. The input of the model is user attribute set, item attribute set, user and item interaction data and knowledge graph, and the output is the vectorized matrix result and prediction result of user item. Finally, classify the attributes of users and projects, and initialize the data. In the recommendation task, extract features and multivalued attribute features for project attributes. In the knowledge graph feature learning task, extract a bunch of true-false triples from it.

Cross compression unit

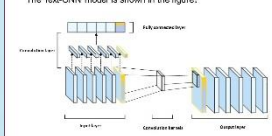
Cross compression unit adds attention mechanism:



The cross attention mechanism can capture information about each user and entity, thereby "seeing" more relevant content related to the user's preference.

Text-CNN

The Text-CNN model is shown in the figure:

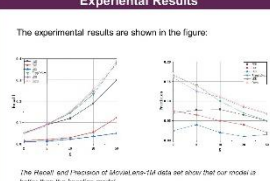


For text type attributes, CNN model is used to mine rich content within text.

The recommendation results of text types and multi-valued attributes of the same item are concatenated, input to the full connection layer and processed by activation function.

Experiential Results

The experimental results are shown in the figure:



The Recall@K and Precision@K of the proposed model are better than the baseline model.

The Recall and Precision of the proposed model are better than the baseline model.

References

- [1] M. D. Ekstrand, J. T. Reed, J. A. Konstan, "Collaborative Filtering Recommendation Systems", vol. 4, no. 2, pp. 173-173, February 2011.
- [2] W. Huang, J. Wu, W. Song, "Cross attention fusion for knowledge graph optimized recommendation", Applied Intelligence, vol. 3, pp. 1-10, January 2022.
- [3] F. Wang, X. Wu, D. Liu, "Collaborative Knowledge Base Embedding for Recommender Systems", the 22nd ACM SIGKDD International Conference, ACM, pp. 353-362, August 2016.
- [4] L. Zhang, Z. Kang, X. Sun, "KCR: Knowledge-aware representation graph convolutional network for recommendation", Knowledge-Based Systems, August 2021.

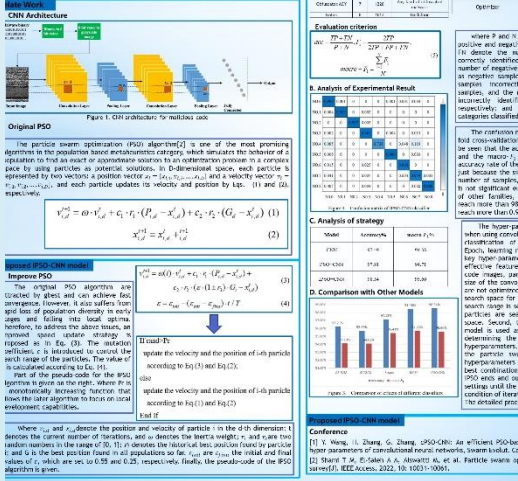
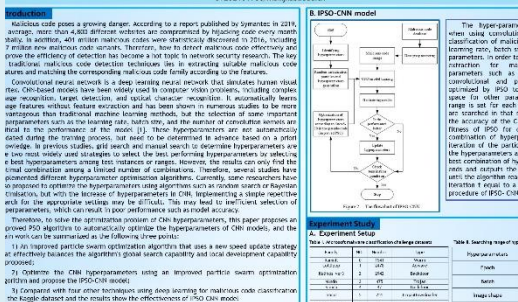


海报展示

Poster Presentation

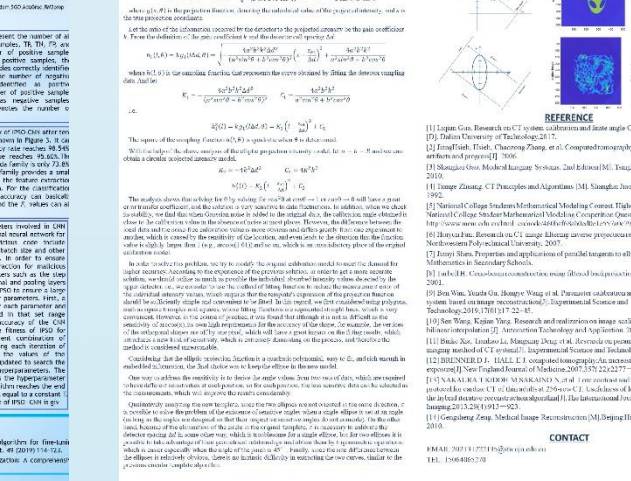
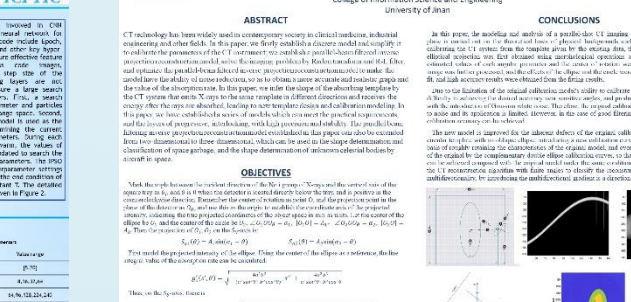
IPSO-CNN: Malicious Code Classification with Improved PSO Optimized CNN

Jinling Wang, Zhong Lei, Xinlin Chang, Dongming Huang
School of Information Engineering, Jiangsu University of Science and Technology
Zhenjiang, China
16120210176@mail.just.edu.cn



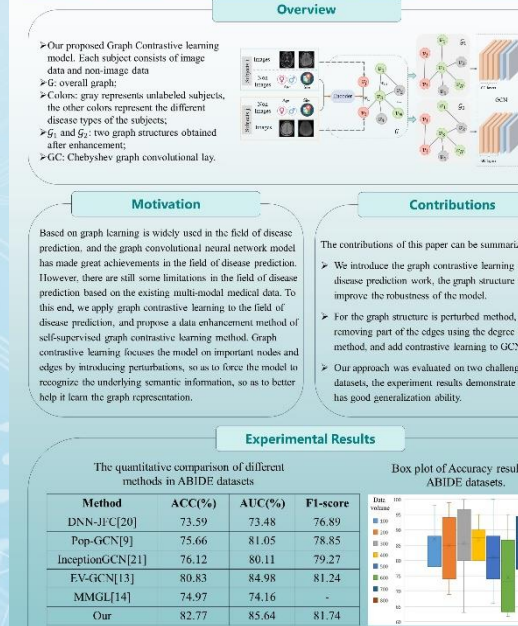
CT system parameter calibration and imaging based on the inverse Radon transform and filter denoising

Yuan Ma, Xue Han
College of Information Science and Engineering
University of Jinan



Autism Disease Prediction with Self-Supervised Graph Contrastive Learning

Zheng Zhang, Ansheng Deng, Xiaoxuan Cao
College of Information Science and Technology
Dalian Maritime University, China
zhangzhang@dmu.edu.cn, anshengdeng@dmu.edu.cn



Remote Sensing Ship Detection based on Feature Fusion

Zheng Zhang, Ansheng Deng, Xiaoxuan Cao
College of Information Science and Technology
Dalian Maritime University, China
zhangzhang@dmu.edu.cn, anshengdeng@dmu.edu.cn





海报展示 Poster Presentation



Human activity recognition based on millimeter-wave radar

Zhengjie Wang*, Zhaolei Dong, Jianhang Li, Qingwei Zhang, Wenchao Wang, Yinying Guo
College of Electronic and Information Engineering, Shandong University of Science and Technology

Introduction

Due to the rapid development of human-computer interaction, human activity recognition has become a hot research topic. Millimeter-wave radar is an advanced device for collecting high-quality data. In this paper, we propose a human activity recognition system utilizing millimeter-wave radar. Firstly, we collect spectrograms caused by human motion using millimeter-wave radar. Then, we adopt residual neural networks to process data and complete the classification task. Based on our proposed system, we classify four activities and achieve an average recognition accuracy of 91.75%. In the end, we discuss some factors that influence the experimental results, and provide the future development of this research field.

Contributions

1. We propose a human activity recognition system utilizing millimeter-wave radar.
2. Based on residual neural networks, we construct a neural network model that effectively extracts features from data, and classifies various human activities using these features.
3. Our system can classify four different activities with an average recognition accuracy of 91.75%.

Methods

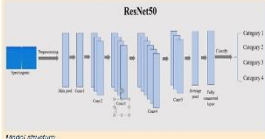
1. Data collection: We select the millimeter-wave radar (WR1643800ST) and the data acquisition board (DCA 1000EVM) to capture data.



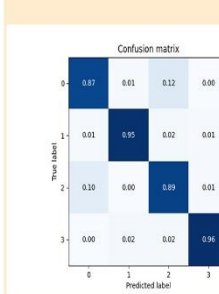
The red is the millimeter-wave radar, and the green is the data acquisition board.

2. Evaluation metric: Confusion matrix.

3. Model construction: We adopt ResNet50 as our neural network model, which is composed of the input layer, convolution layers, average pooling layer, and fully connected layer, in which the convolution layers contain a convolution layer group and four residual blocks with a total of 50 convolution layers.



Results



We summarize our experimental results in the above confusion matrix. The recognition accuracy of half squat with flat arms is 87%, the recognition accuracy of boxing pose is 95%, the recognition accuracy of standing with flat arms is 99%, and the recognition accuracy of sitting on a chair with flat arms is 96%. The average recognition accuracy of four activities is about 91.75%.

Discussion

We analyze two factors that may exert an influence on experimental results.

1. Participants with different heights and weights: It has little effect on the experimental results.
 2. Similar activity: The selected similar activities are half squat with flat arms and standing with flat arms. The recognition accuracy of similar activities are significantly lower than that of other activities.
- We present the future development of this research field.
1. Experimental scenario: Outdoor scenarios.
 2. Participant: More experimental participants with different physical characteristics.
 3. Complex activity: More complex activities.
 4. Multi-person activity recognition.

Conclusion

We apply millimeter-wave radar to collect data and adopt ResNet50 to construct our neural network model. We realize the accurate classification of the four daily activities, and the average recognition accuracy could reach 91.75%. In the end, we discuss the factors that influence the experimental results, and provide the future development of this research field.

Acknowledgement

Project supported by Shandong Provincial Natural Science Foundation (Grant No. ZR2022MF315).

Multi-information Self-attention Autoencoder Sequential recommendation

Nan Wang

School of Computer Science and Software Engineering University of Science and Technology Liaoning

Introduction

The field of sequential recommendation plays a crucial role (Sequential recommendation is an important field) in personalized recommendation systems, aiming to model users' past interactions and predict their future interactions with items or behaviors. Traditional methods in sequential recommendation typically rely on user behavior history and item attributes for making recommendations, but they overlook the internal relationships and contextual information among items within a sequence. Moreover, existing autoencoder models face limitations in capturing long-term dependencies and effectively modeling contextual information for sequential recommendation tasks. To address these issues, we propose a novel framework called miSAASRec that leverages a multi-information autoencoder with a self-attention module to capture internal relevance and contextual features of the data. This enables miSAASRec to achieve more accurate and comprehensive data encoding, thereby enhancing the performance of the autoencoder. We conducted several experiments to demonstrate the superior performance of our miSAASRec model compared to existing methods, achieving improvements ranging from 6.86% to 14.71% in MRR and 7.04% to 10.00% in Recall@10.

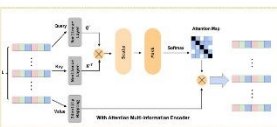


Figure 1. Overview of the Multi-information Self-attention encode.

Methodology

1. Construct a user-item interaction matrix and an item transformation matrix.
2. The matrix input is then passed through a multi-information self-attention autoencoder in order to obtain embeddings of high-dimensional information.
3. These information embeddings are reconstructed using three different decoders, three reconstruction matrices are used to calculate the loss.
4. Computing the inference process to ultimately obtain the predicted rating matrix.

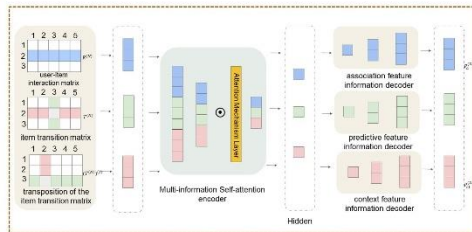


Figure 2. Overview of the miSAASRec.

We introduce a novel model called Multi-information Self-attention Autoencoder (miSAASRec). The miSAASRec model utilizes the self-attention mechanism to effectively capture long-distance dependencies and context information between different elements in sequence data. By incorporating the miSAASRec model, it enhances the learning ability and performance of the sequence recommendation model. The miSAASRec model encodes sequence data into a latent space representation with an objective to capture association patterns and relationships within the data, thereby achieving accurate and effective item recommendation. To evaluate the effectiveness of our proposed miSAASRec model, extensive experiments will be conducted on real-world datasets comparing its performance against state-of-the-art sequence recommendation methods. Evaluation metrics will include accuracy, diversity, and novelty of recommended items. These experiments aim to provide insights into the superior performance of our miSAASRec model.

Summary

Method ¹	ML-100k ²		Garden ³	
	MRR ¹	Recall@10 ¹	MRR ¹	Recall@10 ¹
LightGCN ¹	0.012 [±]	0.025 [±]	0.025 [±]	0.087 [±]
FreeGEM ¹	0.040 [±]	0.079 [±]	0.100 [±]	0.179 [±]
AutoSeqRec ²	0.068 [±]	0.150 [±]	0.103 [±]	0.225 [±]
miSAASRec ¹	0.078[±]	0.165[±]	0.109[±]	0.243[±]
Rel. Imp. ¹	14.71% [±]	10.00% [±]	6.86% [±]	7.04% [±]

Figure 3. Comparison on the interaction prediction task

It is evident that miSAASRec outperforms all the compared methods significantly, achieving superior performance in terms of both Recall@10 and MRR metrics across all datasets. We propose miSAASRec, a depth-3 autoencoder model aimed at enhancing the learning capability and reconstruction performance by incorporating multiple hidden layers to extract more informative features. To better capture internal relationships and contextual information in data representation, miSAASRec introduces a self-attention module in the encoding phase. We apply miSAASRec to sequence recommendation tasks and compare it with other methods, demonstrating its superior performance in terms of Recall@10 and MRR metrics, leading to significant improvements in recommendation accuracy ranging from 6.86% to 14.71% in MRR and 7.04% to 10.00% in Recall@10.

References

- [1] Kang W C, McAuley J. Self-attentive sequential recommendation[C]/2018 IEEE international conference on data mining (ICDM). IEEE, 2018: 197-206.
- [2] Duan J, Zhang P F, Qiu R, et al. Long short-term enhanced memory for sequential recommendation[J]. World Wide Web, 2023, 26(2): 561-583.



扫码观看会议云相册

现场直播



CONTACT US

Website: www.icftic.org

Email: icftic@163.com