

Conference Program 会议日程

7th CSAI 2023

Beijing, China | December 8-10, 2023
中国北京 | 2023年12月8-10日

2023 7th International Conference on Computer Science and Artificial Intelligence 第七届计算机科学与人工智能国际会议

Organized by 主办单位



Published by 出版单位



Technical Sponsors 技术支持



Warsaw University
of Technology

DEC 8-10 | 12月8-10日

BEIJING | 北京

CSAI 2023

扫码查看会议照片:

Scan QR code for photos



◆ Onsite Venue

北京华腾美居酒店

MERCURE BEIJING CBD

地址: 中国北京市朝阳区西大望路甲 16 号院

ADD: No.16 Jia, Xi Da Wang Road, Chao Yang District,
Beijing, 100124, China

Web: <https://all.accor.com/hotel/7565/index.en.shtml>

◆ Online Link

Room A: 668-6527-8590

Link: <https://meeting.tencent.com/dm/3VOtvf01eTDt>

Room B: 371-4663-3757

Link: <https://meeting.tencent.com/dm/p9NUOJCrOzjV>

Time: Beijing Time (GMT+8)

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AGENDA OVERVIEW | 日程概览

*All schedules will be arranged in **Beijing Time (GMT+8)** 日程时间安排均为**北京时间**

Day 1 | December 8, 2023-Friday

Time	Event	Room / Tencent ID
10:20-11:30	Test for Speakers & Session Chairs 嘉宾和分会主席测试	Tencent Meeting 腾讯会议
10:00-12:00	Online Participants Test 线上参会人员测试	Tencent Meeting 腾讯会议
10:00-17:00	Onsite Registration 线下参会人员领取资料	Hotel Lobby 北京华腾美居酒店会议楼大堂

Day 2 | December 9, 2023-Saturday

Time	Event	Room / Tencent ID
9:00-11:40	Opening Ceremony & Keynote Speeches 开幕式及专家报告	Creativity+Tencent Meeting 创新厅-3F+腾讯会议
11:40-14:00	Lunch 午餐	Privilege 2-嘉宾 2 厅-嘉宾楼 1F
14:00-17:45	Session 1&4 线下分会 1&4	Creativity 创新厅-会议楼 3F
14:00-18:00	Session 2&5 线下分会 2&5	Cooperation 1 合作 1 厅-会议楼 3F
14:00-15:45	Session 3 线下分会 3	Cooperation 2 合作 2 厅-会议楼 3F
18:00-20:00	Dinner 晚餐	Privilege 1-嘉宾 1 厅-嘉宾楼 1F

Day 3 | December 10, 2023-Sunday

Time	Event	Room / Tencent ID
10:00-11:30	Session 6 线下分会 6	Cooperation 1 合作 1 厅-会议楼 3F
10:00-11:30	Session 7 线下分会 7	Cooperation 2 合作 2 厅-会议楼 3F
11:30-13:30	Lunch 午餐	Privilege 1-嘉宾 1 厅-嘉宾楼 1F
10:00-12:15	Session A 线上分会 A	668-6527-8590
10:00-12:15	Session B 线上分会 B	371-4663-3757
14:00-16:45	Invited Speech & Session C 特邀报告&线上分会 C	668-6527-8590
14:00-16:45	Session D 线上分会 D	371-4663-3757

WELCOME | 欢迎辞

Dear distinguished delegates,

Welcome to 2023 7th International Conference on Computer Science and Artificial Intelligence (CSAI 2023) and its workshop The 15th International Conference on Information and Multimedia Technology (ICIMT 2023) which is to be held in Beijing, China during December 8-10, 2023.

CSAI is an annual conference which aim to present the latest research and results of scientists (professors, doctoral students, and post-doc scientists) related to computer science and artificial intelligence topics. The conference provides opportunities for delegates from different areas to exchange new ideas, applications and experiences face to face, to establish business or research relations, and to find global partners for future collaboration. We hope that the conference results in significant contributions to the knowledge base in these scientific fields.

A word of special welcome is given to our keynote speakers who are pleased to make contributions to our conference and share their new research ideas with us. Additionally, our special thanks go to our Conference Chair, Program Chairs, Local Chairs and all the other committee members for their excellent work in securing a substantial input of papers from all over the world and in encouraging participation.

We believe that through this conference, you can get more opportunities for further communication with researchers and practitioners with common interests in this field. With the strong support from all of you, CSAI conference is more distinctive. We wish that all guests can gain benefits from this conference and improve their academic performance. Thank each of you for your efforts to make this conference successful.

We wish all of you will have an unforgettable experience in the conference and hope we could meet face to face next year!

Yours sincerely,
Conference Committee

COMMITTEE | 委员会

Conference Chair

Xiangqun Chen	Peking University, China, Executive director of Beijing Computer Federation	China
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Program Chairs

Eric Jiang	University of San Diego	USA
Yanan Sun	Sichuan University	China
Yan Liu	University of Chinese Academy of Sciences	China
Ran Cheng	Southern University of Science and Technology	China
Shudong Huang	Sichuan University	China

Local Chairs

Jiangyong Wu	Peking University	China
Junming Wei	Peking University	China

Steering Committee

Hadi Sutopo	Topazart Educational Development	Indonesia
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Publicity Chairs

Wentao Feng	Sichuan University	China
Jizhe Zhou	Sichuan University	China
Xianggen Liu	Sichuan University	China
Mohd Arfian Ismail	Universiti Malaysia Pahang	Malaysia

International Program Committee

Nikolay Sergeev	Southern Federal University	Russia
Nuno M. Garcia	Universidade da Beira Interior	Portugal
Fairouz Kamareddine	Heriot-Watt University	UK
Agnieszka Jastrzebska	Warsaw University of Technology	Poland

Venue | 会议地点



北京华腾美居酒店 Mercure Beijing CBD

北京朝阳区西大望路甲 16 号院, 近百子湾路口

ADD: No. A-16 Xidawang Road, Chaoyang District, 100124 Beijing, China

订房电话: 15901187612 (王经理)

Reservation Tel: 15901187612 (Miss Wang)

*Accommodation is not included in the registration fee.

注册费中不包含住宿, 请自行安排住房

◆ From Beijing Capital International Airport |从北京首都国际机场出发

By Metro (Around 70 mins): Capital Airport Express→Sanyuanqiao Station (transfer to Line 10) →Shuangjing Station (transfer to Line 7)→Jiulongshan Station Exit B→15-minute Walk

地铁 (大约 70 分钟): 首都机场线→三元桥站 (转 10 号线) →双井站 (转 7 号线) →九龙山站 B 口出, 15 分钟步行。

By Taxi (Around 40 mins): Around RMB 65 fare needed

出租车 (大约 40 分钟): 费用大约 65 元

◆ From Beijing Daxing International Airport |从北京大兴国际机场出发

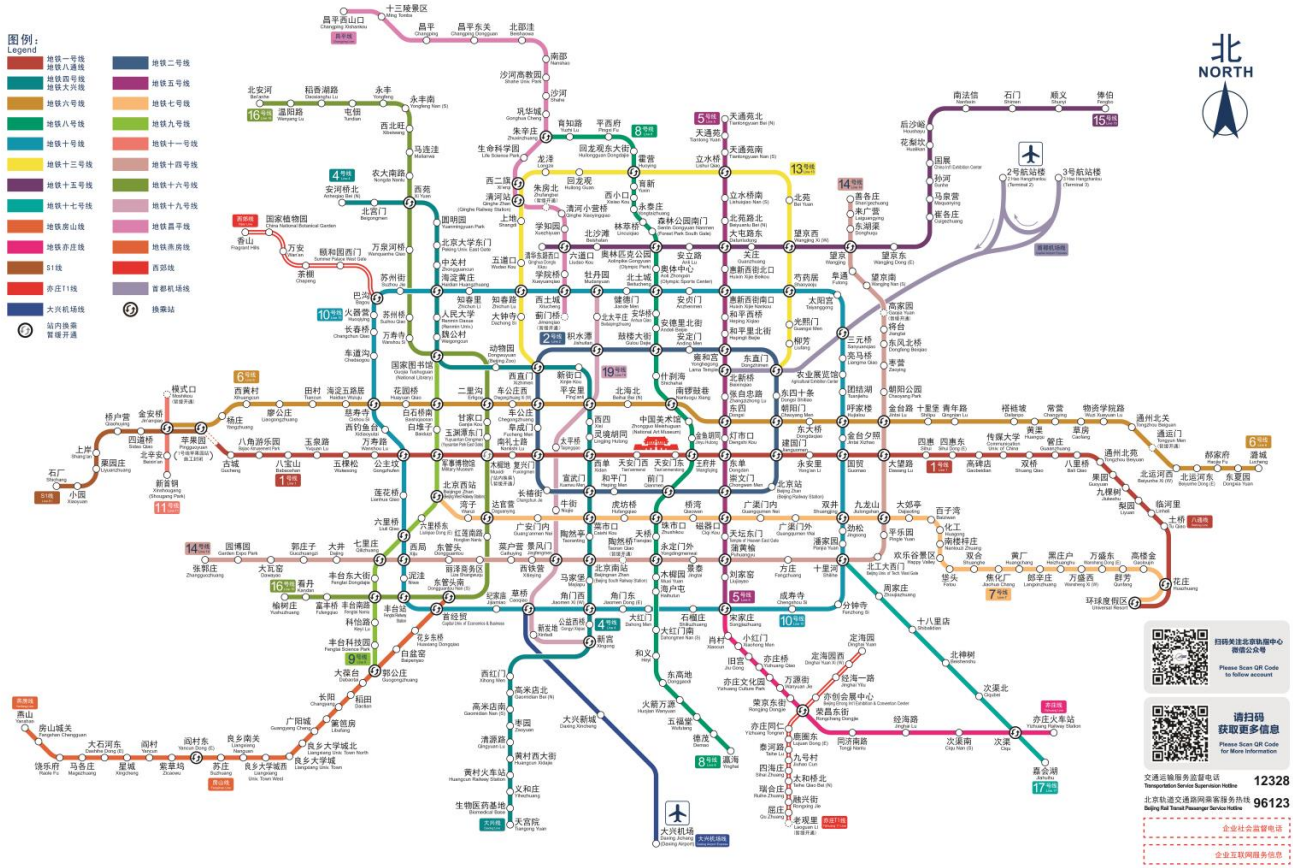
By Metro (Around 80 mins): Daxing Airport Express→Caoqiao Station (transfer to Line 19)→Jingfengmen Station (transfer to Line 14)→Jiulongshan Station Exit B→15-minute Walk

地铁 (大约 80 分钟): 大兴机场线→草桥站 (转 19 号线) →景风门站 (转 14 号线) →九龙山站 B 口出, 15 分钟步行。

By Taxi (Around 60 mins): Around RMB120 fare needed

出租车 (大约 60 分钟): 费用大约 120 元

北京城市轨道交通线网图 Beijing Rail Transit Lines



高清版本轨道交通线网图下载可关注微信公众号-北京轨指中心-乘客服务-线网图下载

The HD version of Beijing Rail Transit Lines can be downloaded from WeChat official account-北京轨指中心-乘客服务-线网图.

ONSITE GUIDELINE | 线下参会须知

★ Oral Presentation | 口头报告

Regular oral presentation: 15 minutes (including Q&A).

Get your presentation PPT or PDF files prepared. Presentations **MUST** be uploaded at the session room at least 15 minutes before the session starts.

Laptop (with MS-Office & Adobe Reader), projector & screen, laser pointer will be provided in all oral session rooms.

★ Important Notes | 注意事项

Please enter the meeting room at least 15 minutes before your session. Your punctual arrival and active involvement will be highly appreciated.

请至少在会议开始前 15 分钟进入会议室，并积极参与会议各环节。

Please wear your name tag for all the conference activities. Lending it to others is not allowed. If you have any accompanying person, please do inform our staff in advance.

会议期间请佩戴代表证进入会场。请勿将代表证转借给他人。如果您有陪同人员，请提前告知工作人员。

Please keep all your belongings (laptop and camera etc.) at any time. The conference organizer does not assume any responsibility for the loss of personal belongings.

请随身携带贵重物品（笔记本电脑和相机等）。本会议不对个人物品的丢失承担任何责任。

Please show name tag and meal coupons when dining.

就餐时请同时出示代表证与餐券。

ONLINE GUIDELINE | 线上参会须知

★ Time Zone | 时区

The whole program is based on **Beijing Time (GMT+8)**, please check on the program for your own test time and formal presentation time, and then convert it to the local time in your country.

★ Platform: Tencent Meeting | 线上会议平台：腾讯会议



Download Link: | 下载链接:

*<https://voovmeeting.com/download-center.html?from=1001> (Voov Meeting)

*<https://meeting.tencent.com/download/> (For Chinese Author(s) only)

★ Guiline Link | 指导文件下载链接

<https://intl.cloud.tencent.com/document/product/1054?lang=en&pg=>

★ Meeting Rooms | 线上会议房间号

Room A: 668-6527-8590

Link: <https://meeting.tencent.com/dm/3VOtvf01eTDt>

Room B: 371-4663-3757

Link: <https://meeting.tencent.com/dm/p9NUOJCrOzjV>

★ Equipment Needed | 设备及环境需求

*A computer with internet connection and camera 带有摄像头的电脑设备

*Headphones 耳机

*Stable internet connection 稳定的网络连接

*A quiet place and proper background 安静的环境及合适的背景

★ How to use Tencent Meeting | 腾讯会议使用指南

Step 1: Download Tencent Meetings

Step 2: Sign up for an account. (If you cannot sign up, please kindly contact us as soon as possible.)

Step 3: You can set up the languages and do some basic test.

Step 4: How to join the conference online:

1. Open the program, search with your paper ID, find your presentation, you will see there is a meeting ID in each session.
2. Open the Tencent Meeting app, click the join (choose JOIN MEETING), paste the meeting ID in the blank, then you can join the conference.

3. If you don't have an account, you may be required to enter your phone number for verification first.

Step 5: Get familiar with the basic functions: Rename, chat, raise hands, and screen share, etc.

Step 6: On **December 8, 2023**, we will have test session, on that day, we will teach you how to use Tencent Meeting and the functions mentioned above, so please download Tencent Meeting first.

Step 7: Every time you enter the conference or the session, please rename as **SESSION NUMBER+PAPER ID+YOUR NAME**, for example: S1+AI-001+Tom

★ Notes | 注意事项

1. Get your presentation PPT/Video files prepared. To effectively control the time and avoid some unexpected situations, we suggest you send us the recorded video in advance as a backup.
2. Regular oral presentation: 15 minutes (including Q&A). The presentation/video should be within 12 minutes, 3 minutes for Q&A.
3. Your punctual arrival and active involvement in each session will be highly appreciated. Please join in the room at least 15 minutes before your session.
4. CSAI encourages all presenters to make live oral presentations. For technical problems such as network instability, we suggest you email a record video/slide to conference secretary as backup before on **December 5, 2023**.

★ Warm Reminder | 温馨提示

5. Guest speeches will be recorded. Only the host can get permission the record.
6. The video or audio recording(s) may be edited, copied, and/or displayed on the office conference website for public broadcast or for any lawful purpose.
7. Participants will not allow recording other presenters' presentation nor distributing it to or share with anyone unless the presenter gives written consent of agree. If someone failure to do so will be considered a serious academic violation subject to disciplinary/ lawful action.
8. The host totally respect all the presenters' copyright. If you need to record your own presentation, please do inform our host in advance.

DETAILED AGENDA | 详细日程

*All schedules will be arranged in **Beijing Time (GMT+8)** 日程时间安排均为北京时间

Day 1 | December 8-Friday

Onsite Sign in and Conference Materials Collection

线下参会人员领取资料

◇ 10:00-17:00

◇ Location: Lobby of Mercure Beijing CBD (北京华腾美居酒店会议楼大堂)



- Give your Paper ID to the staff.
- 告知工作人员您的文章/听众编号
- Sign your name in the attendance list and check meal information.
- 在签到表签字并反馈用餐信息
- Check your conference kit, which includes conference bag, name tag, meal voucher, conference program, the receipt of the payment, the USB.
- 确保您收集齐以下会议资料：会议包，代表证，餐券，会议日程，发票以及会议 U 盘。

Guest Speakers&Session Chair Test

报告嘉宾&分会主席测试

Time	Presenter	Tencent ID
10:20-10:30	Assoc. Prof. Lei Chen	668-6527-8590
10:30-11:30	Dr. Hongbin Hu Dr. Ariesto Hadi Sutopo Prof. Danning Wu Prof. Longyu Jiang Asst. Prof. V. Sowmini Devi	

Authors Test for Online Sessions 报告作者测试

Time	Presenter	Tencent ID
10:00-12:00	Session A: AI-019, AI-103, AI-145, AI-190, AI-246, AI2-020, AI2-025, AI2-036, AI-052	371-4663-3757
	Session B: AI-016, AI-088, AI-296, AI-1001, AI-121, AI-082, AI-118, AI-214, AI-292	
	Session C: AI-106, AI-314, AI-154, AI-237, AI-248, AI-294, AI-312, AI-139, AI-320	
	Session D: AI-055, AI-073, AI-169, AI-202, AI-166, AI-239, AI-269, AI2-033, AI-257, AI-290, AI-321	

Day 2 | December 9-Saturday

Opening Ceremony & Guest Speeches | 开幕式及专家报告

Creativity | 创新厅-会议楼 3F

Room A: 668-6527-8590

Link: <https://meeting.tencent.com/dm/3V0tvf01eTDt>



Time	Event	Presenter
Chaired by Assoc. Prof. Song Yang, Beijing Institute of Technology, China 杨松副教授, 北京理工大学		
09:00-09:10	Opening Remarks	Prof. Xiangqun Chen , Peking University, China 陈向群教授, 北京大学
09:10-09:50	Keynote Speech I	Prof. Wei Lu , University of Michigan, USA Lu Wei 教授, 美国密西根大学 <i>Title: Integrating Machine Learning with Human Knowledge</i>

09:50-10:30	Keynote Speech II	Prof. Dazi Li , Beijing University of Chemical Technology, China 李大字教授, 北京化工大学 <i>Title: Graph Network based Deep Reinforcement Learning Methods for Complex System</i>
10:30-11:00	Coffee Break & Group Photo	
11:00-11:40	Keynote Speech III	Prof. Wei Fang , Jiangnan University, China 方伟教授, 江南大学 <i>Title: Bayesian Network Structure Learning from Data based on Evolutionary Algorithm with Mutual Information and Structural</i>
11:40-14:00	Lunch Privilege 2-嘉宾 2 厅-嘉宾楼 1F	
Time	Venue	Event
14:00-15:30	Creativity 创新厅-会议楼 3F	Session 1: Digital Image Analysis and Processing Methods 数字图像分析与处理方法
		AI-025, AI-142, AI-193, AI-297, AI2-012, AI-266
14:00-15:30	Cooperation 1 合作 1 厅-会议楼 3F	Session 2: Information Network and Signal Analysis 信息化网络与信号分析
		AI2-037, AI-175, AI-091, AI-187, AI-229, AI-031
14:00-15:45	Cooperation 2 合作 2 厅-会议楼 3F	Session 3: Data Structure Analysis and Intelligent Algorithm Design 数据结构分析与智能算法设计
		AI-079, AI-136, AI-217, AI-295, AI-085, AI-263, AI-305
15:30-16:15	Coffee Break	
16:15-17:45	Creativity 创新厅-会议楼 3F	Session 4: Image-based Visualization Data and Education 基于图像的可视化数据与教育
		AI-220, AI-278, AI2-034, AI-276, AI-061, AI-049
16:15-18:00	Cooperation 1 合作 1 厅-会议楼 3F	Session 5: Electronic Collaborative Control and Electrical System Based on Swarm Intelligence 基于群智能的电子协同控制与电气系统
		AI-163, AI-070, AI-178, AI-127, AI-115, AI-043, AI-285
18:00-20:00	Dinner-Privilege 1-嘉宾 1 厅-嘉宾楼 1F	

Day 3 | December 10-Sunday

Onsite Sessions | 线下分会



Time	Venue	Event
10:00-11:30	Cooperation 1 合作 1 厅-会议 楼 3F	Session 6: Information Systems and Management Based on Machine Learning 基于机器学习的信息系统与管理 AI-157, AI-233, AI-058, AI-022, AI-028, AI-251
10:00-11:30	Cooperation 2 合作 2 厅-会议 楼 3F	Session 7: Artificial Intelligence and Potential Applications 人工智能及潜在应用 AI-1005-A, AI-006, AI-253, AI-076, AI-148, AI-181-A
11:30-13:30	Lunch- Privilege 1-嘉宾 1 厅-嘉宾楼 1F	
Online Sessions 线上分会		
Time	Tencent ID	Event
10:00-12:15	668-6527-8590	Session A: Data -based Information Management and Service Platform Development 基于数据驱动的信息管理及服务平台开发 AI-019, AI-103, AI-145, AI-190, AI-246, AI2-020, AI2-025, AI2-036, AI-052
10:00-12:15	371-4663-3757	Session B: Data Model Analysis and Management 数据模型分析与 管理 AI-016, AI-088, AI-296, AI-1001, AI-121, AI-082, AI-118, AI-214, AI-292
14:00-14:30	668-6527-8590	Invite Speech Assoc. Prof. Lei Chen , Shandong University, China 陈雷副教授, 山东大学 <i>Title: Perceptual image quality assessment based on human visual system</i>
14:30-16:45		Session C: Image Detection and Recognition 图像检测及识别 AI-106, AI-314, AI-154, AI-237, AI-248, AI-294, AI-312, AI-139, AI-320

14:00-16:45	371-4663-3757	Session D: Modern Information Security Theory and Key Technologies 现代信息安全理论及关键技术 AI-055, AI-073, AI-169, AI-202, AI-166, AI-239, AI-269, AI2-033, AI-257, AI-290, AI-321
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SPEAKER | 报告嘉宾

Beijing Time 09:10-09:50 on Dec.9**Venue** Creativity-创新厅-会议楼 3F**Tencent ID** 668-6527-8590**Link** <https://meeting.tencent.com/dm/3VOtvf01eTDt>

Prof. Wei Lu

University of Michigan, USA

Fellow of ASME

Lu Wei 教授，美国密西根大学

BIO

Wei Lu is a Full Professor at the Department of Mechanical Engineering, University of Michigan-Ann Arbor. He received his B.S. from Tsinghua University and a Ph.D. from Princeton University. Prof. Lu uses machine learning to address major challenges in energy and other applications. He has more than 180 journal publications in high impact peer-reviewed journals and 200 presentations and invited talks in international conferences, universities and national labs including Harvard, MIT and Stanford. He also has plenty of publications in conference proceedings, encyclopedias and book chapters. Prof. Lu was the recipient of many awards including the CAREER award by the US National Science Foundation; the Robert J. McGrattan Award by the American Society of Mechanical Engineers; Elected Fellow of the American Society of Mechanical Engineers; Robert M. Caddell Memorial Research Achievement Award; Faculty Recognition Award; Department Achievement Award; Novelis/CoE Distinguished Professor Award; CoE Ted Kennedy Family Faculty Team Excellence Award; CoE Creative, Innovative, Daring Award; CoE George J. Huebner, Jr. Research Excellence Award; and the Gustus L Larson Memorial Award by American Society of Mechanical Engineers. He was recognized as academics in the top 2% in the discipline of energy (a study from Stanford University science-wide author databases of standardized citation indicators and top 2% is the highest in the study). He was invited to the National Academies Keck Futures Initiative Conference multiple times.

ABSTRACT

Integrating Machine Learning with Human Knowledge

Machine learning has been heavily researched and widely used in many disciplines. However,



achieving high accuracy requires a large amount of data that is sometimes difficult, expensive, or impractical to obtain. Integrating human knowledge into machine learning can significantly reduce data requirement, increase reliability and robustness of machine learning, and build explainable machine learning systems. This allows leveraging the vast amount of human knowledge and capability of machine learning to achieve functions and performance not available before and will facilitate the interaction between human beings and machine learning systems, making machine learning decisions understandable to humans. In this talk I will present some of our work in these areas, including self-directed online machine learning for topology optimization [1], which reduced the computational time by 5 orders of magnitude and outperformed all state-of-the-art algorithms tested, enabling design optimizations not possible before, integrating machine learning with human knowledge [2], machine learning toward advanced energy storage devices and systems [3], and application of machine learning for medical applications.

1. C. Deng, Y. Wang, C. Qin, Y. Fu, and W. Lu, “Self-directed online machine learning for topology optimization,” *Nature Communications*, 13, 388, 2022.
2. C. Deng, X. Ji, C. Rainey, J. Zhang, and W. Lu, “Integrating machine learning with human knowledge,” *iScience*, 23, 101656, 2020.
3. T. Gao and W. Lu, “Machine learning toward advanced energy storage devices and systems,” *iScience*, 24, 101936, 2021.

SPEAKER | 报告嘉宾

Beijing Time 09:50-10:30 on Dec.9**Venue** Creativity-创新厅-会议楼 3F**Tencent ID** 668-6527-8590**Link** <https://meeting.tencent.com/dm/3VOtvf01eTDt>

Prof. Dazi Li

Beijing University of Chemical Technology, China

李大字教授，北京化工大学

BIO

Li Dazi is a Full Professor and the Vice Dean of the College of Information Science and Technology, Beijing University of Chemical Technology. She went to Japan to study abroad in 2000 and received the Ph.D. degree in engineering from the Department of Electrical and Electronic Systems, Kyushu University, Fukuoka, Japan, in 2004. She is also the head of the national first-class undergraduate program "Automation" and a renowned teaching teacher in Beijing. Her research interests include machine learning and artificial intelligence, advanced process control, fault diagnosis, complex system modeling and optimization. She is currently an Associate Editor of ISA Transactions.

ABSTRACT

Graph Network based Deep Reinforcement Learning Methods for Complex System

Nowadays, the process industries are becoming more and more complex, which brings challenges for data-driven real time intelligent decision-making. Reinforcement learning based method incorporating both prior knowledge and data-driven method is explored. Starting from graph representation of complex process, knowledge expression & extraction technology is studied based on reinforcement learning and graph neural network for application in industries field. The constructed knowledge automation system can organically integrate industrial data and expert experience, and realize the domain knowledge extraction and reconstruction for complex process industry driven by both prior knowledge and data. The proposed approaches for these problems can not only contribute to the theoretical support for deep graph reinforcement learning and its applications, but also provide an effective new solution for the intelligent transformation and applications in other domains under the goals of energy-saving and efficiency-enhancing.

SPEAKER | 报告嘉宾

Beijing Time 11:00-11:40 on Dec.9**Venue** Creativity-创新厅-会议楼 3F**Tencent ID** 668-6527-8590**Link** <https://meeting.tencent.com/dm/3VOtvf01eTDt>

Prof. Wei Fang

Jiangnan University, China

方伟教授，江南大学

BIO

Wei Fang is a Professor at the Department of Artificial Intelligence and Computer Science, Jiangnan University. His main research interests include swarm intelligence and evolutionary computing. In recent years, he has worked on the Neural Architecture Search (NAS), Pattern Mining, and Bayesian Network Structure Learning (BNSL) based on Evolutionary Algorithms. He has published more than 60 top journal and conference papers, including IEEE TPAMI, TEVC, TKDE, TCYB, CIM, TSMC, TII, Information Fusion, Information Sciences, KBS, ICDE, GECCO, etc. His Google Scholar citations is 3909 and h-index is 33. He was the principal investigator of projects granted from the National Natural Science Foundation of China, National Natural Science Foundation of Jiangsu Province, China Postdoctoral Science Foundation, etc. He is the editorial member of International Journal of Swarm Intelligence Research, International Journal of Computing Science and Mathematics, and Complex System Modeling and Simulation.

ABSTRACT

Bayesian Network Structure Learning from Data based on Evolutionary Algorithm with Mutual Information and Structural Information

Bayesian Network (BN) is a probability graph model that combines graph and probability theory and can express the causal relationship between variables clearly. It has played an essential role in representing and reasoning uncertain relationships, such as artificial intelligence, medical treatment, fault diagnosis, data mining, and other fields. BN learning has two major components: structure learning and parameter learning, in which structure learning is the basis of parameter learning and the premise of the BN application. BN structure learning (BNSL) from data has great significance and is also the main research direction of this paper. Due to the search space growing super-exponentially with the increasing number of nodes, BNSL has been proved to be



an NPhard problem. At the same time, evolutionary algorithms are a promising way to solve such problems. Genetic algorithm (GA) has achieved many satisfying results these years but still faces the problems of low search efficiency, low accuracy, and insufficient integration with the problem. In this talk, the BNSL algorithm based on GA is studied. First, the search behaviour of GA is improved by using BN structural information. Besides, the superior information in the population is mined by mutual information and population support. It is used to guide GA to converge rapidly.

SPEAKER | 报告嘉宾

Beijing Time 14:00-14:30 on Dec.10**Tencent ID** 668-6527-8590**Link** <https://meeting.tencent.com/dm/3VOtvf01eTDt>

Assoc. Prof. Lei Chen

Shandong University, China

陈雷副教授，山东大学

BIO

Lei Chen received the B.Sc. and M.Sc. degrees in electrical engineering from Shandong University, Jinan, China, and the Ph.D. degree in electrical and computer engineering from University of Ottawa, Ontario, Canada. He is currently an Associate Professor with the School of Information Science and Engineering, Shandong University, China. His research interests include image processing and computer vision, visual quality assessment and pattern recognition, machine learning and artificial intelligence. He was the principal investigator of projects granted from the National Natural Science Foundation of China, National Natural Science Foundation of Shandong Province, China Postdoctoral Science Foundation, etc. He has published more than 40 papers on top international journals and conferences in recent years including IEEE TIP, Signal Process., ICME, etc. He was awarded the Future Plan for Young Scholars of Shandong University. He served for many international conferences including the ICIGP 2021, CSAI2022, MLCCIM2022, and ICIVC 2023 as Program Chair, Technical Chair or Publicity Chair.

ABSTRACT

Perceptual image quality assessment based on human visual system

With the rapid development of modern technology, people have higher expectations for the visual effects of images. The reference-less image quality assessment method guided by the human visual system is more in line with the way humans perceive the world. In order to address the ill-posed nature of two-dimensional no reference image quality assessment and make it closer to the performance of full reference or reduced reference image quality assessment, we will report a NR-IQA method based on non-adversarial visual restoration networks. Moreover, we will report our method of combining binocular visual saliency weighting in the assessment of stereoscopic image quality. This method combines the 2D saliency map of a stereo image with



the depth saliency map of the left and right views in a linearly weighted manner to obtain a 3D saliency map and assigns weights based on the 3D saliency information to obtain the final prediction score. The performance of the proposed method has been evaluated on various widely-used databases. The experimental results demonstrate the effectiveness and superiority of our proposed method compared to other related methods.





Session 1

14:00-15:30 on Dec.9

Venue: Creativity-创新厅-会议楼 3F

Digital Image Analysis and Processing Methods-数字图像分析与处理方法

Chair Prof. Hualin Li, Chongqing Institute of Engineering, China

Paper Detail

<p>14:00-14:15 AI-025</p>	<p>Efficient and Accurate Abdominal Multi-Organ Segmentation using Cross Pseudo-based Semi-Supervised Learning Tianyu Xiao, Ruining Zhao, Saijun Nie, Xu Ji Presenter-Tianyu Xiao Beijing University of Posts and Telecommunications, China</p> <p>Abstract-Abdominal multi-organ segmentation is of great significance for preoperative treatment planning. At present, there are many public abdominal datasets and deep learning based segmentation methods have been proposed. However, the problem of polycentric and spatio-temporal inefficiency still remain unsolved. Additionally, expensive costs of labeling and lack of labeled data are also serious problems of this field. In this work, with a small amount of labeled ICT images and large number of unlabeled data, we propose a novel Cross Pseudo based semi-supervision method, whose two branches can generate pseudo-labels to supervise each other. we add an organ shape constraint auxiliary branch and redesign the loss function to effectively improve the segmentation accuracy of the model. For quantitative evaluation on the FLARE2022 validation cases, this method achieves the DSC of 0.80, NSD of 0.75 within merely 20s for inference per image. It demonstrates the robustness and efficiency of our method.</p>
<p>14:15-14:30 AI-142</p>	<p>Image Segmentation with Vision-Language Models Lihu Pan, Yunting Yang, Zhengkui Wang, Rui Zhang, Wen Shan, Jiashu Li Presenter-Zhengkui Wang Taiyuan University of Science and Technology, China</p> <p>Abstract-Image segmentation traditionally relies on predefined object classes, which can pose challenges when accommodating new categories or complex queries, often necessitating model retraining. Relying solely on visual information for segmentation heavily depends on annotated samples, and as the number of unknown classes increases, the model's segmentation performance experiences significant declines. To address these challenges, this paper introduces ViLaSeg, an innovative image segmentation model that generates binary segmentation maps for query images based on either free-text prompts or support images. Our model capitalizes on text prompts to establish comprehensive contextual logical relationships, while visual prompts harness the power of the GroupViT encoder to capture local features of multiple objects, enhancing segmentation precision. By employing selective attention and facilitating cross-modal interactions, our model seamlessly fuses</p>

	<p>image and text features, further refined by a transformer-based decoder designed for dense prediction tasks. ViLaSeg excels across a spectrum of segmentation tasks, including referring expression, zero-shot, and one-shot segmentation, surpassing prior state-of-the-art approaches.</p>
14:30-14:45 AI-193	<p>Keep your Eyes on the Road: Hybrid-Anchor guided Road Perception Yanan Wang, Xuexu Ma, Zhongmin Wang Presenter-Yanan Wang University of Science and Technology Beijing, China</p> <p>Abstract-With the traffic safety problem of automatic driving technology gradually becoming the focus of people's attention, accurate lane detection and vehicle target detection are the basis of automatic driving safety technology. In this work, we propose a multi-task learning road information detection model based on hybrid anchor to detect lane lines and vehicles at the same time. We use multi-task learning to improve the inference speed and generalization of the model. Since lanes and obstacles follow regular patterns and are highly correlated in location, we hypothesized that in some cases, global information may be critical to inferring their location, especially in cases of blocked, missing markers, etc. Thus, this work proposes a novel attention mechanism based on hybrid anchor to address this problem. The results show that our method outperforms every single task methods showing both higher efficacy and efficiency. Moreover, an ablation study is performed along with a discussion on efficiency trade-off options that are useful in practice.</p>
14:45-15:00 AI-297	<p>Instance-based 3D Anchor for Monocular 3D Object Detection Ziyu Wu and Ziyang Wu Presenter-Ziyu Wu WuHan University of Technology, China</p> <p>Abstract-The perception component of autonomous driving system usually consists of LiDAR and RGB camera. Compared with LiDAR, RGB cameras have the characteristics of low price and long life. Recently, some works focus on using a single RGB image to conduct 3D object detection task. Due to the lack of depth information in monocular images, it is necessary to constrain depth estimation or introduce depth clues in the detection pipeline. Compared to the depth-guided approach of MonoDETR, we introduce instance-based 3D anchors into the visual features encoder to guide the learning of network parameters. In this way, richer clues can be introduced for the encoding and decoding stages with faster inference speed. Our instance-based 3D anchor detector is trained in an end-to-end manner, achieving advanced performance on the KITTI benchmark with significant gains.</p>
15:00-15:15 AI2-012	<p>Multibeam Imaging Sonar Image Fusion via α-total Variation Model Xiawei Guan,Hao Zhang,Shaobo Fu,Jia Wang,Han Pan* Presenter-Shaobo Fu Wuhan Second Ship Design and Research Institute, China</p> <p>Abstract- Multibeam imaging sonar provides detailed information that has proven crucial in various applications like cognitive robots, navigation, and inspection. However, because of hardware limitations of multibeam imaging sonar, the captured image with controlled frequency suffers from the dispersion and attenuation with respect to specified material. To integrate more information, a more accurate description about the same scene can be obtained via a technique known as image</p>



	<p>fusion. Currently, total variation regularization method provides an efficient way to achieve this task on gradient domain. In this paper, we propose a new problem formulation with ℓ_1-total variation model for multibeam sonar image fusion. An alternative minimization method is proposed, which can integrate dual-frequency imaging sonar image into an enhanced one. To the authors' best knowledge, this is the first study concerning multibeam sonar image fusion. Experimental results on a real world dataset illustrate the effectiveness and efficiency of the proposed algorithm.</p>
<p>15:15-15:30 AI-266</p>	<p>Single-Camera 3D Human Pose Estimation: Addressing Occlusion Challenges and Predictive Quality Assessment Simran Kumar, Isha Sahni Presenter-Simran Kumar NIT HAMERPUR , INDIA</p> <p>Abstract-Human Pose Estimation, or HPE, pertains to the process of precisely determining the spatial coordinates of distinct anatomical segments of the human body depicted within an image frame. This challenge has garnered significant attention over the last decade and is poised to remain a focal point in the future. Beyond its significance within the scientific community, this field holds practical implications for applications such as augmented reality, military operations, and surveillance of densely populated areas. The present study concentrates on the intricacies of 3D HPE using a single 2D camera. The exploration encompasses the accessibility of data, prevailing metrics pertinent to this endeavour, and the complications introduced by occlusion. A specific focus is placed on introducing a methodology to evaluate the accuracy of predictions for visible and occluded key points in scenes characterized by corresponding visibility conditions. Promising outcomes are obtained, as the accuracy of predictions for visible key points remains consistent even in the presence of occlusion affecting other key points. Furthermore, a prospective avenue of research is proposed, involving the identification of occluded key points through the analysis of high-frequency noise incorporated into joint positions over temporal intervals. To conclude, an analysis is provided concerning both the challenges and opportunities inherent in this research endeavour.</p>



Session 2

14:00-15:30 on Dec.9

Venue: Cooperation 1-合作 1 厅-会议楼 3F

Information Network and Signal Analysis-信息化网络与信号分析

Chair Dr. Meiliwen WU, Civil Aviation Management Institute of China, China

Paper Detail

<p>14:00-14:15 AI2-037</p>	<p>An Anomaly Detection Model Based on CNN-VAE for IoT Devices Yichen Liu, Huajian Zhang, Yiqing Liang, Yuzhen Huang, Fangfang Zhu, Daqing Gao Presenter-Yichen Liu Institute of Modern Physics, Chinese Academy of Sciences, China</p> <p>Abstract-Anomaly Detection on IoT devices is a widely studied task in industry. As deep learning methods developed, they have been a prevailing solution to this task, especially in the certain working condition of lacking anomaly samples. Among all the methods, for complicated data with changing period and transmitting noise in the real production environments, VAE appears to be potential. We first reconstruct the 1D time series to 2D tensors as it is hard to apply normal data augmentation methods on a time series dataset with continuous semantic. Then we used a CNN-VAE model, an improved reconstruction-based anomaly detection method, to compute the reconstruction error in an unsupervised way. The method can be integrated to an end-to-end framework as it is lightweight. Comparing with other anomaly detection methods on our dataset, our method showed the best results.</p>
<p>14:15-14:30 AI-175</p>	<p>A Hybrid Resampling Technique with Adaptive Intervals Used in the Parallel/Distributed Particle Filters Xudong Zhang, Feng Gu, Wei Zhong, Chunyu Ai Presenter-Xudong Zhang University of South Carolina Upstate, USA</p> <p>Abstract-Parallel/distributed particle filters estimate the states of dynamic systems by using Bayesian interference and stochastic sampling techniques with multiple processing units (PUs). The sampling procedure and the resampling procedure alternatively execute to estimate the states in particle filters. There are two basic types of resampling techniques used in parallel/distributed particle filters. They are centralized resampling and decentralized resampling. The high communication between PUs in centralized resampling lowers the speedup factor in parallel computing but improves the estimation accuracy. The decentralized resampling can avoid the communication and improve the performance. Some types of hybrid resampling techniques mainly execute the decentralized resampling and only invoke the centralized resampling with constant intervals to achieve ideal performance without losing the estimation accuracy. However, the constant intervals cannot guarantee that the centralized resamplings are invoked timely. In this study, we proposed a hybrid resampling technique with</p>

	<p>adaptive intervals between centralized resamplings to overcome that issue. The experimental results indicate that the proposed hybrid resampling technique is able to improve the performance and the estimation accuracy.</p>
14:30-14:45 AI-091	<p>Towards Dual Optimization of Efficiency and Accuracy: Hyper Billion Scale Model Computing Platform for Address Services Dongxiao Jiang, Hailin Sun, Jiahua Lin, Yanchi Li, Bocheng Xia, Jie Jiang, Xing Sun Presenter-Dongxiao Jiang AILab of J&T Express Co., Ltd, China</p> <p>Abstract-Whether intelligent algorithm services can be successfully implemented into production for enterprises mainly depends on: How to simultaneously achieve dual optimization of efficiency and accuracy at a rational low cost. In this paper we demonstrate an applied computing platform for global user addresses of J&T Express Ltd., to introduce some well-thought-out designs that enable address services to be not only efficient but also precise. These original designs include: (1) a complementary model composed of BERT for deep phased learning and GNN for continuous online learning; (2) biaffine layer to capture the relations between time and space that can improve address representation ability; (3) the last hidden layer is reformed and shared to GNN's construction for embedding consistency; (4) Qdrant is used as a high-efficient vector retrieval engine for inference performance; and (5) intensive computing tools (e.g., TensorRT, Triton) from NVIDIA is deeply utilized to accelerate training and inference. More than one year operation experience has verified the effectiveness, online evaluation indicators such as accuracy rate, inference response time and computing expense in section 5 illustrate the excellent performance even for hyper-billions scale and multilingual queries.</p>
14:45-15:00 AI-187	<p>A Attention-Based Approach for Spatial-Temporal Trajectory similarity Search Zhenkai Lu, Han Jiao, Danpu Zhang Presenter-Zhenkai Lu Beijing Aerospace Changfeng Company Limited, China</p> <p>Abstract-Trajectory similarity calculation serves as the cornerstone for numerous applications within the realm of trajectory data analysis, including popular tasks like route recommendation and trajectory pattern analysis. Nevertheless, the conventional algorithm exhibits sensitivity to noise points and entails high time complexity, rendering it ill-suited for handling large-scale datasets. In contrast, representation methods founded on deep learning have proven instrumental in substantially mitigating the computational burden associated with trajectory distance calculations, concurrently enhancing temporal efficiency. Nevertheless, extant learning-based models predominantly rely on recurrent neural networks (RNNs), which are beset by issues of information decay and the neglect of temporal dynamics—a pivotal dimension in spatiotemporal trajectory data. This quandary has spurred our pursuit of a novel approach, christened as TASTS (Time-aware Similar Trajectory Search), designed to imbue trajectory similarity assessment with temporal awareness. Anchored in attention networks, this model endeavors to markedly enhance accuracy by incorporating not only inter-trajectory interactions but also the relative and absolute time attributes of trajectories. In doing so, it adeptly capitalizes on the spatiotemporal intricacies inherent in trajectory data. To substantiate the effectiveness of our proposed model, we conducted a comprehensive evaluation across two widely adopted real-world datasets, employing a diverse array of trajectory distance</p>



	<p>metrics. The outcomes of our experiments unequivocally underscore the superior validity and computational efficiency of the TASTS model.</p>
15:00-15:15 AI-229	<p>Vietnamese Voice2Text: A Web Application for Whisper Implementation in Vietnamese Automatic Speech Recognition Tasks Quangphuoc Nguyen, Ngocminh Nguyen, Thanhluan Dang and Vanha Tran Presenter-Quangphuoc Nguyen FPT University, Viet Nam</p> <p>Abstract-The publication of the Whisper model by OpenAI inspired us with the idea of a web platform that provides voice-to-text conversion services for Vietnamese people. Using Whisper's powerful generalization capabilities, we have developed a web application with three main features: record-to-text, file-to-text, and subtitles generator for YouTube. We first fine-tuned Whisper with our target language dataset then deployed the model as a Rest API using the Python Flask framework with three paths for three different tasks. The web application has been developed using ReactJS, a popular JavaScript library for building user interfaces. Its architecture is grounded in component-based design principles, which means that the application is structured into reusable and modular components, enhancing code maintainability and scalability. The web application has been developed using ReactJS, a popular JavaScript library for building user interfaces. Its architecture is grounded in component-based design principles, which means that the application is structured into reusable and modular components, enhancing code maintainability and scalability. The record-to-text function will allow users to record audio on the web page, and then the audio will be processed and converted to text. As for the file-totext function, the website will receive audio files uploaded by users and will return the transcript text of that audio file. And finally the subtitles generator for YouTube function, where users can enter the YouTube link as input, wait for the website to process and the website will display that video with the transcript attached to the video based on the timestamps of each transcript. This project can inspire and encourage the testing and application of new automatic speech recognition (ASR) models in specific applications</p>
15:15-15:30 AI-031	<p>A Study of Unsupervised Multi-document Sentiment Summarization Techniques Based on Graph Structure Minghui Xia, Yahui Zhao, Rongyi Cui and Guozhe Jin Presenter-Minghui Xia Institute of Intelligent Information Processing Yanbian University Yanji, China</p> <p>Abstract-To address the problems of large amount of redundant information and difficulty in extracting key information in commentary text information in the Internet, as well as the problems of difficulty in constructing data sets and limited application fields in summary generation based on supervised multi-document summary methods. In this paper, we propose an unsupervised multi-document sentiment summary extraction method based on multi-featured sentiment-semantic relationship graph. Firstly, a corpus based on news commentaries is collected using a combination of crawler and manual methods, and manual summary extraction is performed; secondly, sentiment features, inflectional words features, keyword features, punctuation features and semantic features are used to construct sentiment-semantic relationship graphs to capture sentence relationships; then, spectral clustering, multi-sentence compression and sentence ranking and selection are used to obtain summaries; finally, the proposed method is experimentally validated on the dataset. The</p>

experimental results show that the unsupervised multi-document summary extraction method based on sentiment-semantic relationship graph significantly outperforms other unsupervised methods and is easy to deploy and apply without a heavy learning process compared to supervised methods.

Session 3

14:00-15:45 on Dec.9

Venue: Cooperation 2-合作 2 厅-会议楼 3F

Data Structure Analysis and Intelligent Algorithm Design-数据结构分析与智能算法设计

Chair Assoc. Prof. Abramyan Mikhail, Shenzhen MSU-BIT University, China

Paper Detail

<p>14:00-14:15 AI-079</p>	<p>An Algorithm for Partial Elimination of Jumps in an Object-Oriented Dataflow Language Yegor Bugayenko, Mikhail Lipanin Presenter-Yegor Bugayenko Huawei, Russia</p> <p>Abstract-Despite enduring criticisms spanning several decades, jump state-ments such as goto, break, continue, and return remain preva-lent in imperative programming languages, including but not lim-ited to C++, Java, and Python. The academic community has yet to reach a consensus regarding whether the refactoring of source code in these languages to eliminate such statements can indeed enhance code readability. Nevertheless, it is evident that automated program analysis would derive substantial benefits from this refactoring, given that structured code analysis is more straightforward than analyzing code that exhibits capricious alterations in its control flow. While algorithms tailored for this refactoring process have been proposed for certain imperative languages, we introduce a congruent algorithm, specifically designed for a dataflow program-ming language. It's important to note that although dataflow lan-guages lack jump statements, they might incorporate jump-objects (in object-oriented contexts) or jump-functions (within functional paradigms). Our algorithm has been instantiated as a command-line tool tailored for refactoring EO, an object-oriented dataflow lan-guage. Preliminary tests with several EO programs have validated the tool's efficacy. Leveraging φ-calculus, we provide a formal proof underscoring the validity of every transformation encompassed within our algorithm.</p>
<p>14:15-14:30 AI-136</p>	<p>An improved combined small sample time series data prediction model Yong Shuai, Chuan Yang, Biao Li, Xiaoping Huang, Xinyi Su, Hanhan Wang Presenter-Yong Shuai Chongqing CEPREI Industrial Technology Research Institute Co., Ltd, China</p>

	<p>Abstract-Aiming at the problems that the current artificial intelligence(AI) large model can not accurately carry out small-sample time series data prediction and the sample incremental method was not applicable to small-sample time series data prediction, we proposed an improved combination prediction model for small-sample time series data . Firstly, we used multidimensional data incremental collection method based on the assumption of homogeneous distribution, incremental dataset slicing method, and parallel data preprocessing method to carry out incremental modeling for the sample set. Then, we carried out model selection and hyper-parameter optimization modeling, customized the selection method of optimal model and hyper-parameter combination and the definition of predictive data. Finally, the case study showed that the model proposed in this paper had higher prediction accuracy and broader applicability.</p>
<p>14:30-14:45 AI-217</p>	<p>From spatial data warehouse into NoSQL document-oriented database: case study Forest fire risk management Asma Belaroussi, Khalissa Derbal, Mohamed-Fazil Lounis, Adel Mensouri, Mostefa Belhadj-Aissa Presenter-Asma Belaroussi LTIR/USTHB- ENS Kouba, Algeria</p> <p>Abstract-Spatial Data Warehouses are commonly used for decisionmaking systems, but they require a costing time and considerable resources to analyze all stored information. The traditional approach uses relational databases with Spatial R-OLAP, which can't handle the large amount of data that SDWs contain. As an alternative, Spatial Big Data and NoSQL systems are better suited. This study proposes transformation rules, allowing a direct translation of the spatiomultidimensional schema components as the spatial facts and measures and spatial dimensions and hierarchies from the conceptual level to the target spatial NoSQL model. We then developed a geo-decisional tool powered by the NoSQL spatial data warehouse to manage the risk of the Forest Fire phenomenon in Algeria.</p>
<p>14:45-15:00 AI-295</p>	<p>Data Fusion Optimization and Contribution Assessment of Dual-Polarization Radar Data in Short-Term Forecasting of Convective Precipitation Guoqing Zhao, Leilei Deng, Zhiyuan Chen and Xianbiao Kang Presenter-Guoqing Zhao Civil Aviation Flight University of China, China</p> <p>Abstract-China's complex geographical environment frequently leads to severe convective weather events, including thunderstorms, hail, and tornadoes, posing significant threats to the economy and public safety. Upgraded Doppler weather radar systems now provide a broader range of parameters, enhancing short-term quantitative precipitation estimation. Leveraging the Conv-LSTM method, these systems capture spatiotemporal characteristics and relationships among multiple parameters within radar echo images, enabling precise short-term forecasting of convective weather precipitation. The integration of advanced equipment and technology has yielded breakthroughs in quantitative precipitation forecasting for short-term convective events.To fully utilize Doppler weather radar parameters and select the most effective ones for precipitation estimation, an evaluation and optimization of the current convolutional neural network is essential. Our approach enhances the neural network structure by incorporating a self-attention mechanism layer to assess individual parameter contributions. This ensures that the most informative parameters receive greater importance in the forecasting process. Additionally, we introduce a dynamic allocation layer</p>

	<p>that prioritizes parameters with higher weightings for subsequent predictions. The study results reveal that within the self-attention layer, the KDP parameter exhibits the highest composite weight, underscoring its significance. When compared to the conventional ConvLSTM algorithm, our improved algorithm, which dynamically selects parameters after discerning different precipitation phases, consistently yields superior estimation performance. These findings provide a viable assessment strategy and optimization approach for the application of Doppler weather radar parameters in the estimation of precipitation during severe convective weather events.</p>
15:00-15:15 AI-085	<p>Object Specialization to Partially Reduce Polymorphism of Attributes Alena Vasileva, Yegor Bugayenko Presenter-Yegor Bugayenko Huawei, Russia</p> <p>Abstract-In object-oriented programming languages, objects with polymorphic attributes can negatively impact performance and hinder static analysis. These attributes require dynamic dispatch, which is slower than static binding, and complicate the analysis process. We propose a novel algorithm for object specialization that addresses this issue by replacing polymorphic attributes with monomorphic ones, resulting in improved performance and simplified static analysis. Our algorithm is a new approach compared to existing function specialization algorithms. We provide a proof of the algorithm's soundness and correctness, and present an implementation of the algorithm as a software tool. Empirical evaluation shows that our approach achieves significant improvements in performance and simplifies the static analysis process. Our algorithm can be applied to a variety of object-oriented languages such as Java and Python.</p>
15:15-15:30 AI-263	<p>Research on cross-regional path planning algorithm for aircraft unmanned tractor based on improved A algorithm Zheng Wang, Xin Wang, Feng Gu, Lin Sun Presenter-Lin Sun Aircraft design and research institute in AVIC Harbin Aircraft Industry Group Co., Ltd., China</p> <p>Abstract-Unmanned tractors can replace experienced drivers in driving and warehousing aircraft on the ground. When the airport and hangar environment is more complex, higher requirements are also put forward for the path planning algorithm. The A* algorithm is a heuristic search algorithm widely used in path planning. Improved based on the classic A* algorithm, it can avoid obstacles across regions while improving efficiency and reducing path cost consumption. First, a region segmentation method was designed, and then the evaluation function was redesigned to avoid falling into local optimality. At the same time, it was improved to delete child nodes that have passed the obstacle vertex when selecting child nodes to avoid collisions. Finally, the optimisation path was improved, redundant nodes were deleted, and secondary optimisation was performed to reduce the number of turns and the total number of turns. Simulation experiments were conducted through Matlab, and the data showed that the improved A* algorithm has high smoothness, avoided collisions, reduced crossing areas, and saved movement time.</p>
15:30-15:45 AI-305	<p>Some General Heuristics in the Traveling Salesman Problem and the Problem of Reconstructing the DNA Chain Distance Matrix Boris Melnikov and Dmitrii Chaikovskii Presenter-Melnikov Boris, Melnikova Elena</p>

Shenzhen MSU-BIT University, China

Abstract-With all their differences, the two problems under consideration, namely the traveling salesman problem and the problem of restoring the DNA chain distance matrix, have a lot in common. This generality primarily consists in the following. For real problems and for standard methods of solving them, such as gradient descent, these problems can be formally solved, but in fact they are described by systems of equations with several dozen variables, and sometimes hundreds. In this regard, to solve them, we use sequential algorithms (step-by-step) for filling matrices, sometimes also using backtracking for the variables already considered. We show that such heuristics in the situations we are considering give acceptable anytime algorithms.

Session 4

16:15-17:45 on Dec.9

Venue: Creativity-创新厅-会议楼 3F

Image-based Visualization Data and Education

基于图像的可视化数据与教育

Chair Prof. Melnikov Boris, Shenzhen MSU-BIT University, China

Paper Detail

Enhancing Maintenance Training with Mobile Augmented Reality: An AHP-Based Development Approach

Rattawut Vongvit, Tanawut Churaksa, Nattapan Rattana

Presenter-Rattawut vongvit

Srinakhariwirot University, Thailand

16:15-16:30
AI-220

Abstract-The industrial landscape has witnessed a remarkable proliferation of automated systems in recent years, encompassing various technologies such as robotic arms, CNC machines, and AS/RS systems. These computerized systems, owing to their inherent flexibility, have swiftly adapted to the evolving contours of production processes. However, this paradigm shift in industrial operations necessitates a commensurate evolution in the workforce's skill set. This study's primary aim is to pioneer the development of a mobile augmented reality solution designed to elevate maintenance training. Utilizing the Analytic Hierarchy Process (AHP), our goal is to assess and prioritize the importance of course content, laying a solid groundwork for integrating mobile augmented reality into maintenance training. Through meticulous identification of user requirements and the reasonable prioritization of critical features throughout the development process, our innovative approach culminates in an augmented reality-based training application tailored to meet the specific



	<p>needs of welding robot maintenance staff. This application offers an extensive repository of information on part components, preventive maintenance protocols, and troubleshooting insights. Our research substantially enhances maintenance training quality, bridging the chasm between theoretical knowledge and practical proficiency.</p>
16:30-16:45 AI-278	<p>Autoencoder-based representation learning of hand and finger movements in humans Matvei Khoimov, Stepan Botman and Natalia Shusharina Presenter-Matvei Khoimov Immanuel Kant Baltic Federal University, Russia</p> <p>Abstract-(1) In this work, a set of deep autoencoders with different numbers of layers and layer sizes were trained using a set of open access hand tracking datasets. Examining the results allowed to determine optimal number of layers for deep autoencoders and augmentation parameters for denoising autoencoders. Additionally, variations of autoencoders reconstruction loss depending on hidden unit size and latent space size were observed. (2) Results. Trained autoencoders showed better results in representation extraction than PCA method. A positive relationship between autoencoder depth and model performance was also proven. Future work will be aimed at applying obtained results to transfer learning problems.</p>
16:45-17:00 AI2-034	<p>Inconsistency Detecting and Resolving for Security Policy and IPv6 Firewall Policy Yi Yin, Yuichiro Tateiwa, Guoqiang Zhang, Yun Wang, Xiaojun Qian Presenter-Yi Yin Nanjing Normal University, China</p> <p>Abstract-Firewall is the first defense line for network security. Packet filtering is a basic function in firewall, it filter network packets according to a series of rules, which is called firewall policy. The design of firewall policy should be observe the regulations of security policy, which is a generic guideline that lists the basic requirements for network access permissions. However, even for IPv4 firewall policy, it is extremely hard to keep the consistency between firewall policy and security policy. Some inconsistency decision methods of security policy and IPv4 firewall policy were proposed. However, the address space of IPv6 address is a very large, the existing inconsistency decision methods could not be directly used to handle IPv6 firewall policy. To resolve the above problem, in this work, we use a formal technique to find and eliminate the inconsistencies between security policy and IPv6 firewall policy. We also build a prototype system and test the effectiveness of the proposed method through experiments.</p>
17:00-17:15 AI-276	<p>Analysis of Graph Data Structure from the Perspective of Clustering Peng Lv and Yan Liu Presenter-Peng Lv Key Laboratory of Cyberspace Situation Awareness of Henan, China</p> <p>Abstract-Deep graph clustering is a fundamental task that partitions graph nodes into distinct clusters based on their similarity features, without using human-annotated data. Graph representation learning methods are widely used for deep graph clustering, as they can learn node embeddings that capture the similarity features within each cluster. However, the existing methods have not clearly defined what kind of similarity they capture, and how it varies across different node categories. In this paper, we propose a novel approach for deep graph clustering that addresses these</p>



	<p>issues. We use a combination of qualitative and quantitative methods to analyze the attribute vectors and structure of graph data, and explore the sources of similarity captured by graph representation learning. We also investigate how the attribute and structure features of graph data affect the clustering performance, and identify the specific challenges faced by deep graph clustering tasks. Our approach provides insights and guidance for the future development of deep graph clustering.</p>
<p>17:15-17:30 AI-061</p>	<p>Cultural Heritage Triple Information Extraction Based on Span Pointer NetWork Na Wang, Rongqiang Zhang, Hengyang Wu Presenter-Rongqiang Zhang Shanghai Polytechnic University, China</p> <p>Abstract-Knowledge in the field of cultural heritage has the characteristics of long data, large entity span, high semantic complexity and nesting among some entities, which increase the difficulty of knowledge extraction in the field of cultural heritage. In order to effectively solve the problem of knowledge extraction in the field of cultural heritage, and to solve the problem of error accumulation and entity redundancy in the pipeline method in the relationship extraction task, a relationship joint extraction model based on span pointer network is proposed to extract the triple information in the field of cultural heritage. In addition, in order to improve the extraction performance and generalization ability of the model, based on the model of span pointer network, ERNIE pre-training model which is more suitable for Chinese tasks is used as the coding layer and AdamW is used as the optimizer. The final experimental results show that this method has superior performance in solving the problem of knowledge extraction in the field of cultural heritage.</p>
<p>17:30-17:45 AI-049</p>	<p>Design of Digital Air Traffic Management System for Multi-operator Unmanned Aerial Vehicle Based on Digital Twin Meiliwen WU, Renli LV, Xiangmin GUAN Presenter-Meiliwen Wu CAAC Key laboratory of General Aviation Operation (Civil Aviation Management Institute of China), China</p> <p>Abstract-With the advancement of UAV technology, it is imperative to deliberate and practice the method of UAV operation management in greater detail. This paper presents a design scheme for an urban air traffic management data processing system based on a digital twin, which can solve the problem of multi-operator system digital management for conflict warning management. The system is composed of a digital core module, a digital control module, and a UAV twin flight module. The modules are linked to each other, and utilizing techniques like flight planning, comprehensive warning, and space processing, the twin-algorithm data analysis framework is constructed, and conflict predictions and predictions are made. The process of confirming the system described in this paper will be followed by further refinements and, with the assistance of the Bureau, the collection of information about the sector's activities to enhance the system.</p>



Session 5

16:15-18:00 on Dec.9

Venue: Cooperation 1-合作 1 厅-会议楼 3F

Electronic Collaborative Control and Electrical System Based on Swarm Intelligence-基于群智能的电子协同控制与电气系统

Chair **Dr. Lin Sun, Aircraft design and research institute in AVIC Harbin Aircraft Industry Group Co., Ltd., China**

Paper Detail

<p>16:15-16:30 AI-163</p>	<p>On the Study of All Semilattices on the Set of Covering Automata for the Waterloo Automaton MIKHAIL E. ABRAMYAN, BORIS F. MELNIKOV Presenter-Abramyan Mikhail Shenzhen MSU-BIT University, China</p> <p>Abstract-In this paper, we study semilattices of subsets of grids of the relation # matrix for the Waterloo automaton and corresponding semilattices of covering automata for this automaton. The study was carried out using the NFALib library for analyzing nondeterministic finite automata. We give a complete description of the obtained semilattices from the point of view of equivalence of the covering automata included in them to the original Waterloo automaton, give variants of their visual representation, and formulate a criterion of equivalence of the covering automaton to the Waterloo automaton in terms of properties of the subset of grids defining the covering automaton.</p>
<p>16:30-16:45 AI-070</p>	<p>Detection and classification of power quality disturbances using STFT and deep neural network Dazi Li, Irfan Ali Channa Presenter-Irfan Ali Channa Beijing University of Chemical Technology, China</p> <p>Abstract-Distribution networks with renewable energy sources (RESs) are rapidly integrated to meet the energy demands, and build for hybrid power systems. This causes the power quality (PQ) problems due to use of non-linear loads in the distribution networks. This paper proposes an effective deep learning (DL) architecture with signal processing technique to detect and classify single and composite types of power quality disturbances (PQDs). Main features of PQDs has been extracted from the signals by using Short-time Fourier transform (STFT) and fed into 2D-convolutional neural network to classify data automatically. This technique has the advantage to skip the manual feature selection of PQDs events. The proposed work is compared with other advanced type of deep neural networks (DNNs) to prove the effectiveness of the classifier. Moreover, IEEE-13 node system is simulated in MATLAB/Simulink to create PQDs samples and validate the performance of the proposed method. The classification results show that the new STFT based DNN method is suitable to classify single and composite PQDs.</p>
<p>16:45-17:00 AI-178</p>	<p>A Method of Predicting the Deposited Film Thickness in IC Fabrication Based on Stacking Ensemble Learning</p>

	<p>Jiangchen Wu, Yumeng Shi, Yining Chen Presenter-Jiangchen Wu Zhejiang University, China</p> <p>Abstract- The measurement of deposited film thickness is crucial in the IC manufacturing process, and the traditional physical measurement methods are inefficient and costly. In order to enhance the effectiveness and precision of forecasting deposited film thickness during IC manufacturing, improvements are necessary. This paper proposes a method of predicting the deposited film thickness in IC fabrication based on stacking ensemble learning, which constructs a stacking ensemble model by using XGBoost, CatBoost, SVR, and Ridge as the base learners and using Linear Regression as the meta-learner. We use WOA to preprocess and feature screen HDPCVD data and build four single machine learners for comparison, including XGBoost, CatBoost, SVR, and Ridge. The test results show that the stacking ensemble learning model performs better in predicting deposited film thickness. In addition, the stacking ensemble learning model we use entirely considers the time factor by selecting efficient learners as the base learners. The training prediction time is about twenty seconds on an ordinary computer, much lower than that of the conventional RF or DNN that is often used. It can achieve fast prediction and timely improvement of the quality of the subsequent products.</p>
<p>17:00-17:15 AI-127</p>	<p>Nonlinear system identification using a semi concurrent sequential niching framework Yves Matanga, Yanxia Sun, Zenghui Wang Presenter-Zenghui Wang University of South Africa, South Africa</p> <p>Abstract- System identification is a very critical process in a control system aiming to determine the system dynamics of practical processes before devising an adequate control approach. Several metaheuristic approaches have been used for the parametric estimation of nonlinear systems, ranging from classical to new-generation metaheuristics. Nevertheless, the stochastic nature of these algorithms does not guarantee the obtention of the true optima solution thus leaving room for more explorative algorithmic enhancements. The current research proposes the use of a computationally efficient semi-concurrent sequential niching framework to boost the search performance of the parameter estimation task in a bid to obtain more accurate parameters. This framework has been validated in our previous studies on multimodal test functions and is here applied for system identification of nonlinear models, particularly PV model estimation.</p>
<p>17:15-17:30 AI-115</p>	<p>Analysis of the performance of PID-based new-generation metaheuristic algorithms for automatic voltage regulation system Stephen Oladipo, Yanxia Sun Presenter-Yanxia Sun University of Johannesburg, South Africa</p> <p>Abstract- In recent decades, the expansion of industrial organizations in both scale and scope has necessitated dependable output voltage supplies. However, persistent oscillations in electromechanical devices can impede power efficiency and stability, underscoring the importance of reliable automatic generation regulation (AVR) systems and power system design in the manufacturing sector. To address this issue, this study presents a performance analysis of a</p>



	<p>proportional integral derivative (PID) controller based on new-generation metaheuristic algorithms (MAs) for the AVR system. Five recent and novel MAs were employed to optimize the PID controller for the AVR system, with the controllers' performances evaluated under five distinct performance metrics. The findings revealed that the Northern Goshawk Optimization (NGO) algorithm was the most effective optimization approach, exhibiting the lowest values of overshoot (33.2784%), peak time (0.2120 s), and objective value (0.0077). These results suggest that the NGO algorithm is a promising optimization method for improving AVR system performance in industrial settings.</p>
17:30-17:45 AI-043	<p>False Data Injection Attacks Intrusion Simulation Applying Semi-Supervised for Power System Based on Knowledge Graph Hao Wang, Zhilin Duo, Jianfei Chen Presenter-Hao Wang State Grid Electric Power Research Institute, China</p> <p>Abstract- With the increased risk of power systems facing external attacks, the all-round simulation of conventional attack patterns has become an important demand for current power system security protection against conventional cyber attacks. This paper proposes a false data injection attack (FDIA) simulation method for power systems, which is safer, faster, more comprehensive and more accurate than the traditional FDIA monitoring and defense methods. The proposed method requires firstly to simulate the key parameters of the actual power system equipment, the actual operation process, the equipment interactions, the simulation and the actual equipment operation status to maintain consistency. Then, the simulated system is subjected to the "black-box attack" and "white-box attack" defined in this paper. After that, we obtain the key equipment parameters, state changes, and system alarms of the system after the attack. Finally, two semi-supervised learning algorithms XGboost and support vector machine (SVM) are required to improve the accuracy of this attack method. The advantage of the proposed method in this paper is that the attack can be identified by tracing the root cause in reverse, and furthermore, mutual verification can be done by the original initiated attack, and finally, the all-round analysis of the attack and the impact of the intrusion can be accomplished from the attacker's point of view by using the knowledge graph visualization.</p>
17:45-18:00 AI-285	<p>Semantic Topic Extraction from Research Artifacts Daiveek Sai P and Anouksha Rajesh Presenter-Daiveek Sai P SRM UNIVERSITY, India</p> <p>Abstract-The GENESIS project introduces a novel framework for Research Artifact Data Semantics to enhance semantic web technologies within academic institutions. This paper introduces a system developed as part of the GENESIS challenge, focusing on extracting and labelling topics from diverse research artifacts. The approach employs knowledge graphs, topic models, and named entity recognition to infer meaningful topics. Evaluation encompasses measures such as topic coherence and semantic similarity. Future work includes refining entity linking techniques, optimizing system performance, and implementing advanced graph centrality algorithms. This contribution advances semantic understanding in various research contexts.</p>



Session 6

10:00-11:30 on Dec.10

Venue: Cooperation 1-合作 1 厅-会议楼 3F

Information Systems and Management Based on Machine Learning-基于机器学习的信息系统与管理

Chair **Dr. Li Guannan, Huzhou Institute of Zhejiang University, China**

Paper Detail

<p>10:00-10:15 AI-157</p>	<p>Improve the efficiency of deep reinforcement learning through semantic exploration guided by natural language Zhourui Guo, Meng Yao, Yang Yu, Qiyue Yin Presenter-Zhourui Guo University of Chinese Academy of Sciences, China</p> <p>Abstract-Reinforcement learning is a powerful technique for learning from trial and error, but it often requires a large number of interactions to achieve good performance. In some domains, such as sparse-reward tasks, an oracle that can provide useful feedback or guidance to the agent during the learning process is really of great importance. However, querying the oracle too frequently may be costly or impractical, and the oracle may not always have a clear answer for every situation. Therefore, we propose a novel method for interacting with the oracle in a selective and efficient way, using a retrieval-based approach. We assume that the interaction can be modeled as a sequence of templated questions and answers, and that there is a large corpus of previous interactions available. We use a neural network to encode the current state of the agent and the oracle, and retrieve the most relevant question from the corpus to ask the oracle. We then use the oracle's answer to update the agent's policy and value function. We evaluate our method on an object manipulation task. We show that our method can significantly improve the efficiency of RL by reducing the number of interactions needed to reach a certain level of performance, compared to baselines that do not use the oracle or use it in a naive way.</p>
<p>10:15-10:30 AI-233</p>	<p>Detection of Financial Fraudulent Activities with Machine Learning: A Case Study of Detecting Potential Tax and Invoice Fraud Maohong Tian, Jian Liang, Hualin Li, Xintong Zhang, Dequan Zhang and Zuo Wang Presenter-Hualin Li ChongQing Institute of Engineering, China</p> <p>Abstract-Financial fraud is a widespread problem that can cause significant economic losses. Traditional fraud detection methods often rely on manual audits and rules-based systems, which can be timeconsuming and error-prone. In recent years, machine learning methods have emerged as a</p>



	<p>promising approach to automating fraud detection by leveraging large-scale data analysis. This article explores the use of machine learning methods to detect financial fraud by using tax, invoice, and big data. We first introduce the challenges and opportunities of using these data sources for fraud detection, and then survey various machine learning techniques that have been applied to this problem. We also discuss the evaluation metrics and case studies of these methods, and highlight the potential benefits and limitations of using machine learning for fraud detection. Finally, we identify some future research directions and challenges in this area. This article aims to provide a comprehensive method of the state-of-the-art in using machine learning methods for financial fraud detection, and to inspire further research and development in this important field.</p>
10:30-10:45 AI-058	<p>A Novel Classification Model for Automatic Multi-Label ICD Coding via BERT-LSTM Luhan Wen, Dongmei Zhou, Hao Luo, Yongjian Cheng Presenter-Luhan Wen Chengdu University of Technology, China</p> <p>Abstract-Clinical notes are text documents created by physicians at each patient visit to record details of diagnosis and treatment, and are labeled using medical codes. However, manually marking up these codes is time-consuming and error-prone. To address this problem, we propose a new multi-label classification method inspired by the encoder-decoder structure that utilizes the BERT-LSTM network structure to automatically assign ICD codes to clinical texts. The model is able to accurately predict the appropriate medical codes based on the content and contextual information of the clinical text, improving efficiency while reducing errors. By combining these two powerful neural network models, we are able to better handle the task of coding clinical notes. In comparative experiments, the application results of the model are better than some basic neural network architectures, achieving 85.7% of AUC, 61.2% of precision@5 and 56.5% of Micro-F1. This result demonstrates the robustness of our proposed method and the effectiveness automatic ICD coding classification.</p>
10:45-11:00 AI-022	<p>User entity alignment method based on cross-attribute knowledge association Meijuan Yin, Yan Zheng, Shunran Duan, Longlong Jiao, Hao Yang Presenter-Shunran Duan Key Laboratory of Cyberspace Situation Awareness of Henan Province, China</p> <p>Abstract-User entity alignment is the core technology of associating multisource user identities and constructing user portraits, which is of great significance in cyberspace security, personalized service recommendation, social network, data mining, and other fields. It is difficult to accurately align user entities based on common attributes when the common attributes of multisource user data are sparse. Aiming at the above problem, we propose a user entity alignment method based on cross-attribute knowledge association. Firstly, the attribute values in the user information are linked to the corresponding entities in a knowledge graph, and the representation vector of each attribute value is obtained by embedding the subgraph of the knowledge graph. With the help of knowledge graph, the knowledge association between attribute values is embedded into the attribute vectors. At the same time, to accurately measure the attribute weight, the attribute identification degree is calculated by the distribution of attribute values. Finally, the user representation vector is generated by weighted cumulative attribute value vectors, and the similarity between user vectors is calculated to judge whether two users refer to the same person entity. Experimental results demonstrate that,</p>



	<p>the accuracy, recall, and F1 score of the proposed method are not less than 0.87 on the person entity dataset with sparse attributes. Compared with existing typical methods based on common attributes and methods based on knowledge graph embedding, the accuracy, recall, and F1 score are 12%, 7% and 10% higher than the comparative algorithm respectively.</p>
11:00-11:15 AI-028	<p>Activation Function: Absolute Function, One Function Behaves more Individualized Yun Fu, Jingyi Fu, Jinxin Wei Presenter-Jinxin Wei Vocational school of Juancheng, China</p> <p>Abstract-Inspired by natural world mode, a activation function is proposed. It is absolute function. According to probability principle, nature word is normal distribution. Stimulation which happens frequently is low value, it is shown around zero in figure1 . Stimulation which happens accidentally is high value, it is shown far away from zero in figure1. So the high value is the big stimulation, which is individualization. Through test on mnist dataset and fully-connected neural network and convolutional neural network, some conclusions are put forward. The line of accuracy of absolute function is a little shaken that is different from the line of accuracy of relu and leaky relu. The absolute function can keep the negative parts as equal as the positive parts, so the individualization is more active than relu and leaky relu function. In order to generalization, the individualization is the reason of shake, the accuracy may be good in some set and may be worse in some set. The absolute function is less likely to be over-fitting. The batch size is small, the individualization is clear, vice versa. If you want to change the individualization of absolute function, just change the batch size. Through one more test on mnist and autoencoder, It is that the leaky relu function can do classification task well, while the absolute function can do generation task well. Because the classification task need more universality and generation task need more individualization.</p>
11:15-11:30 AI-251	<p>Behavior Mining of Robot-Animal Mixed Swarm Xinyang Cui, Mingxuan Wei and Guannan Li Presenter-Li Guannan Huzhou Institute of Zhejiang University, China</p> <p>Abstract-Emergent intelligence and collective behaviors have long captivated the interest of researchers. These phenomena often stem from intricate interactions among numerous individuals adhering to straightforward rules. This paper focuses on a mixed swarm consisting of both controllable and uncontrollable swarms. We aim to harness the controllable group's behavior to influence and intervene in the uncontrollable group's actions. Here the controllable group is a robot swarm that can be controlled by human, while the uncontrollable group primarily comprise biological swarms. Designing behavioral rules for the controllable group to effectively affect the behavior of the uncontrolled group presents a challenge. To address this issue, we propose a behavior-mining-based approach. By utilizing the NEAT algorithm through iterative processes, we generate a multitude of potential behavioral rules for the controllable group. Subsequently, we gather data on how the uncontrollable group responds to the actions of the controllable group. We then apply dimensionality reduction and clustering techniques to extract distinctive behavioral trajectory features for the uncontrollable group (method features). Ultimately, through a series of simulation experiments, we validate the effectiveness of this approach.</p>



Session 7

10:00-11:30 on Dec.10

Venue: Cooperation 2-合作 2 厅-会议楼 3F

Artificial Intelligence and Potential Applications-人工智能及潜在应用

Chair Asst. Prof. Xianlin Jin, University of Toledo, USA

Paper Detail

<p>10:00-10:15 AI-1005-A</p>	<p>Integrating Big Data Tools to Study Human-Computer Interaction between Artificial Intelligence and Humans: Methodology Strengths, Applications, and Future Directions Xianlin Jin, Patric R., Seungahn Nah Presenter-Xianlin Jin University of Toledo, USA</p> <p>Abstract-The growing adoption of Artificial Intelligence (AI) in multiple settings makes interaction and communication between AI and humans seem inevitable. How does the public perceive and use AI? How does the information about AI diffuse among stakeholders? Answering these questions will illuminate human-computer interaction theory-building and AI designing, contributing to a better user experience. This article brings big data to explore communication patterns between AI and humans. Compared to traditional qualitative and quantitative methods, big data can systematically analyze and interpret vast and unstructured data [1]. This article contains two empirical studies to illustrate the strengths and applications of big data methods in exploring human-AI communication. The first study focused on the perceived accuracy, accessibility, and credibility of AI dermatologists. The second study used topic modeling analyses to understand how stakeholders (e.g., users, developers, and industry) evaluate Replika—an AI chatbot. The ethics and possibility of human-AI romantic relationships were the primary concerns. There were debates about building social relationships with AI [2]. This article further proposes future directions: (1) More empirical studies on emotion detection to distinguish the type and degree of human emotions by analyzing multiple cues (e.g., facial expressions, body language, and speech patterns) [3] will benefit theory AI design; (2) studying how different stakeholders (e.g., users, industry, and government agencies) perceive and use AI will help researchers and professionals understand humancomputer interaction; and (3) interdisciplinary collaborations among computer science, engineering, and communication scholars are vital to studying human-computer interaction and communication.</p>
<p>10:15-10:30 AI-006</p>	<p>A-share trading strategy based on MTL-DDPG Wei Deng, Juncheng Chen, Zhen Li, Weiwei Wang and Zhi Cai Presenter-Wei Deng Beijing University of Technology, China</p>

	<p>Abstract-With the development of artificial intelligence, more investors are applying machine learning and deep learning algorithms to financial time series, aiming to improve traditional quantitative trading strategies. However, most of the current research focus on mature institutional-type markets and strategies proposed by the current research lack dynamic adjustment capability, especially in a complex environment with high volatility and strong noise, are difficult to derive a stable and profitable portfolio. In response to the above problems, we fully combine the advantages of artificial intelligence and traditional financial market theory techniques to construct a quantitative trading strategy model MTL-DDPG (Multi Time-scale LSTM Deep Deterministic Policy Gradient) that can obtain excess returns. By conducting back testing and comparing with other classical quantitative trading strategies, we verify that our proposed quantitative trading strategy, MTL-DDPG, achieves good results in the A-share market by obtaining excess returns, and the selected portfolio outperforms the benchmark both in terms of total return and risk management.</p>
<p>10:30-10:45 AI-253</p>	<p>Design of an experiment platform for robot-fish swarm interaction Mingxuan Wei, Xingyang Cui, Kaijie Lai, Fulin Yang, Kaipeng Ji, Lei Wang and Guannan Li Presenter-Cui Xingyang Xi'an Jiaotong-Liverpool University, China</p> <p>Abstract-Emergent intelligence and collective behaviors have long captivated the interest of researchers. These phenomena often stem from intricate interactions among numerous individuals adhering to straightforward rules. This paper focuses on a mixed swarm consisting of both controllable and uncontrollable swarms. We aim to harness the controllable group's behavior to influence and intervene in the uncontrollable group's actions. Here the controllable group is a robot swarm that can be controlled by human, while the uncontrollable group primarily comprise biological swarms. Designing behavioral rules for the controllable group to effectively affect the behavior of the uncontrolled group presents a challenge. To address this issue, we propose a behavior-mining-based approach. By utilizing the NEAT algorithm through iterative processes, we generate a multitude of potential behavioral rules for the controllable group. Subsequently, we gather data on how the uncontrollable group responds to the actions of the controllable group. We then apply dimensionality reduction and clustering techniques to extract distinctive behavioral trajectory features for the uncontrollable group (method features). Ultimately, through a series of simulation experiments, we validate the effectiveness of this approach.</p>
<p>10:45-11:00 AI-076</p>	<p>WOA-BP Based Predicting Daily Production Method of Single Wells in Oilfield Hongtao Hu, Xueying Zhang Presenter-Xueying Zhang Xi'an Shiyou University, China</p> <p>Abstract-The daily production of a single well in an oil field can reflect the changes in oil and water in the reservoir and it is an important basis for formulating single well stimulation measures. However, the factors that affect the daily production of a single well are complex, and there is currently no standard calculation method. In recent years, BP neural networks have been widely used in yield prediction, but they have problems such as slow convergence speed and easy to fall into local optima. In response to the above issues, this paper proposes a backpropagation neural network model WOA-BP based on the whale optimization algorithm. Firstly, the Spearman and</p>



	<p>Pearson correlation coefficient methods are used to screen feature attributes related to oil production as input parameters of the neural network, with oil production as output parameter; Then, the Whale Optimization Algorithm (WOA) is used to optimize the initial parameters such as learning rate, weight and bias, as well as the number of hidden layer neurons in the BP neural network; Finally, based on the optimized initial network parameters, a single well daily production prediction model is constructed. Train and evaluate the established model using real oilfield data, and compare it with the prediction models of BP, GA-BP, and PSO-BP. The experimental results show that the WOA-BP model has good prediction performance, with a coefficient of determination (R²) of 0.9633 and a mean square error (MSE) of 0.0017. It can effectively predict the daily oil production of a single well and aid with predicting the production of oilfield blocks.</p>
11:00-11:15 AI-148	<p>Review on Research of Automated Machine Learning Yanzhen Yu Zhong, Chuan Yang, Xinyi Su, Biao Li, Xiaoping Huang, Yong Shuai Presenter-Yuyanzhen Zhong Chongqing CEPREI Industrial Technology Research Institute Co., Ltd, China</p> <p>Abstract-Automated Machine Learning (AutoML) can automatically discover high-performance models to build deep learning systems without human assistance, with the ultimate goal of reducing the complexity and entry barriers of building deep learning systems. Although AutoML has achieved a certain degree of automation through four important steps: data preparation, feature engineering, model generation, and model evaluation, there is still a significant gap compared to the ultimate ideal of achieving truly intelligent lifelong learning. Therefore, a deep understanding of AutoML can help drive the development of artificial intelligence. Firstly, we comprehensively reviewed the latest technologies and achievements involved in these four steps, then we introduced their shortcomings and challenges. Secondly, a detailed introduction was given to the existing AutoML libraries and the theoretical and practical applications of AutoML. Finally, we summarized AutoML models and Proposed an outlook.</p>
11:15-11:30 AI-181-A	<p>A CO-WORD ANALYSIS OF RESEARCH ON IMPULSE PURCHASE BEHAVIOR IN LIVE STREAMING E-COMMERCE Fuyume Sai Presenter-Fuyume Sai Daito Bunka University, Japan</p> <p>Abstract-As a new shopping mode, live streaming e-commerce presents an innovative take on traditional e-commerce by embedding live streaming into an e-commerce platform or integrating e-commerce functions with a content platform. In the past few years, impulse purchase in live streaming e-commerce has attracted considerable attention from both academic and industrial communities. This study aims to present the existing research in this field comprehensively. To this end, both descriptive analysis and co-word analysis were conducted to examine prior research that focused on the factors influencing impulse buying behavior in live e-commerce. The constructs examined in 75 relevant empirical studies, including journal articles, theses, and dissertations, are explored using the co-word occurring analysis technique. Due to the complex nature of impulse buying behavior, in this study, we concentrate on the research models involving mediation relationships and apply the marketing mix approach to present antecedents of impulse purchase in live e-commerce for further empirical study.</p>



Session A

10:00-12:15 on Dec.10

Tencent ID: 668-6527-8590

Data -based information management and service platform development-基于数据驱动的信息管理及服务平台开发

Chair Dr. Hongbin Hu, Communication University of China, China

Paper Detail

<p>10:00-10:15 AI-019</p>	<p>Sentiment Analysis of Russia-Ukraine Conflict: A Hybrid Approach Using VADER, GloVe-embedding and LSTM Soumen Sinha, Saketh Innani, Pawan Chinnari, Mehek Khan Presenter-Mehek Khan Mahindra University, India</p> <p>Abstract- Russian-Ukraine conflict is going on for quite a long period and it has become very crucial to understand the public opinion on this issue for various reasons like policy implication, peace building efforts, humanitarian reasons and many more. This paper aims to study the public sentiment on Russia - Ukraine conflict from twitter data using a hybrid approach. It presents a hybrid approach to perform sentiment analysis on twitter data using VADER, GloVe-embedding and LSTM. Our research analyses and classifies sentiments using deep learning techniques. A lot of work done till now using twitter data requires a lot of time to label the tweets. Twitter possesses huge amount of data and it becomes difficult to label each one of them manually. For training our model tweets were scraped from twitter using Tweepy library in python. We scraped 1 million tweets from first week of January 2023 till first week of February 2023. Tweets were scraped using various queries which are there in Tweepy library. In this paper we have shown the application of VADER which can be used to label unlabelled dataset. After labelling the data using VADER we performed word and GloVe embedding on our dataset. After performing GloVe embedding we performed sentiment analysis using Bi-directional LSTM. Our model achieved an overall accuracy of 97.09%. We also compare the accuracy achieved by other models with our hybrid approach.</p>
<p>10:15-10:30 AI-103</p>	<p>Knowledge Ecological Model and Its Implementations in the Context of Metaverse Danning Wu Presenter-Danning Wu Zhejiang Conservatory of Music, China</p> <p>Abstract- Adapting to the innovative concepts of Metaverse, academic institutions or libraries should develop more quality and efficient knowledge service and build up smarter knowledge eco-infrastructure. This paper reviews the factual demands and inadequacies of online Q&A</p>

	<p>community and institutional disciplinary service. Integrating the Metaverse features of virtual-real symbiosis, internet of everything and decentralization, it explores the knowledge ecosystem construction from the perspectives of subject elements, environment elements, ecological chain and operating mechanism. Generally, knowledge interacts, competes and evolves to reach a dynamic synergy between knowledge service and innovation, influenced by subject and environment elements in knowledge ecosystem. For the implementation of Metaverse-based knowledge ecological theory, three conceptual aspects of immersive learning space, ecological knowledge organization and intelligent knowledge recommendation have been discussed.</p>
10:30-10:45 AI-145	<p>Research on the Construction of Smart Community Based on Text Mining Yingbo Zhai, Yanji Piao Presenter-Yingbo Zhai Yanbian University, China</p> <p>Abstract- Image segmentation traditionally relies on predefined object classes, which can pose challenges when accommodating new categories or complex queries, often necessitating model retraining. Relying solely on visual information for segmentation heavily depends on annotated samples, and as the number of unknown classes increases, the model's segmentation performance experiences significant declines. To address these challenges, this paper introduces ViLaSeg, an innovative image segmentation model that generates binary segmentation maps for query images based on either free-text prompts or support images. Our model capitalizes on text prompts to establish comprehensive contextual logical relationships, while visual prompts harness the power of the GroupViT encoder to capture local features of multiple objects, enhancing segmentation precision. By employing selective attention and facilitating cross-modal interactions, our model seamlessly fuses image and text features, further refined by a transformer-based decoder designed for dense prediction tasks. ViLaSeg excels across a spectrum of segmentation tasks, including referring expression, zero-shot, and one-shot segmentation, surpassing prior state-of-the-art approaches.</p>
10:45-11:00 AI-190	<p>Analyzing the “ Belt and Road ” topic of overseas Chinese media based on the BERTopic modeling Huiying Yan, Yu Zhang Presenter-Huiying Yan Jinan University, China</p> <p>Abstract- Trajectory similarity calculation serves as the cornerstone for numerous applications within the realm of trajectory data analysis, including popular tasks like route recommendation and trajectory pattern analysis. Nevertheless, the conventional algorithm exhibits sensitivity to noise points and entails high time complexity, rendering it ill-suited for handling large-scale datasets. In contrast, representation methods founded on deep learning have proven instrumental in substantially mitigating the computational burden associated with trajectory distance calculations, concurrently enhancing temporal efficiency. Nevertheless, extant learning-based models predominantly rely on recurrent neural networks (RNNs), which are beset by issues of information decay and the neglect of temporal dynamics—a pivotal dimension in spatiotemporal trajectory data. This quandary has spurred our pursuit of a novel approach, christened as TASTS (Time-aware Similar Trajectory Search), designed to imbue trajectory similarity assessment with</p>

	<p>temporal awareness. Anchored in attention networks, this model endeavors to markedly enhance accuracy by incorporating not only inter-trajectory interactions but also the relative and absolute time attributes of trajectories. In doing so, it adeptly capitalizes on the spatiotemporal intricacies inherent in trajectory data. To substantiate the effectiveness of our proposed model, we conducted a comprehensive evaluation across two widely adopted real-world datasets, employing a diverse array of trajectory distance metrics. The outcomes of our experiments unequivocally underscore the superior validity and computational efficiency of the TASTS model.</p>
11:00-11:15 AI-246	<p>Ontology-Semantic Alignment On Contrastive Video-Language Model for Multimodal Video Retrieval Task Yifan Zhou, Yizhou Ding, Yuwu Dong and Hao He Presenter-Yifan Zhou Shanghai Jiao Tong University, China</p> <p>Abstract- Contrastive Learning-based models have shown impressive performance in text-image retrieval tasks. However, when applied in video retrieval, traditional contrastive learning strategies have faced challenges in achieving satisfactory results due to redundancy of video contents. We discern several potential reasons- (1)Current methodologies sometimes overlook the significant information imbalance between videos and query text, specifically neglecting the in-depth textual representation of the content within the videos. (2) Current video matching methodologies typically focus on crossmodel alignment at general entity similarity level, without specific consideration for how entity pair preferences and similarity properties affect the task at hand. (3) Previous vectorized retrieval based on video content features have been somewhat flawed. They primarily focused on aligning overall features without having an video content tags feature for meaningful feature discrimination. Considering the shortcomings identified in the mentioned three aspects, we propose an ontology semantic labels augments retrieval model and introduce a method to integrate video ontology semantic labels into the contrastive learning framework. In particular, we have developed ontology semantic descriptions about entities encompassing both human figures and textual elements within the videos. Subsequently, we conducted training and testing on the CMIVQA dataset to assess the performance of our approach. The experimental results show that employing fine-grained ontology labels as sample pairs for contrastive learning leads to an increased level of precision in video retrieval tasks.</p>
11:15-11:30 AI2-020	<p>The Future of EFL Reading: How Digital Technology is Changing the Game Wen-Chi Hu, Shih-Tsung Hsu Presenter- Wen-Chi Hu Chaoyang University of Technology, China</p> <p>Abstract- This research aims to explore the effectiveness of integrating a Digital Storytelling Project (DS) aligned with the Sustainable Development Goals (SDGs) into English lessons to improve the reading skills of English as a Foreign Language (EFL) learners in Taiwan. This quasi-experimental study involved 62 college students in a private university. The research employed various assessment tools, including initial and final assessments of English reading comprehension, alongside classroom observations. The reading scores were statistically analyzed using one-way ANCOVA. The findings of this investigation reveal that the treatment group exposed to the SDGs-based DS instruction exhibited better reading performance than the control</p>

	<p>group. Thus, using technology and integrating Sustainable Development Goals (SDGs) within the pedagogical framework offer distinct advantages in English as a Foreign Language (EFL) instruction. This approach addresses the evolving educational landscape and caters to the multifaceted needs of contemporary learners.</p>
11:30-11:45 AI2-025	<p>Study on the Impact of Job Embeddedness on Employee's Innovative Behavior in Information Technology Industry Wang Lan, Li Ran Presenter- Li Ran Beijing Language and Culture University, China</p> <p>Abstract- Management scholars and practitioners are increasingly concerned with understanding what makes some firms "out-innovate" others. While, to realize an innovative solution represents what Jarillo (1988) describes as the first entrepreneurial problem i.e., it requires increased employee innovation performance. The issue of how job embeddedness can create employee innovation performance has become a fundamental research question. To assess the effects of job embeddedness on employee innovation behavior, this paper elaborates a theoretical framework that relates three dimensions of job embeddedness to employee innovation behavior. We argue organizational identity plays a prominent role in facilitating innovation behavior by promoting the transfer of values, goals, and information sharing. Using survey data from a sample of 214 employees from the information technology industry, we demonstrate that job embeddedness has a positive impact on employee innovation behavior. We also find that organizational identity partially mediates the relationship between job embeddedness and employee's innovative behavior. These findings provide novel insights into how to improve employee's job embeddedness and enhance organizational identity to stimulate innovative behavior among employees. Theoretical and managerial implications are discussed.</p>
11:45-12:00 AI2-036	<p>Scaling Machine Learning with a ring-based distributed framework Kankan Zhao Presenter- Kankan Zhao Shandong Inspur Database Technology Co., Ltd, China</p> <p>Abstract- In centralized distributed machine learning systems, communication overhead between servers and computing nodes has always been an important issue affecting the training efficiency. Although existing research has proposed various measures to reduce communication overhead between nodes in parameter server frameworks, the communication pressure and overhead inherited from centralized architectures are still significant. To address the above issue, this paper proposes a ring-based parameter server framework that is distinct from node division and model training mechanism in the standard p/s framework. The ring-based architecture cancels the global model stored on the server side, and each computing node stores a local copy of the model. During model training, computing nodes can asynchronously train local models based on local or remote training data. After all nodes finish learning, the ensemble learning method can predict test data based on all local models. To avoid the negative impact of remote data reading on model training efficiency, a producer-consumer data reading strategy is proposed. This strategy can reduce data reading overhead in a pipeline manner. To make rational use of the input and output bandwidths of all nodes, a circular data scheduling mechanism is proposed. At any given time, this mechanism</p>

	<p>ensures each node has at most one input stream and one output stream, thereby dispersing communication pressure. The experimental results show that the proposed distributed architecture achieves significantly better performance (1.7%-2.1% RMSE) than the state-of-the-art baselines and also achieves a 2.2x-3.4x speedup when reaching a comparable RMSE performance.</p>
<p>12:00-12:15 AI-052</p>	<p>Research on the dynamic application of trademark similarity determination based on dynamic time regularization and XGBoost Hong Zhang, Xiaojuan Wang, Yaping Xu Presenter-Hong Zhang Guizhou China Tobacco Industry Co., Ltd, China</p> <p>Abstract- In order to improve the possibility of successful trademark registration in the tobacco industry and monitor the problem of whether the 34 categories of trademarks are preempted, this paper conducts an experimental design based on dynamic time regularization and XGBoost algorithm. The main innovation points are firstly, the similarity is calculated by the Dynamic Time Wrangling (DTW) algorithm by combining the information of text structure and location, and also as a comparison with the accuracy of machine learning prediction results; secondly, both Chinese similarity and English similarity are incorporated into the training set as input features; thirdly, the weekly updated data training results are checked and used as the test set to enhance the accuracy and adaptability of the model. This experiment is applied to automatically output the determination of trademark similarity results, and then take measures to adjust the trademark design or raise objections to the infringing trademark after obtaining the similarity results, which greatly reduces the workload of manual comparison and improves the accuracy rate of comparison at the same time. The experimental design of this paper evaluates the accuracy rate, and the experimental results are in the acceptable range, which can be applied to the whole tobacco industry for screening similar brand names, and can be extended to other text similarity determinations, and this study can continue to optimize the extraction of more features as input, which will be helpful in providing accuracy rate.</p>



Session B

10:00-12:15 on Dec.10

Tencent ID: 371-4663-3757

Data Model Analysis and Management-数据模型分析与管理

Chair Dr. Ariesto Hadi Sutopo, Topazart Educational Development, Indonesia

Paper Detail

<p>10:00-10:15 AI-016</p>	<p>Soil Data Storage Framework based on Blockchain and Improved Merkle Mountain Range Chufeng Liang, Zhicheng Hong, Zeming Wei, Hua Tang Presenter-Chufeng Liang South China Normal University, China</p> <p>Abstract- Soil pollution control has become one of the environmental issues that governments in various regions are gradually paying attention to. However, under the Internet of Things (IoT) environment, the storage and traceability of soil environment data has become an important challenge for the future. In addition, the credibility of soil pollution data is also an important prerequisite for soil remediation. Third-party or on-machine regulatory units need real and credible soil data to support environmental governance and accountability. To tackle the problem of soil data tampering in IoT scenarios, this paper presents a blockchain-based data storage framework. The study is based on Ethereum smart contracts and Orbit-db soil data to achieve soil pollution data tamper-proofing. At the same time, we also solve the problem of on-chain of large amounts of real-time data or log data generated by IoT devices through the improved Merkle mountain (KMMR)computation data digest. Our experimental results show that KMMR not only improves the efficiency of data chain calculation but also reduces storage costs.</p>
<p>10:15-10:30 AI-088</p>	<p>Exploiting Paraphrasers and Inverse Paraphrasers: A Novel Approach to Enhance English Writing Fluency through Improved Style Transfer Training Data Zhendong Du, Kenji Hashimoto Presenter-Zhendong Du Waseda University, Japan</p> <p>Abstract- In the realm of enhancing English writing fluency, the scarcity of high-quality training data has perennially posed a significant challenge. Moreover, elevating the fluency of writing while ensuring the preservation of semantic integrity compounds the intricacies of this task. In this study, we introduce and implement a style converter rooted in the Paraphraser and Inverse Paraphraser methodologies, aimed at ameliorating English writing fluency. Concurrently, this converter facilitated the generation of a voluminous corpus of synthetic training data. Utilizing this data, we fine-tuned GPT-2 to forge an English text style transfer model. Remarkably, despite our model being trained on a dataset substantially smaller than that of prevailing baseline methods, it exhibited exemplary performance across multiple evaluation metrics, even surpassing these baselines on</p>



	<p>certain pivotal indices. These findings corroborate the efficacy of our approach and underscore its immense potential in the domain of English writing fluency enhancement. This investigation not only offers a novel optimization strategy for English composition but also furnishes researchers in cognate fields with fresh research perspectives and methodologies.</p>
<p>10:30-10:45 AI-296</p>	<p>Design and Architecture of Smart Agriculture System based on Big Data Analytics Guanyu Zhu, Domingo Palaoag Thelma and Xia Shao Presenter-Guanyu Zhu University of the Cordilleras, Philippines</p> <p>Abstract- The rise of smart agricultural systems marks the digital transformation of the agricultural sector, offering endless possibilities for improving agricultural productivity, sustainability and food supply chain management. The technical architecture of the intelligent agricultural system is the main technical support for realizing the functions of the whole system, and the architecture of the agricultural monitoring system for a long time in the past, mainly has three layers, namely the perception layer, the transmission layer and the application layer, to form the basic technical architecture of the system. This study aims at the current low level of agricultural intelligent management, lack of data analysis and inappropriate processing of collected data, and combines the current Internet of Things, big data and artificial intelligence and other cutting-edge technologies in the practical application of agricultural production and management, on the basis of which to design an intelligent agricultural system based on big data analysis. The system adds a data layer and a control layer compared with the previous agricultural system architecture, and the overall smart agricultural system architecture includes a perception layer, a transmission layer, a data layer, a control layer and an application layer. In this way, the intelligent agricultural system can monitor all kinds of parameters in the process of crop growth in real time, including temperature and humidity, soil composition, light intensity and other parameters affecting the growth of crops, through the data layer, the monitoring data to analyse the trend of its changes, and then through the control layer, the changes in the relevant parameters to make adjustments in order to ensure that the crops can be grown in the optimal environment. Thus, the purpose of improving crop yield and saving labour is achieved.</p>
<p>10:45-11:00 AI-1001</p>	<p>Data Analysis of Attitude Evaluation System in News Discourse Yuelu Wang, Jing Meng, Benjie Yue Presenter-Yuelu Wang Jilin Agricultural University, China</p> <p>Abstract- Music mood classification is a significant research area in the field of music information retrieval (MIR). Understanding and categorizing the emotional content of music is crucial for various applications. Numerous studies on music classification have been performed. Although most of these studies reports high accuracy levels, however, the overfitting problem may exist. This paper performs an exploratory analysis to overcome overfitting problems and investigates approaches towards improving the performance of music mood classification system (MMCS). Initially, the 4Q emotion dataset was used with input acoustic features in 1D and 2D formats. Different CNN architectures were designed with parameter optimizations for the 1D and 2D data formats. Results from the initial experiment clearly indicated the overfitting problem. Following this, a comparative evaluation was then performed with the 4Q Turkish music dataset. Further exploratory analysis was</p>

	<p>conducted. Data augmentation techniques were applied to overcome insufficient data. The results of this analysis are presented.</p>
11:00-11:15 AI-121	<p>Research on wireless signal dataset and modulation pattern recognition technology Hewei Li, Jingguo Sun, Zhangyuan Ji, Yuanpei Chang, Ying Xue, Yu Zhang, Jiancun Zuo Presenter-Hewei LI Shanghai Polytechnic University, China</p> <p>Abstract- With the development of communication technology, the modulation methods of wireless signals show a diversified trend. Modulation pattern recognition is a very key technology in non-cooperative communication systems such as wireless signal spectrum resource regulation and modern military warfare. When performing wireless signal modulation pattern recognition, the type and quantity of the data set have an important impact on the recognition result, so it is also very important to select or construct a data set reasonably. This article mainly studies the wireless signal dataset and modulation pattern recognition technology. Firstly, provide an overview of wireless signal datasets and introduce the types and construction of wireless signal datasets. Subsequently, the principle of modulation pattern recognition is introduced and the research status of three types of modulation recognition methods, namely, likelihood ratio recognition method based on decision theory, modulation pattern recognition technique based on feature extraction and modulation recognition technique based on deep learning, is elaborated. And compare the performance of various modulation recognition technologies. Finally, a summary and outlook were made on future research directions.</p>
11:15-11:30 AI-082	<p>LDSeq: Latent Diffusion Models for Sequence to Sequence Text Generation Yizhou Ding, Jidong Tian, Shanxing Mei, Yifan Zhou, Yuwu Dong, Hao He, Weisheng Hu Presenter-Yizhou Ding Shanghai Jiao Tong University, China</p> <p>Abstract- Diffusion models have demonstrated remarkable success in generating continuous data, such as images and audios. Previous studies on text generation employing continuous diffusion models have revealed the potential of the diffusion framework. However, challenges like embedding collapse persist, limiting the overall generation performance. In this paper we introduce LDSeq, a latent diffusion framework employing a two-stage training procedure for sequence-to-sequence text generation. In the proposed framework, we first train a Variational Auto-Encoder (VAE) on downstream datasets to compress the target text of samples into a continuous latent space, and then we train a conditional latent diffusion model in the fixed continuous latent space, where the latent vectors are iteratively sampled conditioned on the input source text. The disjoint training stages prevent the collapse of diffusion space. Experimental results on paraphrase generation and text summarization datasets show that LDSeq achieves comparable or superior performance in comparison to AR and NAR baselines while requiring lower training cost. Furthermore, We discuss some potential future directions for enhancing diffusion models in the text generation domain.</p>
11:30-11:45 AI-118	<p>Iteratively Reweighted Hypergraph Subspace Clustering Ting Yang, Shuisheng Zhou Presenter-Ting Yang Xidian University, China</p>



	<p>Abstract- With the development and application of hypergraphs, many hypergraph-based subspace clustering methods have been proposed by designing unique hypergraph construction based on the specific subspace representation model. However, there is no unified method to introduce hypergraphs into traditional simple graph-based subspace clustering methods to improve their clustering performance. To this end, this paper proposes an iteratively reweighted hypergraph subspace clustering framework (IRHSC), where the hypergraph is constructed unified based on representation coefficients. The hyperedge is generated according to a neighborhood strategy by taking each data point as a centroid vertex and linking to its coefficient-based K-nearest-neighbors adaptively selected via the rule of energy ratio θ. The weight is calculated through an iteratively reweighted method that continuously modifies the weights until a satisfactory weight is obtained. The adjustable ratio θ and continuously revised weights make the proposed framework IRHSC suitable for various subspace representation models and provide improvement effects. Experiments demonstrate the superiority of the framework IRHSC.</p>
<p>11:45-12:00 AI-214</p>	<p>Towards Discrete Object Representations in Vision Transformers with Tensor Products Wei Yuen Teh, Chern Hong Lim, Mei Kuan Lim, Ian K.T. Tan Presenter-Wei Yuen The Monash University Malaysia, Malaysia</p> <p>Abstract- In this work, we explore the use of Tensor Product Representations (TPRs) in a Vision Transformer model to form image representations that can later be used for symbolic manipulation in a neurosymbolic model. We propose the Tensor Product Vision Transformer (TPViT), an enhancement of a Vision Transformer that incorporates TPRs, an object representation methodology that utilizes filler and role vectors to represent objects. TP-ViT is the first application of TPRs on visual input, and we report qualitative and quantitative results which show that the use of TPRs allows for the formation of more targeted and diverse object representations when compared to a standard Vision Transformer</p>
<p>12:00-12:15 AI-292</p>	<p>Gradient Based Hybridization Of Pso Arun K Pujari and Sowmini Devi Veeramachaneni Presenter-Devi Veeramachaneni Mahindra University, India</p> <p>Abstract- Particle Swarm Optimization (PSO) has emerged as a powerful metaheuristic global optimization approach over the past three decades. Its appeal lies in its ability to tackle complex multidimensional problems that defy conventional algorithms. However, PSO faces challenges, such as premature stagnation in single-objective scenarios and the need to strike a balance between exploration and exploitation. Hybridizing PSO by integrating its cooperative nature with established optimization techniques from diverse paradigms offers a promising solution. In this paper, we investigate various strategies for synergizing gradient-based optimizers with PSO. We introduce different hybridization principles and explore several approaches, including sequential decoupled hybridization, coupled hybridization, and adaptive hybridization. These strategies aim to enhance the efficiency and effectiveness of PSO, ultimately improving its ability to navigate intricate optimization landscapes. By combining the strengths of gradient-based methods with the inherent social dynamics of PSO, we seek to address the critical objectives of intelligent exploration and exploitation in complex optimization tasks. Our study delves into the comparative merits of these</p>

hybridization techniques and offers insights into their application across different problem domains.

Session C

14:00-16:45 on Dec.10

Tencent ID: 668-6527-8590

Image detection and recognition-图像检测及识别

Chair Prof. Danning Wu, Zhejiang Conservatory of Music, China

Paper Detail

<p>Invited Speech 14:00-14:30</p>	<p>Assoc. Prof. Lei Chen, Shandong University, China 陈雷副教授, 山东大学 Title-Perceptual image quality assessment based on human visual system</p> <p>Abstract-With the rapid development of modern technology, people have higher expectations for the visual effects of images. The reference-less image quality assessment method guided by the human visual system is more in line with the way humans perceive the world. In order to address the ill-posed nature of two-dimensional no reference image quality assessment and make it closer to the performance of full reference or reduced reference image quality assessment, we will report a NR-IQA method based on non-adversarial visual restoration networks. Moreover, we will report our method of combining binocular visual saliency weighting in the assessment of stereoscopic image quality. This method combines the 2D saliency map of a stereo image with the depth saliency map of the left and right views in a linearly weighted manner to obtain a 3D saliency map and assigns weights based on the 3D saliency information to obtain the final prediction score. The performance of the proposed method has been evaluated on various widely-used databases. The experimental results demonstrate the effectiveness and superiority of our proposed method compared to other related methods.</p>
<p>14:30-14:15 AI-106</p>	<p>Improve the defect detection of printed circuit board by Yolov5s Yingbo Wang, Siliang Song Presenter-Siliang Song Liaoning Technical University, China</p> <p>Abstract-With the improvement of integrated circuit integration, the industrial complexity of printed circuit boards is gradually increasing, and the defects generated in the manufacturing process are also more subtle and complex. Traditional target detection methods are difficult to meet the needs of industrial detection. In order to reduce the error detection and missed detection in the defect detection of printed circuit boards, and effectively improve the detection accuracy under the</p>



	<p>premise of ensuring the detection speed, a defect detection algorithm for printed circuit boards based on improved Yolov5s is proposed. Firstly, the BiFPN (Bidirectional Feature Pyramid) is combined in the neck network, and the PANet in the Yolov5s benchmark structure is replaced by the BIFPN structure, and the bidirectional cross-scale connection is used to enhance the feature representation ability. Secondly, the Transformer layer module is designed by using the attention mechanism, and the sparse Transformer is proposed. The deformable layer contains a multi-head attention structure, which reduces the time complexity of the self-attention mechanism operation. Finally, the SE (Squeeze-and-Excitation) attention module is embedded in the basic network architecture to improve the performance of the model, so that it can better focus on important features and improve the detection accuracy. The experimental results show that the average accuracy value (mAP @ 0.5) of the improved Yolov5s model for defect detection of printed circuit boards reaches 97.7 %, which is 2.3 % higher than that before the model improvement, and can meet the requirements of industrial detection.</p>
14:45-15:00 AI-314	<p>Adaptive Human Interaction Detection Algorithm for Oilfield Security System Jun Zhang, Chuyang Wen, Yurun Zhao, Peiqin Zhao Presenter-Rui Dong Southwest Oil and Gas Field Digital Intelligence Technology Branch of China National Petroleum Corporation , China</p> <p>Abstract- This paper proposes an adaptive human interaction detection algorithm based on the Vision Transformer structure and domain adaptive algorithm for the security system in oil fields. The algorithm extracts features of individuals in the image using the Vision Transformer structure and adapts to different oil field scenes using domain adaptive algorithm. Experimental results show that the proposed algorithm has high accuracy and robustness in the application of security systems in oil fields.</p>
15:00-15:15 AI-154	<p>Helmet detection algorithm based on improved yolov7 Zhenjiu Xiao, Jian Zhang Presenter-Jian Zhang Liaoning Technical University, China</p> <p>Abstract- In order to solve the problems of low detection accuracy, wrong detection and missed detection in the traditional target detection algorithm in the safety helmet detection task, a safety helmet detection algorithm based on improved YOLOv7 is proposed. The algorithm is based on the YOLOv7 framework structure. Firstly, in the backbone network, the 3x3 convolution in the ELAN structure is replaced by the SAC convolution, and the receptive field size is adaptively selected in combination with the dilated convolution to improve the detection accuracy. At the same time, the SimAM attention mechanism is introduced to focus on key information and improve the accuracy of model detection. Finally, WIoU loss is used to replace the cross entropy in the original loss function to improve the weight of positive and negative samples, accelerate the convergence speed of the model, and further improve the detection accuracy. The experimental results show that the accuracy of the algorithm on the safety helmet data set is 3.6 percentage points higher than that of YOLOv7, which improves the detection accuracy of the safety helmet and has certain application value.</p>
15:15-15:30	SkinAACN: An Efficient Skin Lesion Classification Based on Attention Augmented ConvNeXt



AI-237	<p>with Hybrid Loss Function Abel Zenebe Yutra, Jiangbin Zheng and Xiaoyu Li Presenter-Abel Zenebe Northwestern Polytechnical University, China</p> <p>Abstract- The accurate diagnosis and treatment of skin lesions require precise identification. Traditional approaches rely on the expertise of dermatologists, creating a demand for more efficient methods. Recent advancements in deep learning have facilitated the development of intelligent systems for the detection and classification of dermoscopic images. However, existing models often struggle to selectively focus on relevant image regions, leading to reduced classification accuracy. This paper introduces an attention-augmented ConvNeXt network designed to address this limitation. The proposed model incorporates diverse attention mechanisms, including channel and spatial attention, enhancing its ability to focus on informative image segments. Furthermore, a hybrid loss function combining cross-entropy and triplet loss was utilized during training to improve feature embedding and class separation. Our experiments on the HAM10000 dataset show that our model outperforms the ConvNeXt baseline, with the Efficient Channel Attention (ECA) augmented model achieving the highest accuracy of 94.89.</p>
15:30-15:45 AI-248	<p>Architectural Floorplan Recognition via Iterative Semantic Segmentation Networks Wenming Wu Presenter-Wenming Wu Hefei University of Technology, China</p> <p>Abstract- This paper presents a novel method for architectural floorplan recognition based on iterative semantic segmentation networks, effectively improving the segmentation performance of the network, achieving the semantic segmentation of floorplans, and simplifying the workflow of recognition. Given a rasterized floorplan, we employ the fully Convolutional neural network to iteratively optimize the results of semantic segmentation. This process is equivalent to using the neural network to optimize and correct the semantic segmentation results, avoiding the need for heuristic optimization of semantic segmentation results. Experimental results demonstrate that our proposed method with iterative semantic segmentation networks significantly outperforms the traditional semantic segmentation network for architectural floorplan recognition.</p>
15:45-16:00 AI-294	<p>Rethinking Similar Object Interference in Single Object Tracking Yipei Wang, Shiyu Hu and Xin Zhao Presenter-Yipei Wang Chinese Academy of Sciences, China</p> <p>Abstract- Similar object interference (SOI) problem challenges the single object tracking (SOT) task, leading to the failure of feature-based trackers and subsequent performance degradation. Unfortunately, current generic SOT benchmarks do not effectively tackle this critical challenge, while popular SOT algorithms consistently underestimate the influence they have on tracking performance. To bridge this gap and further enhance the investigation of similar object interference in SOT, we adopt the following viewpoints- (1) By examining the operational principles of mainstream trackers and their performance on representative SOT datasets, we redefine similar objects, taking into account the cognitive bias that exists between trackers and humans when</p>



	<p>dealing with this challenge. (2) Subsequently, we develop a mining methodology that enables the extraction of the SOI sub-dataset from SOT datasets without relying on human intervention. This methodology comprises two main components- determining the SOI challenge and screening the SOI sequences. The SOI dataset is acquired from representative SOT dataset using our proposed approach, known as SOI2023. This dataset serves as an ideal environment to facilitate the investigation of challenges related to similar object interference. (3) Additionally, we conduct extensive tracking experiments with 20 typical trackers and their variants on SOI2023 and analyze their performance for similar object interference scenes in several dimensions. The experimental results demonstrate the effectiveness of our proposed mining method, while revealing the strengths and weaknesses of current trackers when faced with the challenge of similar object interference. We hope this work can provide inspiration to the tracking community and also provide support and insights for robust tracking under the SOI challenge.</p>
<p>16:00-16:15 AI-312</p>	<p>Domain Adaptive Pedestrian Re-recognition for Oilfield Operations Security Yang Huang, Guanghua Xie, Kege Yang, Rui Dong Presenter-Rui Dong Southwest Oil and Gas Field Digital Intelligence Technology Branch of China National Petroleum Corporation , China</p> <p>Abstract- In the field of prepress, "imposition" holds a crucial role, referring to the arrangement of pages on press sheets to ensure consecutive readability when folded. This process is highly dependent on the dimensions of both the press sheets and individual pages, as well as the intended folding and binding methods for the final product. To grasp the fundamentals of simple imposition, one can simulate the folding of a sheet of paper to represent a section of the finished publication, stacking or inserting these sections, and sequentially numbering the pages in reading order. Recognizing the significance of imposition in cost-effective print production, the objective of this study is to develop an imposition visualization tool. This tool facilitates the arrangement of pages on press sheets, enabling it to be used for planning book publishing even before the actual book design takes place. The imposition application is crafted as an interactive multimedia application using Adobe Animate authoring tools. The final output text file generated by this application can seamlessly integrate into the planning and processing stages of publishing documents, streamlining the workflow and contributing to the overall efficiency and accuracy of the printing process.</p>
<p>16:15-16:30 AI-139</p>	<p>Improved YOLOv7 UAV image small target detection algorithm Yingbo Wang, Zhi Liu Presenter-Zhi Liu Liaoning Technical University, China</p> <p>Abstract- In order to improve the detection efficiency of small targets in UAV images in traffic systems, a small target detection algorithm for UAV images in traffic systems based on improved YOLOv7 is proposed. In the feature fusion network, the small target detection layer is added to extract feature information of different scales to improve the perception ability and positioning accuracy of small targets. Deep separable convolution (DSCConv) is introduced into the feature extraction and feature fusion network of the model, and feature extraction is performed on each channel without introducing additional parameters, which reduces the computational complexity and memory occupation of the network and enhances the ability of the network to extract target</p>



	<p>features. The nearest upsampling module of the original model is replaced by the lightweight operator Carafe, which expands the receptive field of the model and improves the quality and accuracy of the feature map. In the feature extraction and feature fusion connection part of the model, the CBAM hybrid attention mechanism is introduced to dynamically adjust the channel and spatial information in the feature map, and improve the model 's ability to capture the important features of small targets in the traffic system under complex background. The experimental results show that compared with the original algorithm, the improved YOLOv7 algorithm improves the mAP by 4.5 percentage points and the recall rate by 5 %. Compared with the current mainstream algorithms, the improved algorithm can effectively improve the detection accuracy of small targets in UAV images in traffic systems, and significantly improve the false detection and missed detection of small target images in complex backgrounds.</p>
<p>16:30-16:45 AI-320</p>	<p>A Low-latency Vehicle Edge Computing Network Distributed Task Offloading Solution Weihua Wei, Yisheng An Presenter: Weihua Wei Chang'an University, China</p> <p>Abstract- With the continuous development of the Internet of Vehicles (IoV), the computational capabilities of vehicle nodes have been gradually enhanced, allowing them to handle numerous computationally intensive and latency-sensitive applications. However, these applications generate complex data that cannot be processed entirely by individual vehicle nodes. To address this issue effectively, task offloading using vehicle edge computing networks can be employed. This paper introduces the concept of vehicle offloading reputation as one of the criteria for selecting service vehicles. It evaluates the overall performance of nearby vehicles based on factors such as available computational resources and vehicle link stability, and identifies vehicles with higher overall performance as service providers. Subsequently, a heuristic algorithm is used to decompose tasks into sub-tasks equal to the number of selected service vehicles, which are then distributed to their corresponding service vehicles. Experimental results demonstrate that this approach achieves significant performance improvements in terms of latency and offloading success rate.</p>



Session D

14:00-16:45 on Dec.10

Tencent ID: 371-4663-3757

Modern Information Security Theory and Key Technologies-现代信息安全理论及关键技术

Chair Prof. Longyu Jiang, Southeast University, China

Co-Chair Asst. Prof. V. Sowmini Devi, Mahindra University, India

Paper Detail

<p>14:00-14:15 AI-055</p>	<p>Research on Power Network Fault Event Extraction Based on Hybrid Neural Network Ting Wang, YuxiaoZhou, FengxiGao, Feng Shang, Qingchuan Zhang Presenter-Ting Wang State Grid Liaoning Electric Power Co., Ltd., China</p> <p>Abstract- In order to obtain event information of power grid faults in time, assist electric power workers to solve fault problems, make quick decisions, and reduce economic losses, a power grid fault event extraction model based on deep learning is proposed. The model is mainly composed of two Parts are composed of fault detection model and event role extraction model. Firstly, the power-related text is encoded based on the RoBERTa pre-training model. The fault detection model uses the BLSTM model to further extract the text features to obtain the specific fault category of the power public opinion text. Secondly, the event role extraction model uses the BLSTM-CRF model Extract the text features to get the event roles contained in the text. Finally, the power grid fault event information contained in the text data is obtained through the joint extraction of fault detection and event roles. Experimental tests show that the proposed model has better performance in grid fault event extraction results and accuracy.</p>
<p>14:15-14:30 AI-073</p>	<p>Protection of Access Pattern Biao Gao, Shijie Jia, Peng Yin, Xueying Zhang Presenter-Biao Gao The State Key Laboratory of Information Security, Institute of Information Engineering, CAS, China</p> <p>Abstract- Encryption is insufficient to ensure the system security because the access patterns of user will still reflect the information about the data and serve as an indicator for adversary to infer the sensitive information. We conclude the related work on the access pattern protection to provide a thorough literature review of history independence and oblivious random access machine, which address the issues of static and dynamic access pattern observations respectively. Encryption is insufficient to ensure the system security because the access patterns of user will still reflect the information about the data and serve as an indicator for adversary to infer the sensitive information.</p>



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<p>14:30-14:45 AI-169</p>	<p>VulPin: Finer-Grained Slicing for Pinpointing Vulnerability in Binary Programs Abdulrahman Chukkol, Luo Senlin, Yunus Haruna Presenter-Abdulrahman Chukkol Beijing Institute of Technology, China</p> <p>Abstract- Identifying vulnerabilities in binary code with precision is a critical area of study in the field of software security. Most existing techniques fail to pinpoint the vulnerability's exact location, due to the extensive labelled data requirement and lack of targeted approach to improve on the problematic code. In this paper, we introduce VulPin, a system specifically designed to pinpoint vulnerabilities in binary code. This framework uses a hierarchical attention network that analyze program slices along with a vulnerability position matrix. Experimental outcomes indicate that our framework not only outperforms existing approaches but also pinpoints vulnerabilities more rapidly with a high Accuracy and a very low rate of false positives.</p>
<p>14:45-15:00 AI-202</p>	<p>A Systematic Literature Review of Blockchain Technology: Applications Fields, Platforms, and Consensus Protocols Carlos A. Estrada, Sergio S. Naranjo, Verónica J. Toasa, Sang Guun Yoo Presenter-Sang Guun Yoo Escuela Politécnica Nacional, Ecuador</p> <p>Abstract- In the context of today's digital era, blockchain technology has established itself as one of the transformative innovations that pushes the boundaries of data management and security. Given this situation, the present work carries out a systematic literature review of this technology. It examines three essential aspects of the blockchain world. First of all, the various fields of application of this technology are analyzed, which go beyond the field of cryptocurrencies and extend to other industries such as the internet of things, supply chains, health, identity management, business, and much more. Secondly, the most used platforms for the development of blockchain applications are studied, such as Ethereum, Hyperledger Fabric, Solana among others; each platform has its particular characteristics, compatible programming languages and recommended application areas. Finally, an analysis of the consensus protocols is carried out, such as Proof of Work, Proof of Stake, Proof of Authority, RAFT, among others. This literature review provides a comprehensive overview of blockchain, shedding light on its versatility, challenges, and transformative potential in a variety of industries. It offers a solid foundation for those interested in exploring and taking advantage of the blockchain revolution in the 21st century.</p>
<p>15:00-15:15 AI-166</p>	<p>Research on dynamic management of convergence media ecology node based on blockchain Hongbin Hu Presenter-Hongbin Hu Communication University of China, China</p> <p>Abstract- At present, the media industry is in the rapid development of convergence media, and is undergoing the development process of gradually evolving from full coverage of new media to full integration of media. Blockchain is a distributed database technology, with decentralized,</p>



	<p>immutable, traceable and other characteristics. The convergence media ecology built on blockchain technology can delegate power to ordinary nodes in the ecology, which is expected to have a profound impact and change on the existing convergence media business model, content creation method and industry structure. Based on the special attributes of the media industry, the blockchain convergence media ecology uses the form of alliance chain in the early stage of establishment. The existing blockchain node management mechanism is universal and does not adapt to the characteristics of the media industry. In order to ensure the basic operation and maintenance of the blockchain convergence media ecology, this paper defines the participation and credit degree system of the ecological node. On this basis, a Node dynamic access and exit (NDAE) operation and maintenance mechanism based on node interaction and node integrity was established. Simulation experiments show that the NDAE mechanism can better handle the access, exit and forced exit of nodes, which ensures the security of the blockchain convergence media ecology to a certain extent.</p>
<p>15:15-15:30 AI-239</p>	<p>A Comparative Study of Indoor Place Recognition Using Multi-modal Range Information Chenrushi Yang and Hui Cheng Presenter-Chenrushi Yang Sun Yat-sen University, China</p> <p>Abstract- This paper presents a discussion on the challenges encountered in localizing mobile robots in large-scale indoor environments, particularly the issues of kidnapping and localization failure, which are prevalent in factories and malls. Visual place recognition (VPR) methods are often used to alleviate these issues; however, in largescale indoor settings, obtaining ground truth through precise 3D reconstruction using cameras can be time-consuming and challenging due to their limited field of view and varying illumination conditions. LiDAR is more suitable for large-scale mapping due to its wider field of view and its robustness to environmental changes and sensor drifts; however, the cost of LiDAR systems can be prohibitive for indoor applications. RGB-D cameras are lighter and less expensive, making them more suitable for a wide range of applications on multi-robot platforms. Therefore, it is important to investigate the use of RGB-D camera data for place recognition, especially in indoor contexts where only LiDAR maps can be used for place recognition. This paper presents a rigorous comparative study based on existing techniques to identify the key factors in addressing indoor place recognition challenges.</p>
<p>15:30-15:45 AI-269</p>	<p>A SQL Synthesis System with Operator Handler Huixian Wang, Quansheng Dou, Huanling Tang, Shun Zhang and Hao Pan Presenter-Huixian Wang Shandong Technology and Business University, China</p> <p>Abstract- In the era of big data, there is an increasing demand for expertise in data analytics. However, many users lack sufficient knowledge to write correct SQL queries. This gap in knowledge has led to research in SQL synthesis. Example-based SQL synthesis, also known as Query Reverse Engineering. This paper introduces PROSQL, a system designed to enhance SQUARES, which is one of the best Query Reverse Engineering systems available, by integrating an Operator handler and replacing the Enumerator based on solver with an Enumerator based on optimizer. The Operator handler employs a neural network to predict operators required for synthesis, pre-sorts, and removes operators based on the prediction. Subsequently, the Enumerator generates programs based on the predicted probabilities of operators, thereby enhancing synthesis</p>

	<p>efficiency. In the same experimental setting, the success rate of PROSQL increased from 80.0% to 90.9%, average synthesis time was decreased from 251 seconds to 113 seconds compared to the baseline.</p>
15:45-16:00 AI2-033	<p>Self-Attention Driven Image-to-image Translation with Conditional Adversarial Networks Yu Jiang, Yancong Deng Presenter-Yu Jiang Huazhong University of Science and Technology, China</p> <p>Abstract-In this paper, we introduce a novel model that combines the strengths of Pix2pix with a Self-Attention mechanism. Our self-attention module is uniquely designed to not only compute relationships and dependencies as represented in the attention map but also to determine attention values. These values facilitate the bifurcation of input image features between two distinct generators. To enhance the efficacy of this separation, we devised a method to remap attention values. Additionally, our model integrates a paired down-scaling and up-scaling process, which significantly conserves GPU memory. This efficiency makes our model particularly suitable for lightweight devices. Experimental results indicate that our proposed model outperforms the original Pix2pix in image quality, as evidenced by both visual assessments and quantitative scores from semantic segmentation models.</p>
16:00-16:15 AI-257	<p>An Improved Gradient Optimizer with Adaptive Mechanism Xiang-Yu Deng and You-Min Fan Presenter-You-Min Fan Northwest Normal University, China</p> <p>Abstract- In recent years, various improved gradient descent methods have been applied to neural networks and proved to be an effective way for training. However, the gradient descent method in networks has the defects of depending on the training model too much and is difficult to modify the parameters after setting. In this paper, we propose an adaptive mechanism, which can set the learning rate adaptively. And the learning rate will adaptively increase or decrease with the training process. In addition, it also has a certain sensing ability. By comparing with other methods, it is proved that our method has good generalization and reliability.</p>
16:15-16:30 AI-290	<p>A hybrid self-attention convolution network for MI signals decoding Xiyue Tan, Dan Wang, Jiaming Chen Presenter-Xiyue Tan Faculty of Information Technology, Beijing University of Technology, China</p> <p>Abstract-Research on Motor imagery electroencephalogram (MI-EEG) can reveal the motor intentions that trigger electrical changes in the research of brain-computer interface (BCI), which enables assistance of rehabilitation treatment of patients with neurological and muscle dysfunction. Recent deep learning methods generally fail to obtain the most discriminative motor imagery features due to the uneven information distribution on various electrode channels. In addition, the lack of sufficient sample sizes, leading to the limited decoding performance of neural networks. To address these two problems, a hybrid self-attention convolution network (HSACNet) method combined with optimization method based on attention mechanism is proposed in this paper. HSACNet contains an improved optimization method which employs the Particle Swarm</p>



	<p>Optimization (PSO) to enhance the adaptivity ability of the model. The proposed method is evaluated on BCI Competition IV public dataset and achieves the highest average accuracy of 56.75 % in cross-subject experiments, which is significantly higher than that found for recently published algorithms. Competitive experimental results show that the proposed classification algorithm promotes the global connection and the performance of decoding motor intentions, which can provide innovative perspectives for BCI systems.</p>
<p>16:30-16:45 AI-321</p>	<p>A FCCPN-based Movement Coordination Strategy for Deadlock Avoidance in Multi-AGV Systems Yaoyao Wang, Yisheng An Presenter: Yaoyao Wang Chang'an University, China</p> <p>Abstract- Automated Guided Vehicles (AGVs) are widely applied in agile manufacturing systems. However, when multiple AGVs operate simultaneously, they may cause a deadlock problem, which can reduce the efficiency of the manufacturing system. TDDsDo solve these problems, a hierarchical architecture is adopted to describe the AGV system in this paper. The upper-level controller is used to plan paths for all AGVs, while the lower-level system controls the deadlock-free operation of the AGV system. In this paper, we establish a FCCPN model of the AGV system and analyze the causes of deadlocks To avoid deadlocks, we propose corresponding avoidance algorithms by controlling the motion status of AGVs. The experimental results show that the proposed algorithm has higher flexibility and effectiveness in avoiding deadlock in the AGV system and maintaining system safety.</p>