Conference Program

2026 the 11th International Conference on Cloud Computing and Big Data Analytics (ICCCBDA 2026)

2026 the 6th International Symposium on AI (ISAI2026)

April 24-26 | Chengdu, China

CO-SPONSORED BY

四川省電子學會 Sichuan Institute of Electronics

IEEE

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四川省電子學會 Sichuan Institute of Electronics
青年人才工作委員會 Youth Talent Work Committee

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WELCOME MESSAGE

Dear Colleagues and Distinguished Guests,

On behalf of the organizing committees, we are delighted to extend our warmest welcome to the 2026 11th International Conference on Cloud Computing and Big Data Analytics (ICCCBDA 2026) and its affiliated workshop, the 2026 6th International Symposium on AI (ISAI 2026), taking place from April 24-26, 2026, in Chengdu, China.

As a premier international forum co-sponsored by the Sichuan Institute of Electronics and IEEE, ICCCBDA 2026 brings together leading researchers, practitioners, and industry experts to share cutting-edge advancements in cloud computing, big data analytics, security and privacy, IoT, edge computing, and intelligent systems. Co-hosted by Southwest Jiaotong University, Xihua University, and University of Electronic Science and Technology of China, the conference features inspiring keynote speeches, peer-reviewed paper presentations, and vibrant discussions on frontier technologies and real-world applications.

Running concurrently as an integral workshop of ICCBDA 2026, ISAI 2026 provides a dedicated platform for exploring the latest innovations in artificial intelligence, machine learning, and intelligent systems. This symposium encourages interdisciplinary exchange among academia, industry, and government institutions, fostering collaboration that bridges theory and practice.

We are honored to host these events at the Tibet Hotel in Chengdu-a city renowned for its rich cultural heritage, technological vitality, and warm hospitality. We sincerely hope your participation will spark meaningful collaborations, inspire innovative ideas, and create lasting memories.

Thank you for joining us. We look forward to an engaging and successful conference!!

ICCCBDA 2026

Conference Committee

ORGANIZING COMMITTEE

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CONFERENCE VENUE

Tibet Hotel, Chengdu

(西藏饭店)

Address: North Renmin Road, Chengdu, Sichuan, China

TRAFFIC INFORMATION

➤ Departing from Chengdu Shuangliu International Airport

Subway: The whole journey is about 21 kilometers. First, take Subway Line 10, transfer to Subway Line 3 at Taipingyuan Station, then transfer to Subway Line 1 at Provincial Gymnasium Station. Get off at Renmin North Road Station, Exit B, and walk to Tibet Hotel.

Taxi/Online Car-hailing: The driving time is about 30 - 40 minutes, and the cost is about 60 - 80 yuan, depending on the traffic conditions and vehicle type.

Airport Shuttle Bus: You can take the airport shuttle bus to the urban area, and then transfer to the subway or take a taxi to the hotel after getting off at the appropriate stop.

➤ Departing from Chengdu Tianfu International Airport

Subway: The whole journey is about 64 kilometers. Take Subway Line 18, transfer to Subway Line 1 at South Railway Station, get off at Renmin North Road Station, Exit B, and walk to Tibet Hotel.

Taxi/Online Car-hailing: The driving time is about 50 - 60 minutes, and the cost is about 150 - 200 yuan. The actual cost will fluctuate due to traffic conditions.

Airport Shuttle Bus: Choose the airport shuttle bus line to the urban area, and then transfer to other means of transportation to the hotel.

GUIDELINES

- **Onsite Oral Presentation**

1. The duration of a presentation slot is 15 minutes. Please target your lecture for a duration of about 10 minutes for the presentation plus about 5 minutes for questions from the audience.
2. Your punctual arrival and active involvement in each session will be highly appreciated.
   - Get your presentation PPT or PDF files prepared and backed up.
3. Laptops, projector & screen, laser sticks will be provided by the conference organizer.

- **Poster Presentation**

1. The Size for poster is 650x1000mm, please print it out and bring it to the venue.
2. It's expected that at least one author stands by the poster for (most of the time of) the duration of the poster session. This is essential both to present your work to anyone interest in it and to make sure that your presence is verified by committee.

- **Online Presentation**

1. Meeting Rooms

Password for all online Zoom**: 042426**

Time Zone: China Standard Time (CST), UTC/GMT+8

2. Test Your Presentation

Date: **April 24, 2026**

Prior to the formal meeting, online presenters shall join the test room to ensure everything is on the right track. Please check your test Zoom Meeting ID on this program.

3. Oral Presentation

Please join the meeting room 10 minutes in advance.

Stay online during Keynote & Invited speeches and your own sessions. English Only during the conference. Rename your screen name before entering the room.

4. Follow us on We-chat

5. Photo Stream

AGENDA OVERVIEW

All times in this schedule are listed in GMT+8,

April 24, 2026 | Friday		
Time	**Activity**	**Venue**
10:00-17:00	**Onsite Sign-in & Conference Materials Collection**	**Lobby of Tibet Hotel**
13:00-16:00	**Online Sign-in & Equipment Testing**	**899 2400 0098 Password: 042426**

April 25, 2026 | Saturday		
Time	**Activity**	**Venue**
	Opening Ceremony **Host: Qing Tan,** Athabasca University, Canada **Zoom: 895 9753 0118 | Password: 042426**	
09:00-09:05	**Opening Remarks** **Yingqiao Pu,** Deputy Secretary-general, Sichuan Institute of Electronics, China	**Himalaya Hall 17F**
09:05-09:10	**Welcome Address** **Tianrui Li,** Southwest Jiaotong University, China	**Himalaya Hall 17F**
09:10-09:15	**Conference Committee Address** **Fangnian Lang,** Xihua University, China	**Himalaya Hall 17F**
09:15-09:30	**Group Photo**	
	Keynote Speech	
09:30-10:10	**Keynote Speech** **Prof. Jie Lu**, University of Technology Sydney, Australia ***Title: Machine Learning for Decision Support in Complex Environments***	**Himalaya Hall 17F**
10:10-10:25	**Coffee Break**	
10:25-11:05	**Keynote Speech** **Prof. Ning Zhong,** Web Intelligence Consortium (WIC), Maebashi Institute of Technology, Japan ***Title: Web Intelligence Meets Brain Informatics: Building the Foundations for Future Intelligent Societies***	**Himalaya Hall 17F**

11:05-11:45	**Keynote Speech (Online)** **Prof. Yi Pan,** Shenzhen University of Advanced Technology, China ***Title: Some thoughts on the generation and screening of small molecule drugs based on AI***	Himalaya Hall 17F
11:45-13:30	Lunch	Yak Coffee Shop 2F
13:30-14:10	**Keynote Speech (Online)** **Prof. Jie Xu,** University of Leeds, UK ***Title: Structuring Massive-Scale Distributed Systems for Intelligent Applications***	Himalaya Hall 17F
14:30-15:45	Technical Session 1 - Data Ethics and Governance CB229, CB227, CB223, CB219, CB470	Red Mountain Hall 17F
14:30-16:05	Technical Session 2: AI for Healthcare and Medical Applications Invited Speaker - Simon James Fong CB617, CB3046, CB471, CB608	Namtso Meeting Room 2F
14:30-16:00	Technical Session 3: Deep Learning for Computer Vision CB348, CB798, CB800, CB810, CB3040, CB3056	Manasarovar Meeting Room 2F
14:30-16:00	Technical Session 4: Natural Language Processing and Sentiment Analysis CB621, CB770, CB769, CB794, CB808, CB359	Yaamdrok Meeting Room 2F
14:30-16:00	Poster Session 1 - AI and Machine Learning Applications CB224, CB217, CB352, CB362, CB607, CB597, CB583, CB611, CB592, CB757, CB787, CB784, CB801, CB777, CB818, CB1002, CB1007-A, CB2037, CB2029, CB2021, CB2032, CB3049, CB3051, CB1008, CB3045, CB3050, CB4067, CB4057, CB2019, CB4072, CB4086	Himalaya Hall 17F
16:00-16:20	Coffee Break	
16:20-18:10	Technical Session 5: IoT, Edge Computing and UAV Systems Invited Speaker - Shunli Wang CB208, CB354, CB368, CB609, CB793, CB2036	Red Mountain Hall 17F
16:20-17:50	Technical Session 6: Cybersecurity and Fraud Detection CB357, CB595, CB606, CB809, CB585, CB817	Namtso Meeting Room 2F
16:20-18:10	Technical Session 7: Advanced AI and Emerging Technologies Invited Speaker - Xiaoping Qiu CB590, CB783, CB2028, CB4079-A, CB4078, CB4085	Manasarovar Meeting Room 2F
16:20-17:50	Technical Session 8: Cloud Computing and Security CB222, CB343, CB587, CB626, CB741, CB807	Yaamdrok Meeting Room 2F

16:20-18:10	Poster Session 2 - Cloud Computing, Security and Data Analytics CB230, CB361, CB364, CB367, CB356, CB350, CB337, CB336, CB365, CB586, CB578, CB589, CB604, CB605, CB603, CB619, CB799, CB796, CB805, CB797, CB790, CB814, CB815, CB816, CB2017, CB4064, CB4084, CB4082, CB4087, CB615	Himalaya Hall 17F
18:50	Banquet	Summer Hall 4F

April 26, 2026 | Sunday		
Time	**Activity**	**Venue**
10:00-11:35	Online Session 1: AI for Healthcare and Medical Applications Invited Speaker - Radhakrishna Bhat CB225, CB612, CB1010, CB4088, CB588	895 9753 0118 Password: 042426
10:00-11:50	Online Session 2: Multimodal AI and Sentiment Analysis Invited Speaker - Anand Nayyar CB228, CB582, CB616, CB1006, CB4068, CB1004	899 2400 0098 Password: 042426
10:00-11:50	Online Session 3: Multi-Agent Systems and Orchestration Invited Speaker - Abhishek Kumar CB341, CB4070, CB355, CB623, CB765, CB4069	894 4253 2020 Password: 042426
11:50-14:00	Break	
14:00-15:20	Online Session 4: Federated Learning and Cybersecurity Invited Speaker - Pascal Lorenz CB353, CB795, CB213, CB2023	895 9753 0118 Password: 042426
14:00-15:50	Online Session 5: Cloud Computing and Data Management Invited Speaker - Anand Nayyar CB791, CB349, CB802, CB782, CB803, CB358	899 2400 0098 Password: 042426
14:00-15:35	Online Session 6: Financial Systems and Fraud Detection Invited Speaker - Paulo Batista CB360, CB572, CB728, CB599, CB4077	894 4253 2020 Password: 042426
15:35-16:00	Break	
16:00-17:50	Online Session 7: Large Language Models and Knowledge Graphs Invited Speaker - Vilem Novak CB622, CB786, CB2024, CB3054, CB3055, CB2035	895 9753 0118 Password: 042426

16:00-18:05	Online Session 8: Computer Vision and Object Detection Invited Speaker - Samir Brahim Belhaouari CB226, CB3047, CB3048, CB3053, CB4080, CB4066, CB4071	899 2400 0098 Password: 042426
16:00-18:05	Online Session 9: Edge Computing, IoT and Industrial Applications Invited Speaker - S.Anne Susan Georgena CB591, CB776, CB2020, CB4090, CB4076, CB4083, CB581	894 4253 2020 Password: 042426

KEYNOTE SPEAKER

09:30-10:10 | Himalaya Hall 17F

Jie Lu

Professor at University of Technology Sydney, Australia
IEEE Fellow, IFSA Fellow, Australian Laureate Fellow, Australian Industry Laureate Fellow
Director of Australian Artificial Intelligence Institute
Director of Australian Research Council Research Hub in Responsible AI for a Sustainable Grain Industry (gRAIn)

Biography: Distinguished Professor Jie Lu is a world-renowned scientist in the field of computational intelligence, best known for her contributions to fuzzy machine learning, transfer learning, concept drift, recommender systems, and decision support systems. She is an IEEE Fellow, IFSA Fellow, Australian Laureate Fellow, and Australian Industry Laureate Fellow. Professor Lu is the Director of the Australian Artificial Intelligence Institute (AAII) and Director of Australian Research Council (ARC) Research Hub in Responsible AI for a Sustainable Grain Industry (gRAIn) at the University of Technology Sydney (UTS), Australia. She has published six research books and over 500 papers in leading journals and conferences; won ten ARC Discovery Projects, one ARC Linkage Project as Lead Chief Investigator, an ARC Research Hub in Responsible AI for a Sustainable Grain Industry (gRAIn) as the Director, and over 20 industry-funded projects; and supervised 60 doctoral students to completion. Professor Lu also serves as Editor-in-Chief of Knowledge-Based Systems and the International Journal of Computational Intelligence Systems. She is a highly sought-after keynote speaker and has delivered over 40 keynote addresses at major international conferences. Her honours include three IEEE Transactions on Fuzzy Systems Outstanding Paper Awards (2019, 2022, 2025), the NeurIPS 2022 Outstanding Paper Award, Australia's Most Innovative Engineer Award (2019), the Australasian Artificial Intelligence Distinguished Research Contribution Award (2022), the NSW Premier's Prize for Excellence in Engineering or Information and Communication Technology (2023), and appointment as an Officer of the Order of Australia (AO) in the 2023 Australia Day.

Speech Title: Machine Learning for Decision Support in Complex Environments

Abstract: This talk will present how advanced machine learning can innovatively and effectively learn from complex data to support data-driven decision-making in uncertain and dynamic environments. A set of new autonomous transfer learning theories, methodologies, and algorithms will be introduced to enable knowledge transfer from multiple source domains to a target domain through the construction of latent spaces, mapping functions, and self-training mechanisms, thereby addressing substantial uncertainties in data, learning processes, and decision outputs. In addition, a new suite of theories, methodologies, and algorithms for concept

drift detection, understanding, and adaptation will be discussed, focusing on how to manage continuously evolving data stream environments with unpredictable pattern changes. These approaches can detect concept drift accurately and in an explanatory manner, identifying when, where, and how drift occurs and enabling timely adaptive responses. These advanced machine learning capabilities have been applied to develop a range of real-world applications across multiple industry sectors, significantly strengthening data-driven prediction and decision support systems.

KEYNOTE SPEAKER

10:25-11:05 | Himalaya Hall 17F

Ning Zhong

Professor at Web Intelligence Consortium (WIC), Maebashi Institute of Technology, Japan

Biography: Ning Zhong received a Ph.D. degree from the University of Tokyo. He currently holds positions as the chairman of the Web Intelligence Consortium (WIC, wi-consortium.org), senior professor of engineering at Maebashi Institute of Technology, Japan. His research interests focus on Web Intelligence, Brain Informatics, machine learning, data mining, intelligent health echnologies, and intelligent systems. He serves as the editor-in-chief of the Brain Informatics journal (Springer Nature). He is a foreign fellow of the Engineering Academy of Japan (EAJ) and a member of the National Academy of Artificial Intelligence (NAAI).

Speech Title: Web Intelligence Meets Brain Informatics: Building the Foundations for Future Intelligent Societies

Abstract: This keynote explores the transformative convergence of Web Intelligence and Brain Informatics, focusing on how their integration is driving the development of future intelligent societies. It highlights cutting-edge research and industrial innovations led by the International Web Intelligence Consortium (WIC), including Web Intelligence (WI) 3.0–based wisdom services, intelligent computing for brain big data, and advanced solutions for the prevention and treatment of psychiatric and neurocognitive disorders through intelligent health technologies. These initiatives address critical and societal challenges, and set the stage for the next generation of intelligent systems and services.

KEYNOTE SPEAKER

11:05-11:50 | Himalaya Hall 17F | Zoom: 895 9753 0118
Password: 042426

Yi Pan (Online)

Professor at Shenzhen University of Advanced Technology, China

Biography: Yi Pan is currently a Chair Professor and the Dean with the College of Computer Science and Control Engineering, Shenzhen University of Advanced Technology, Shenzhen, China, and a Regents' Professor Emeritus with Georgia State University, Atlanta, GA, USA. From 2005 to 2020, he was the Chair with Computer Science Department, Georgia State University. During 2013-2017, he was also the Interim Associate Dean and Chair with Biology Department. In 2000, he joined Georgia State University, was promoted to Full Professor in 2004, named a Distinguished University Professor in 2013, and Designated a Regents' Professor (the highest recognition given to a Faculty Member by the University System of Georgia) in 2015. He has authored or coauthored more than 450 papers including more than 250 journal papers with more than 100 papers published in IEEE/ACM Transactions/Journals and has also edited/authored 43 books. His work has been cited more than 27000 times based on Google Scholar and his current H-index is 98. Dr. Pan is also the Editor-in-Chief of Big Data Mining and Analytics (a top 3% journal), Associate Editor-in-Chief of Journal of Computer Science and Technology (JCST), and Chinese Journal of Electronics (CJE). He was the Editor-in-Chief or Editorial Board Member for 20 journals including seven IEEE Transactions.

Speech Title: Some Thoughts on the Generation and Screening of Small Molecule Drugs Based on AI

Abstract: As we all know, the field of drug research and development generally faces three core challenges, namely long cycle, high cost and low success rate. In view of the pain points of traditional drug design, this talk puts forward a set of all-round artificial intelligence (AI)-assisted drug design strategies. Specifically, the strategy includes several small molecule generation methods, and further comprehensively evaluates multi-dimensional indicators such as affinity, potential therapeutic effect, ADMET characteristics, energy characteristics and binding conformation of small molecules to specific targets to determine their adaptability to the target. At the same time, in order to screen out small molecules with better comprehensive performance, we introduce a multi-objective optimization method, which aims to achieve the balanced performance of molecules in various key indicators from the macro level. This talk will also elaborate on the preliminary framework design and some experimental verification results of the above strategies.

KEYNOTE SPEAKER

13:30-14:10 | Himalaya Hall 17F | Zoom: 895 9753 0118
Password: 042426

Jie Xu (Online)

Professor at University of Leeds, UK

Biography: Jie Xu is Chair of Computing at the University of Leeds, Director of the UK White Rose Grid e-Science Centre, involving the three White Rose Universities of Leeds, Sheffield and York, a co-Leader of the EPSRC-funded UK National Hub in Clouds and Distributed Computing, and Head of the Distributed Systems and Services (DSS) Theme at Leeds. Xu has worked in the field of Distributed Computing Systems for over forty years, engaging closely with industrial leaders in the field. He received a PhD in Computing Science from the University of Newcastle upon Tyne, and was Professor of Distributed Systems at the University of Durham before joined Leeds in 2003. Professor Xu is an executive member of UKCRC (UK Computing Research Committee) and a Turing Fellow in AI and Data Science. He has served as an academic expert for numerous governments and industries, such as Singapore IDA, Lenovo, UK EPSRC, UK DTI (InnovateUK), and Research Ireland. In addition, he has extensive editorial experience, having served as an editor for IEEE Distributed Systems from 2000 to 2005, and currently acting as an associate editor of IEEE Transactions on Parallel and Distributed Systems and ACM Computing Surveys. Professor Xu is currently the Steering Committee Chair of IEEE ISADS, a Steering Committee member for several IEEE conferences, such as SRDS, ISORC, HASE, SOSE, JCC, and CISOSE, as well as serving on the steering board of IEEE TC on BIS. He has also been a General Chair/PC Chair for various IEEE international conferences. With over 300 academic publications, including papers in top-ranked IEEE and ACM Transactions, Professor Xu has received international research prizes, such as the BCS/AT&T Brendan Murphy Prize and HiPEAC Transfer Award 2025, and led or co-led more than 20 research projects worth over £30M. He is also the co-founder of two university spinouts specializing in data analytics and AI software for optimizing data-centre performance, as well as in co-simulation and digital-twin technologies, and is the founding co-director of ACE3 AI Ltd.

Speech Title: Structuring Massive-Scale Distributed Systems for Intelligent Applications

Abstract: This talk revisits our experience in designing and implementing massive-scale distributed systems, drawing lessons from real-world deployments and evolving architectural practices. It explores how next-generation distributed systems must adapt to support an AI-native world and the growing demands of increasingly intelligent, autonomous applications. The talk examines a set of powerful structuring techniques for building such systems, analyses the diverse design forces that shape them and the trade-offs they entail, and discusses the highly dynamic challenges of multi-party environments, including authentication, trust, and collaboration among AI agents and other actors.

INVITED SPEAKER

14:00-14:20 | Namtso Meeting Room 2F

Simon James Fong (Onsite)

University of Macau, China

Biography: Simon James Fong graduated from La Trobe University, Australia, with a 1st Class Honours BEng in Computer Systems and a PhD in Computer Science in 1993 and 1998, respectively. Simon was a senior consultant at Hong Kong Telecom in 1998. He is now working as an Associate Professor at the University of Macau. He is also an Adjunct Professor at Durban University of Technology, South Africa, and a Senior Visiting Scholar at Tsinghua University, Beijing. Dr. Fong has published over 500 international conference and journal papers, mostly in the areas of machine learning and IoT technology. He serves actively as the IEEE ComSoc e-Health SIG Chair and an IEEE CIS member.

Speech Title: Federated Learning for Secure AI-Driven Clinical Collaboration: Toward Virtual Doctors Across Regions

Abstract: Federated learning has emerged as a cornerstone technology for enabling AI-assisted healthcare while safeguarding patient confidentiality. In this keynote, I will present recent advances in privacy-preserving and resource-aware federated learning frameworks that support collaborative diagnosis and clinical decision-making across hospitals, cities, and even countries—without requiring sensitive medical data to be transferred over networks. Building on our SecFedGate architecture, we show how adaptive multimodal fusion, ontology-guided knowledge integration, and formally verified privacy mechanisms can power “virtual doctors” capable of learning from distributed experiences while ensuring security against adversarial threats. These innovations not only improve diagnostic accuracy and robustness under heterogeneous clinical environments but also establish new foundations for trusted AI collaboration in healthcare. The talk will highlight real-world implications for secure cross-institutional medical AI, advancing global healthcare collaboration without compromising privacy.

16:00-16:20 | Red Mountain Hall 2F

Shunli Wang (Onsite)

Sichuan University, China

Biography: Shunli Wang is a Professor, Doctoral Supervisor at Sichuan University, Academic Dean at Inner Mongolia University of Technology, Executive Vice President at Smart Energy Storage Institute, Deputy General Manager of Daqingshan Laboratory in Inner Mongolia Electric Power Group, Fellow of the Royal Society of Arts and Crafts (RSA Fellow), Fellow of the Institute of Engineering and Technology (IET Fellow), IEEE Senior Member, PCIM Asia Committee Member, IEEE PES Committee Member, Academic Leader of National Electrical Safety and Quality Testing Center, Tianfu Qingcheng Scientific and Technological Talent, High-level Overseas Talent, Tianfu A Talents, Academic & Technical Leader of Chinese Science and Technology City, Top 2% Worldwide Scientist, Global Highly Cited Researcher. Focusing on the major national strategic needs of new energy and energy storage systems, the research of green and low-carbon energy storage is conducted in smart grids, undertaken 56 projects such as the National Natural Science Foundation and National Key Research & Development, with a Research Interest Score value of 14995, and 258 articles published on SCI-indexed famous journals with 53 articles in the First Area / TOP journals in Chinese Academy of Sciences, 42 high-cited / hot ones, 23 international and domestic invention patents, 20 software Copyrights and standard formulation and 9 books have been published by first-class international and domestic publishing houses. 10 awards at or above the provincial or ministerial level have been achieved, including 3 international gold medals.

Speech Title: Cloud Computing and Its Application In State Estimation of New Power Storage Systems

Abstract: Cloud computing and its application in state estimation of new power storage systems is not yet fully mature, facing numerous technical bottlenecks and challenges. This report delves into the methods of multi-time scale state monitoring and evaluation for energy storage and the new power system, aiming to achieve reliable monitoring of core state parameters. It constructs an electro-thermal-electrochemical multi-feature composite optimization model to accurately characterize the internal characteristics of batteries, breaking through the difficulties of dynamic response of electrical parameters and nonlinear analysis of electrical characteristics. A new algorithm for multi-dimensional information fusion online estimation is proposed, breaking through the bottleneck of collaborative prediction of multi-time scale state parameters. It achieves innovation in real-time monitoring and early warning of core state parameters, significantly enhancing the reliability of safety monitoring for energy storage systems. A dual amplification isolation and multiple EMC protection mechanism is formed, tackling extreme new energy and energy storage challenges from the device level to the system level. A smart new energy storage system is constructed, realizing the application of multi-time scale state monitoring and evaluation for energy storage and the new power system.

16:00-16:20 | Manasarovar Meeting Room 2F

Xiaoping Qiu (Onsite)

Southwest Jiaotong University, China

Biography: Dr. Xiaoping Qiu received the B.E. in automobile and M.E. degrees in vehicle engineering and the Ph.D. degree in traffic information engineering and control from Southwest Jiaotong University, Chengdu, China, in 1997, 2000, and 2004, respectively. He is currently a professor and the director of the department of artificial intelligence with the school of computing and artificial intelligence, Southwest Jiaotong University. He also serves as the deputy director of the national-local joint engineering laboratory of comprehensive intelligent transportation. His research interests include supply chain information management and integration, industrial chain knowledge management and collaboration, and logistics system simulation and optimization. He has authored over 140 academic papers, including more than 70 as the first author, with over 100 indexed by SCI, EI, and ISTP. He has published 17 monographs/textbooks and filed 10 invention patents (8 granted). He has led more than 10 national-level projects, including national Key R&D programs, national natural science foundation of China, and national social science foundation of China, as well as nearly 20 provincial/ministerial projects. He was selected as a "Sishi Star" of Southwest Jiaotong university in 2009, a reserve candidate for Sichuan provincial academic and technical leader in 2010, a Sichuan provincial logistics expert in 2014, and an outstanding educator of Southwest Jiaotong university in 2019. He served as a review expert for the national key R&D program on new generation artificial intelligence in 2022.

Speech Title: CSO operational monitoring system and key technologies for hot product supply chain

Abstract: The operational monitoring of hot product supply chain is different from others. Based on the management requirements of CSO (chief supply chain officer), the paper starts the 4-stage lifecycle of hot product firstly includes introduction, growth, mature, and decline, followed by 5-aspect operational monitoring of it includes supply, inventory, lifecycle, sale and order. Then the key technologies related to those aspects are introduced with the evaluating indicators of hot product supply chain, and the cloud software frame of the system is cooperated the cooresponding data model. Finally, the designed interfaces are demostrated with future knowledge management.

Pascal Lorenz (Online)

University of Haute-Alsace, France

Biography: Pascal Lorenz (lorenz@ieee.org) received his M.Sc. (1990) and Ph.D. (1994) from the University of Nancy, France. Between 1990 and 1995 he was a research engineer at WorldFIP Europe and at Alcatel-Alsthom. He is a professor at the University of Haute-Alsace, France, since 1995. His research interests include QoS, wireless networks and high-speed networks. He is the author/co-author of 3 books, 3 patents and 200 international publications in refereed journals and conferences. He was Technical Editor of the IEEE Communications Magazine Editorial Board (2000-2006), IEEE Networks Magazine since 2015, IEEE Transactions on Vehicular Technology since 2017, Chair of IEEE ComSoc France (2014-2020), Financial chair of IEEE France (2017-2022), Chair of Vertical Issues in Communication Systems Technical Committee Cluster (2008-2009), Chair of the Communications Systems Integration and Modeling Technical Committee (2003-2009), Chair of the Communications Software Technical Committee (2008-2010) and Chair of the Technical Committee on Information Infrastructure and Networking (2016-2017), Chair of IEEE/ComSoc Satellite and Space Communications Technical (2022-2023), IEEE R8 Finance Committee (2022-2023), IEEE R8 Conference Coordination Committee (2023). He has served as Co-Guest Editor for special issues of IEEE Communications Magazine, Networks Magazine, Wireless Communications Magazine, Telecommunications Systems and LNCS. He is associate Editor for International Journal of Communication Systems (IJCS-Wiley), Journal on Security and Communication Networks (SCN-Wiley) and International Journal of Business Data Communications and Networking, Journal of Network and Computer Applications (JNCA-Elsevier)

Speech Title: Architectures of Next Generation Wireless Networks

Abstract: Internet Quality of Service (QoS) mechanisms are expected to enable wide spread use of real time services. New standards and new communication architectures allowing guaranteed QoS services are now developed. We will cover the issues of QoS provisioning in heterogeneous networks, Internet access over 5G networks and discusses most emerging technologies in the area of networks and telecommunications such as IoT, SDN, Edge Computing and MEC networking. We will also present routing, security, baseline architectures of the inter-networking protocols and end-to-end traffic management issues.

Anand Nayyar (Online)

Duy Tan University, Viet Nam

Biography: Anand Nayyar received Ph.D (Computer Science) from Desh Bhagat University in 2017 in the area of Wireless Sensor Networks, Swarm Intelligence and Network Simulation. He is currently working in School of Computer Science-Duy Tan University, Da Nang, Vietnam as Professor, Scientist, Vice-Chairman (Research) and Director- IoT and Intelligent Systems Lab. A Certified Professional with 280+ Professional certifications from CISCO, Microsoft, CompTIA, Amazon, Alibaba Cloud, Oracle, Google, Salesforce, Tableau, FinOps, Beingcert, EXIN, GAQM, Cyberoam and many more. Published more than 300+ Research Papers in various High-Quality ISI-SCI/SCIE/SSCI Impact Factor- Q1, Q2, Q3, Q4 Journals cum Scopus/ESCI indexed Journals, 80+ Papers in International Conferences indexed with Springer, IEEE and ACM Digital Library, 60+ Book Chapters in various SCOPUS/WEB OF SCIENCE Indexed Books with Springer, CRC Press, Wiley, IET, Elsevier with Citations: (Google Scholar):23000+, H-Index: 77 and I-Index: 311; (Scopus): 12700+; H-index: 60. Member of more than 60+ Associations as Senior and Life Member like: IEEE (Senior Member) and ACM (Senior Member). He has authored/co-authored cum Edited 70+ Books of Computer Science. Associated with more than 600+ International Conferences as Programme Committee/Chair/Advisory Board/Review Board member. He has completed 1 Grassroot and 1 ASEAN Project. He has 18 Australian Patents, 16 German Patents, 4 Japanese Patents, 44 Indian Design cum Utility Patents, 13 UK Patents, 1 USA Patent, 3 Indian Copyrights and 2 Canadian Copyrights to his credit in the area of Wireless Communications, Artificial Intelligence, Cloud Computing, IoT, Healthcare, Drones, Robotics and Image Processing.

Speech Title: DataOps Engineering: A 9-Phase Framework for Building Agile, Automated Data Pipelines and Maximizing Data Science Impact

Abstract: This lecture presents a comprehensive, practitioner-oriented exposition on DataOps-a methodology that converges Agile development, DevOps principles, and statistical process control to orchestrate end-to-end data pipeline automation and amplify data science throughput. We delineate a rigorous 9-step transformation framework encompassing environment provisioning, version-controlled data lineage, continuous integration/continuous deployment (CI/CD) for analytical workflows, automated data quality validation through schema enforcement and anomaly detection, infrastructure-as-code (IaC) orchestration, containerized model serving, observability-driven monitoring via telemetry instrumentation, cross-functional governance, and feedback-loop optimization for iterative model retraining. The discourse further examines best practices in constructing fault-tolerant, idempotent, and horizontally scalable ETL/ELT pipelines leveraging directed acyclic graph (DAG)-based orchestration engines, event-driven microservices architectures, and declarative data transformation paradigms. Key topics include

metadata-driven pipeline parameterization, data contract enforcement across producer-consumer boundaries, SLA-aware scheduling, drift detection mechanisms, and reproducibility guarantees through deterministic execution environments. Attendees will gain actionable insights into reducing pipeline technical debt, minimizing mean-time-to-recovery (MTTR), achieving sub-linear operational overhead scaling, and establishing a culture of continuous improvement through DataOps maturity modeling. This lecture bridges the gap between theoretical data engineering constructs and production-grade implementation patterns for enterprise-scale analytical ecosystems.

Paulo Batista (Online)

University of Évora, Portugal

Biography: Current director of the Arquivo Nacional Torre do Tombo, he was senior technician positions at the Instituto de Arquivos Nacionais/Torre do Tombo, Instituto Português do Património Cultural and the Instituto Português do Património Arquitetónico. He has also worked as researcher at the Instituto de Investigação Científica Tropical – Centro de Estudos de História e Cartografia Antiga, and as professor at the MS program in Information Science and Documentation at Universidade NOVA de Lisboa (UNL).

Speech Title: Action Research and Case Studies in Information Science

Abstract: Following the Second World War an explosion in the quantity of documentation led to a dramatic change in Archiving, or the profession referred to as records managers/records management and archivists/archives. Starting in the 1980s, however, archivists in Quebec began to make great progress by changing their approach and looking at the entire documentary cycle from current to definitive information. Carol Couture and Jean- Yves Rousseau made a crucial contribution towards the understanding of the Three Age Theory that viewed Archiving as an integrated discipline centered on a structural understanding of archives. In 1994, their work Les Fondements de la Discipline Archivistique, presented a new interpretation of Theodore Schellenberg's Three Age Theory. They called attention to the fact that the three phases of archival documents are not separate but, on the contrary, integrated. They argued that these three stages can even be looked at in a segmented way, provided the union between them is ensured. Their great innovation relative to Schellenberg's work lay, precisely, in critiquing the division and separation between the three ages of archival documents. Couture and Rousseau thereby brought together all the phases of the lifecycle of records, from production to dissemination, in opposition to the sterile distinction advocated by traditional archivists and document managers. In my opinion, however, the best approach to integrating information management is known as records continuum, which place archives in a post-custodial, informational, and scientific paradigm. This Australian concept arose in the 1990s amid the huge explosion of information, communication technologies and new media. This context forced Information Science to redefine its object of study. Records continuum is closely related to the integrated management model of Couture and Rousseau, while it carries their innovation further, perfecting it and replacing it with systemic dynamics and providing continuity between archives. In fact, records continuum means, literally, continuous management. It looks at the whole process from the production of records to their final archiving. Otherwise, we cannot speak of continuous management. That is why, when we speak of rigid archives – current,

intermediate, and definitive, this approach is more theoretical than practical. There is, in fact, no separation between these phases, even less so from the point of view of the value of documents. The traditional distinction between information with probative and historical value ceases to exist. The information is simultaneous and is, in fact, the same.

Radhakrishna Bhat (Online)

Manipal Institute of Technology, India

Biography: Dr. RADHAKRISHNA BHAT received his Ph.D. degree from Visveswaraya Technological University, Belagavi, India. He is currently working as an Associate Professor with the School Computer Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education (MAHE), Manipal, India. He is an active researcher who has published many scientific research papers in reputed journals and conferences. He is serving as editorial board member for many peer-reviewed journals including PLOS ONE, Journal of Cybersecurity and Privacy, Intelligent Decision Technologies. He is the active technical program committee member for premier conferences including ICISSP, ICOIN, COMSNETS, IEA/AIE. Currently, he is guiding Ph.D research scholars on various topics including information security, high-performance computing, and deep learning.

Speech Title: Decentralized Privacy-Preserving Federated Multi-Architecture Deep Ensemble Framework for Lung Cancer

Abstract: Early detection of lung cancer improves patient survival outcomes and identifies the most effective treatment options. Deep learning models have played a vital role in lung cancer classification with significant drawbacks about centralized systems, including single points of failure, scaling issues across healthcare networks, and limited access to multi-institutional datasets. Our study presents a blockchain-coordinated federated learning framework that enables secure multi-hospital collaboration to increase the precision of diagnosis. In this approach, we integrate three pre-trained convolutional neural network (CNN) models and develop a meta-model ensemble architecture, ensuring privacy protection of sensitive data by differential privacy. By using an interplanetary file system (IPFS) for decentralized model storage and ethereum smart contracts for transparent coordination, the proposed methodology removes single points of failure and permits multiple institutions to collaboratively develop models.

Vilem Novak (Online)

University of Ostrava, Czech Republic

Biography: Prof. Vilém Novák, Ph.D., DSc. is the founder and former director of the Institute for Research and Applications of Fuzzy Modeling of the University of Ostrava. He obtained PhD in mathematical logic at Charles University, Prague in 1988; DSc. (Doctor of Sciences) in computer science in the Polish Academy of Sciences, Warsaw in 1995; full professor at Masaryk University, Brno in 2001. His research activities include mathematical fuzzy logic, approximate reasoning, mathematical modeling of linguistic semantics, fuzzy control, analysis and forecasting of time series, and various kinds of fuzzy modeling applications. He belongs among the pioneers of the fuzzy set theory. He was general chair of the VIIth IFSA'97 World Congress, Prague and of the international conferences EUSFLAT 2007, Ostrava and EUSFLAT 2019, Prague. He is a member of the editorial boards of several scientific journals. He is often invited to give plenary talks at international conferences and to give lectures in universities worldwide. He is the author or co-author of 6 scientific monographs, two edited monographs, and over 350 scientific papers with more than 10000 citations. He was awarded in the International Conference FLINS 2010 in China and in 2017, he obtained the title "IFSA fellow". He is currently the vice-president of IFSA.

Speech Title: Fuzzy Natural Logic and Generalized Quantifiers in AI

Abstract: Artificial Intelligence includes many theories and methods that are capable of performing tasks associated with human intelligence. Among them, the leading role is played by techniques of machine learning and neural networks. We argue that important role in AI plays also formal logic. In this talk we will mention the concept of Fuzzy Natural Logic (FNL) that is a system of theories of mathematical fuzzy logic enabling us to model special ways of human reasoning that is based on the use of natural language. FNL stems from the results of classical linguistics, logical analysis of concepts and semantics of natural language and is formalized using higher-order mathematical fuzzy logic.

A constituent of FNL is the theory of generalized quantifiers that are special natural language expressions using which we quantify the number of elements in various contexts. Typical examples are ``Many, most, a lot of, a few, several, almost all'' that form a subclass called ``intermediate quantifiers''. In this talk we will present results obtained in a formal theory of the latter. We will also describe reasoning using generalized syllogisms in which intermediate quantifiers occur. We argue that methods of formal logic are indispensable for their theory because using the latter we can distinguish valid syllogisms from those which are not valid and, therefore, cannot be used in human reasoning. We will also show that AI without logic fails when checking validity of syllogisms. We will demonstrate valid as well as invalid syllogisms on examples. Along with it, we will discuss graded square of opposition as a general scheme for

human reasoning.

Finally we will touch non-monotonic reasoning and show that our theory is capable of solving typical problems of it. Namely, we will prove that the classical example ``Most birds fly'' and ``Tweety is a penguin which does not fly'' does not lead to contradiction in our theory. We argue that this is the consequence of capability of FNL to model the meaning of vague concepts.

Samir Brahim Belhaouari (Online)

Hamad Bin Khalifa University, Qatar

Biography: Dr. Samir Brahim Belhaouari is a faculty member in the Division of Information & Computing Technology at Hamad Bin Khalifa University (HBKU), Qatar. He received his Ph.D. in Mathematical Sciences from EPFL, Switzerland, and his MSc in Networks and Telecommunications from INP/ENSEEIHT, France. With international academic experience across Europe, the Middle East, Russia, and Asia, he has developed a strong global research profile.His work spans mathematics, machine learning, and data science, with notable contributions in classification, GenAI, feature selection, data preprocessing, and optimization. He is the creator of the Multilevel Architecture of Deep Learning (MADL), a framework that enhances neural network training efficiency and performance. He has also developed novel algorithms for time-frequency decomposition, model compression, Green AI, and image/graph representation, as well as an enhanced hashing function inspired by mathematical conjectures.

Dr. Belhaouari has served as principal investigator on major research projects funded by Qatar, Russian, and Malaysia, and his contributions have earned him multiple international awards, including medals at global innovation exhibitions. With over 300 publications, more than 5,000 citations, and an H-index of 36, he continues to influence both theoretical and applied aspects of AI, delivering innovative solutions that bridge mathematics, sustainability, and advanced computing.

Speech Title: Leveraging Mathematics to Address AI and Security Challenges

Abstract: Solving complex computer science problems becomes more manageable by harnessing the power of unsolved mathematical puzzles and inspiration from nature. Mathematics provides the foundation for crafting advanced algorithms in optimization, hashing, data compression, and model refinement, which are essential for tackling a wide range of challenges in artificial intelligence (AI) and cybersecurity. This talk will explore several key projects that illustrate the pivotal role of mathematics in addressing these issues.

Highlights include smart pruning techniques for deep neural networks (Green LLMs, CNNs, etc.), Green AI from Deep to shallow learning, the Walking Algorithm for Longitudinal Key Signatures (WALKS), and optimizing dimensionality reduction and visualization using enhanced clustering and optimal transport.

We will also discuss a novel time-frequency decomposition, KNNOR-a method for oversampling and downsampling imbalanced datasets—and chaos-based hashing combined with Gaussian Kernel LSH for improved data security and similarity search. Other topics include feature selection for high-dimensional data, extending the Komlós Conjecture for categorical variable

encoding, and various deep learning innovations, such as architectural designs, fine-tuning methods, specialized loss functions, and activation functions. Additionally, we'll cover anomaly detection, clustering techniques, and a dynamic Markov Chain coupled with reinforcement learning for optimization and feature selection. Applications of these techniques in biomedical and bioinformatics domains will be examined, along with the use of number theory in security, particularly in hashing and RSA encryption. Through these projects, we demonstrate how mathematical insights lead to cutting-edge solutions in AI and cybersecurity

Anand Nayyar (Online)

Duy Tan University, Vietnam

Biography: Dr. Anand Nayyar received Ph.D (Computer Science) from Desh Bhagat University in 2017 in the area of Wireless Sensor Networks, Swarm Intelligence and Network Simulation. He is currently working in School of Computer Science-Duy Tan University, Da Nang, Vietnam as Professor, Scientist, Vice-Chairman (Research) and Director- IoT and Intelligent Systems Lab. A Certified Professional with 250+ Professional certificates. Published more than 250+ Research Papers in various High-Quality ISI-SCI/SCIE/SSCI Impact Factor Journals cum Scopus/ESCI indexed Journals, 100+ Papers in International Conferences indexed with Springer, IEEE and ACM Digital Library, 80+ Book Chapters with Citations: 21000+, H-Index: 75 and I-Index: 300. He has 18 Australian Patents, 16 German Patents, 4 Japanese Patents, 44 Indian Design cum Utility Patents, 1 USA Patent, 3 Indian Copyrights and 2 Canadian Copyrights to his credit. Awarded 55 Awards for Teaching and Research. He is listed in Top 2% Scientists as per Stanford University (2019, 2020, 2021, 2022, 2023, 2024). He is Listed on Research.com (No:2 in Viet Nam; D-INDEX: 46). He is acting as Managing Editor of IGI-Global, USA Journal titled "IJKSS" - Scopus Q3 Indexed.

Speech Title: From Multimodal LLM to Human-level AI

Abstract: This keynote explores the rapidly evolving journey from multimodal large language models (LLMs) toward human-level AI, highlighting both the extraordinary progress achieved and the scientific challenges that remain. Recent advances in multimodal foundation models have enabled AI systems to process and reason across text, images, audio, video, code, and sensor data, opening new possibilities for intelligent assistants, autonomous systems, scientific discovery, healthcare, education, robotics, and smart infrastructure. The talk examines how multimodal LLMs are transforming from language-centric systems into more general-purpose cognitive architectures capable of perception, reasoning, planning, memory integration, tool use, and adaptive decision-making. It will discuss the core technologies driving this transition, including transformer-based architectures, retrieval-augmented generation, agentic workflows, multimodal fusion, reinforcement learning, and neuro-symbolic reasoning. At the same time, the keynote will address critical limitations such as hallucination, contextual inconsistency, lack of grounded understanding, interpretability challenges, safety risks, and constraints in long-horizon autonomy.

By connecting current research trends with future directions, this keynote provides a balanced perspective on what it would take to move beyond today's powerful yet narrow systems toward AI that more closely resembles human-level intelligence. The session will emphasize not only capability expansion, but also the importance of trustworthy, explainable, aligned, and human-centered AI for real-world deployment and societal benefit.

Abhishek Kumar (Online)

Chandigarh University Punjab, India

Biography: Dr. Abhishek Kumar, Senior Member of IEEE, is an Assistant Director and Professor in the Computer Science & Engineering Department at Chandigarh University, Punjab, India.and Senior researcher in Ingeniot lab UCLM Spain.With over 14 years of teaching experience, he has published 200+ peer-reviewed papers and successfully supervised 6 Ph.D. scholars, , along with 48+ M.Tech projects. He holds postdoctoral research at Universidad de Castilla-La Mancha, Spain. His research interests span artificial intelligence, renewable energy systems, image processing, and data mining. An award-winning researcher, Dr. Kumar has received several accolades, including the Sir C.V. Raman National Award (2018), and holds a patent. An accomplished author and editor, he has authored seven books and edited 97 volumes with reputed publishers like IET, Elsevier, Wiley, Springer, and De Gruyter. Dr. Kumar also serves as Series Editor for book series.

Speech Title: Multi-Agent Generative AI for Renewable Integration and Grid Operations

Abstract: Rapid renewable penetration is increasing variability and operational complexity across power systems, while electrification and rising AI-driven loads intensify the need for reliability, flexibility, and resilience. This paper proposes an AI-centric framework that unifies (i) foundation-model and generative-AI assistants for operator decision support and automated workflow orchestration, (ii) real-time digital twins to mirror grid and renewable-asset states for what-if analysis and predictive maintenance, and (iii) reinforcement-learning control for adaptive dispatch, microgrid energy management, and storage coordination under uncertainty. We synthesize recent advances in renewable forecasting and control-highlighting how modern AI can improve solar/wind prediction accuracy and enable multi-objective optimization balancing cost, emissions, and resilience. Finally, we discuss deployment considerations-data governance, cybersecurity, and model validation-emphasizing safe integration of AI into critical infrastructure and measurable pathways to accelerate the renewable energy transformation at scale.

S.Anne Susan Georgena (Online)

Sri Ramakrishna Institute of Technology, India

Biography: Dr. Abhishek Kumar, Senior Member of IEEE, is an Assistant Director and Professor in the Computer Science & Engineering Department at Chandigarh University, Punjab, India.and Senior researcher in Ingeniot lab UCLM Spain.With over 14 years of teaching experience, he has published 200+ peer-reviewed papers and successfully supervised 6 Ph.D. scholars, , along with 48+ M.Tech projects. He holds postdoctoral research at Universidad de Castilla-La Mancha, Spain. His research interests span artificial intelligence, renewable energy systems, image processing, and data mining. An award-winning researcher, Dr. Kumar has received several accolades, including the Sir C.V. Raman National Award (2018), and holds a patent. An accomplished author and editor, he has authored seven books and edited 97 volumes with reputed publishers like IET, Elsevier, Wiley, Springer, and De Gruyter. Dr. Kumar also serves as Series Editor for book series.

Speech Title: Modeling and Analysis of Unsteady Hydromagnetic Flows with Radiative and Newtonian Thermal Conditions

Abstract: The modeling of multi-physical transport phenomena involving magnetic fields and thermal effects is essential in advanced engineering and high-temperature industrial systems. This lecture presents a comprehensive analysis of unsteady hydromagnetic (MHD) boundary layer flows over stretching and shrinking surfaces incorporating radiative heat transfer and Newtonian heating conditions. Advanced computational modeling plays a critical role in understanding complex transport phenomena encountered in modern engineering systems. This lecture presents a detailed numerical investigation of unsteady hydromagnetic (MHD) boundary layer flows over stretching and shrinking surfaces incorporating radiative heat transfer and Newtonian heating effects.The mathematical formulation considers a two-dimensional, viscous, incompressible, electrically conducting fluid subjected to a transverse magnetic field. Thermal radiation is modeled using the Rosseland approximation, while convective surface heating is represented through Newtonian heating conditions. The governing nonlinear partial differential equations are transformed into similarity-based ordinary differential equations and solved using an efficient fourth-order Runge–Kutta shooting algorithm coupled with an iterative boundary correction scheme.A comprehensive parametric analysis is performed to examine the influence of magnetic interaction, radiation parameter, unsteadiness, suction, Biot number, viscous dissipation, slip effects, and chemical reaction on velocity, temperature, and concentration distributions. The results reveal strong nonlinear coupling between magnetic damping and thermal enhancement mechanisms.The study demonstrates how advanced numerical techniques and intelligent computational frameworks can be employed to analyze multi-physics transport processes, offering insights relevant to high-temperature materials processing, energy systems, plasma engineering, and thermally optimized industrial designs.

TECHNICAL SESSIONS

Session 1: Data Ethics and Governance

Chair: **Xiaoping Qiu,** Southwest Jiaotong University, China

14:30-15:45 | Red Mountain Hall 17F

TAIK DETAILS	
Time	**Presentation**
14:30 - 14:45 **CB229**	Paper Title: Research on Ethical Risks and Governance Strategies in the Transformation of Scientific Data into New Quality Productive Forces All Author: Ruoduo Guo, Guanle Liu, Liangming Wen Presenter: Ruduo Guo, Southwest University, China Abstract: New quality productive forces, driven primarily by technological innovation, rely heavily on data elements for their generation and evolution, with scientific data serving as a crucial foundation for knowledge innovation. However, the transformation of scientific data into new quality productive forces inevitably gives rise to corresponding ethical risks. These include privacy violations during data collection and acquisition, data bias and algorithmic black boxes in processing and analysis, disputes over intellectual property rights during application and transformation, and data misuse. This paper first clarifies the core concepts and their intrinsic transformation logic. It then focuses on three critical stages-data collection and acquisition, processing and analysis, and application transformation-to deeply analyze the underlying core ethical risks. Finally, it constructs targeted governance strategies, providing valuable theoretical and practical references for efficiently empowering the transformation of scientific data into new quality productive forces. This contributes to the coordinated development of technological innovation and social welfare.
14:45 - 15:00 **CB227**	Paper Title: Regulating the Future: A Theoretical Study on How Big Data Ethics Drive Paradigm Shifts in Regulatory Approaches All Author: Yaqi Xie, Liangming Wen Presenter: Yaqi Xie, Southwest University, China Abstract: While big data and artificial intelligence technologies enhance efficiency, they also trigger systemic ethical risks such as privacy violations and algorithmic discrimination, exposing the structural failures of traditional regulatory paradigms. This paper argues that big data ethics has evolved from an external constraint into an endogenous force for self-reform within the regulatory system, driving a dual shift in the regulatory paradigm: a transition in objectives from"ex post punishment"to "ex ante prevention", and a shift in values from"technological neutrality" to"value embedding. By constructing the framework" ethical risk - crisis of social trust - regulatory paradigm innovation", this paper systematically elucidates the "triple mechanism" of ethics-driven regulatory transformation-value rationality, instrumental rationality, and structural rationality-and proposes the "three-dimensional characteristics" of the new paradigm: evolution toward full-process embedded agile governance in regulatory sequencing;

deepening toward intrinsic logic and value embedding in regulatory focus; and expansion toward a networked, multi-stakeholder co-governance ecosystem in participatory actors. Based on this three-dimensional model, this paper compares regulatory practices in the EU, the US, and the UK, revealing how ethical considerations intrinsically and differentially shape global regulatory evolution pathways. It provides an integrated theoretical foundation for constructing an agile, responsible, and ethically embedded governance system for the digital age.

15:00 - 15:15
CB223

Paper Title: A Study on Citation Characteristics and Dissemination Patterns of Scientific Data Policies within Core Journals: An Empirical Analysis Based on the "Scientific Data Management Measures"
All Author: Jin Liu, Liangming Wen
Presenter: Jin Liu, Southwest University, China

Abstract: This study aims to systematically characterise the academic dissemination patterns of the "Scientific Data Management Measures" through a quantitative analysis of its citation characteristics within core journals. Using literature from CSSCI and Peking University Core Journals indexed in CNKI between April 2018 and November 2025 as the sample, this study employs bibliometric and comparative analysis methods. An analytical framework is constructed across three dimensions-citation frequency, dissemination timeliness, and disciplinary diffusion-to systematically examine the policy's macro-level dissemination patterns, phased characteristics, and interdisciplinary penetration disparities. Findings reveal that the "Scientific Data Management Measures" exhibits a dissemination pattern characterized by "short-term bursts followed by long-term decline" within core journals, with disciplinary diffusion highly concentrated in fields such as scientific research management, library and information science, and journalism and communication. Notably, its citation structure presents a dual form: "low explicit citation rates (scant article title/keyword citations) coupled with widespread implicit implementation (extremely high proportion of reference list citations)". This indicates that the policy has been internalised as background consensus within relevant research, yet has not yet become a core issue driving theoretical innovation. Future efforts should focus on deepening the policy's transition from" implicit citation to "explicit citation", while strengthening targeted dissemination in disciplines where penetration remains weak, such as the natural sciences.

15:15 - 15:30
CB219

Paper Title: Exploring Factors Influencing Second-Hand Housing Market Prices Through Multi-Source Data Integration: A Case Study of Chongqing Liangjiang New Area
All Author: Linhui Yan, Liangming Wen
Presenter: Linhui Yan, Southwest University, China

Abstract: To reveal the price formation mechanism and structural characteristics of the secondary housing market following the administrative restructuring of Chongqing Liangjiang New Area, this study utilized 18,000 initial property listings from the Fang.com platform. After preprocessing, 16,015 valid samples were obtained and systematically analyzed using data mining methods. By constructing multiple linear regression and random forest regression models, we found that the random forest model achieved an R^2 of 0.7132 on the training set and 0.6535 on the test set,

demonstrating significantly higher predictive accuracy than linear regression. Feature importance analysis further revealed that building area and distance to subway stations are the core variables influencing housing prices, collectively contributing nearly 70% of the importance weight.

Paper Title: An Empirical Investigation on a Posterior Version of p value for Statistical Testing against Small Sample Size
All Author: Jinxiong Lv, Yang Huang, Yuhang Wu, Wei Li, Darui Pan, Dongliang Li
Presenter: Jinxiong Lv, China Tobacco Sichuan Industrial Co., Ltd., China

15:30 - 15:45
CB470

Abstract: Small sample size is challenging for statistical testing in case-control studies, especially on the testing space of high complexity when the statistic is multidimensional. Recently, a posterior version of p value (pp value) was suggested in the literature to tackle the challenge. The pp value is devised to reduce the background disturbance and to appropriately control the testing complexity. However, practical performance of the pp value is still not investigated when the sample size is small. Here, we propose a statistical method based on the pp value for detecting significant findings with small sample sizes, and conduct an empirical analysis for the pp value compared with traditional p values under scenarios of different sample sizes, effect sizes and data types (continuous or discrete). An index is proposed to evaluate the performance of the method. Moreover, although calculating the pp value involves a repeated p value computations on the sample data from permutations of the original case-control data, we show that the permutation times have little effect on detection power of the pp value. Results from both simulated and real-world datasets demonstrate that the method outperforms the traditional p value.

TECHNICAL SESSIONS

Session 2: AI for Healthcare and Medical Applications

Chair: **Zhipan Wu,** Huizhou University, China

14:30-16:05 | Namtso Meeting Room 2F

TAIK DETAILS	
Time	**Presentation**
14:30 - 14:50 **Invited Speech**	Paper Title: Federated Learning for Secure AI-Driven Clinical Collaboration: Toward Virtual Doctors Across Regions Presenter: Simon James Fong, University of Macau, China Abstract: Federated learning has emerged as a cornerstone technology for enabling AI-assisted healthcare while safeguarding patient confidentiality. In this keynote, I will present recent advances in privacy-preserving and resource-aware federated learning frameworks that support collaborative diagnosis and clinical decision-making across hospitals, cities, and even countries—without requiring sensitive medical data to be transferred over networks. Building on our SecFedGate architecture, we show how adaptive multimodal fusion, ontology-guided knowledge integration, and formally verified privacy mechanisms can power “virtual doctors" capable of learning from distributed experiences while ensuring security against adversarial threats. These innovations not only improve diagnostic accuracy and robustness under heterogeneous clinical environments but also establish new foundations for trusted AI collaboration in healthcare. The talk will highlight real-world implications for secure cross-institutional medical AI, advancing global healthcare collaboration without compromising privacy.
14:50 - 15:05 **CB617**	Paper Title: Early Warning of Depression Risk Based on Multi-Granularity Modeling of Abnormal Sleep Behavior All Author: Dan Xiang, Lixia Zhu, Yuanyuan Yi Presenter: Dan Xiang, Southwest University, China Abstract: Abnormal sleep behavior is prevalent among young adults and linked to depression-related autonomic dysfunction. This study examines temporal heterogeneity in autonomic regulation between normal and disturbed sleep, developing a multi-granularity framework to identify abnormal sleep patterns. We collected 22-hour Electrocardiogram (ECG) signals from 177 students, dividing the day into 153 time slots, aggregated into eight segments and three models (night, day, full-day). From each slot, 47 heart rate variability (HRV) features were extracted, and Support Vector Machine(SVM) classifiers distinguished healthy controls from abnormal sleep individuals. Results show significant temporal heterogeneity: daytime segments (F1=0.70-0.73) outperformed nighttime segments (F1=0.51-0.63). The Early Morning segment showed high precision (0.9136) but low recall (0.5781). Aggregated models outperformed segment-specific ones: the night aggregated model improved recall from

0.41–0.58 to 0.68, while the full-day aggregated model achieved the best F1 (0.8828), 21% higher than the best segment model. These findings confirm circadian differences in autonomic regulation, with aggregated models reducing nighttime false negatives. The full-day aggregated model's superiority suggests data volume is more critical than temporal specificity, informing wearable-based continuous monitoring.

15:20 - 15:35
CB3046

Paper Title: Identification of Mpox Skin Lesion Images Based on Deep Learning Classification Models
All Author: Xianghong Deng, Cheng Li, ZhiweiZhou, ShuangYang
Presenter: Xianghong Deng, Hunan Mechanical & Electrical Polytechnic, China

Abstract: Mpox (formerly known as monkeypox) is a rare zoonotic disease that can cause skin lesions and has the potential for global spread. With the deepening integration of computer science and medicine, intelligent disease detection models based on deep learning and neural networks have become important auxiliary tools for enhancing clinical diagnosis and treatment. This study conducted a comparative analysis of the performance of mainstream deep learning classification models,VGG19, ResNet50, DenseNet201, GoogLeNet, and ConvNeXt_B,in the task of mpox skin image recognition. For the binary classification task, images were categorized into a “Mpox” class and an “Others” class, where the latter includes chickenpox and measles cases, given that their initial rash and pustule presentations closely resemble those of mpox. Beyond quantitative performance evaluation, this study further employed GradCAM++ to generate class activation heatmaps, providing visual interpretability of model decision-making. The resulting heatmaps offer critical clinical diagnostic value by highlighting key lesion regions, thereby enhancing model transparency and supporting clinicians in validating predictions. The experimental results indicate that under identical model parameters and learning rates, the ResNet50 model achieved higher classification accuracy and inference speed, demonstrating its application potential for accurate diagnosis in mpox and other disease image recognition tasks.

15:35 - 15:50
CB471

Paper Title: Differential analysis of chemical composition based on integrative hypothesis tests: case study for cigar tobacco leaves
All Author: Jinxiong Lv, Dailin She, Yasen Li, Jia Li, Jinhong Zhao, Dongliang Li
Presenter: Jinxiong Lv, China Tobacco Sichuan Industrial Co., Ltd., China

Abstract: Differential analysis serves as a critical statistica and data analysis method for comparing differences across groups or categories. By applying this approach, underlying patterns and trends within the data can be uncovered, providing a scientific basis for informed decision-making. However, a certain false positive rate is inevitable unless the sample size is sufficiently increased. Recently, the integrated hypothesis test (IHT) has been proposed in the literature to tackle the challenge without increasing the sample size. In this paper, we proposed the rank integration method based on IHT, and the performance on simulation experiments illustrated indicates a reduction in the false positive rate and an improvement in the true positive rate. Subsequently, we applied IHT to detect significant chemical compositions for discriminating between cigar tobacco leaves from Sichuan and Indonesia. The results demonstrate that the method can effectively distinguish the geographic origins of cigar tobacco leaves, with acceptable classification performance.

Paper Title: A Hybrid Model for Oat Water Requirement Prediction Based on Harris Hawks Optimization

All Author: Wanzhen Huang, Zirun Wang, Fanting Zhou, Pengzi Chen, Jinbo He, Tongli He, Jianhong Gan, Peiyang Wei, Zhibin Li, Chunjiang Wu, Xun Deng and Tinghui Chen
Presenter: Wanzhen Huang, Chengdu University of Information Technology, China

15:50 - 16:05
CB608

Abstract: Oats are a hardy, high-yielding cultivated forage crop with stringent water management requirements. We present an HHO-optimized hybrid neural architecture for improved oat irrigation forecasting. Our approach mitigates two critical shortcomings in current practice: labor-intensive hyperparameter selection and deficient spatio-temporal dependency capture. The network architecture interleaves TCN, BiLSTM, and multi-head attention layers, with the Harris Hawks Optimizer governing automated parameter search. Experiments were conducted using an oat water requirement and environmental dataset from the Pengbo Irrigation District in Tibet from 2019 to 2023. The results demonstrate that the proposed model achieves a Mean Absolute Error (MAE) of 0.3432 and a Root Mean Square Error (RMSE) of 0.4863, representing reductions of 52.73% and 46.39%, respectively, compared to the traditional LSTM model. The coefficient of determination (R^2) improved by approximately 15.31%. Ablation studies further validated the necessity and synergistic benefits of each module. This model can provide effective technical support and decision-making basis for smart irrigation in alpine regions.

TECHNICAL SESSIONS

Session 3: Deep Learning for Computer Vision

Chair: **Qing Tan,** Athabasca University, Canada

14:30-16:00 | Manasarovar Meeting Room 2F

TAIK DETAILS	
Time	**Presentation**
14:30 - 14:45 CB348	Paper Title: Towards Explainable Model Fingerprints: A Saliency-Bound Multi-Bit Watermarking Framework All Author: Zhengjie Tang, Yong Liu, Jingyan Zhou, Canghong Shi Presenter: Zhengjie Tang, Xihua University, China Abstract: With the vigorous development of the Deep Learning as a Service (MLaaS) model and the model market, high-performance deep neural network models have become core digital assets with circulation value. However, its easy replicability also brings serious risks of copyright infringement and abuse, especially in multi-user distribution scenarios, where the source of leakage is difficult to precisely locate. Most of the existing black-box watermarking schemes rely on zero-bit verification mechanisms, and their watermark embeddings are usually based on unexplainable perturbations, resulting in insufficient con-cealment and lack of interpretability of the verification methods. To this end, this paper proposes an interpretable black-box multi-bit watermarking method based on Saliency guidance (SBW, Saliency Bound watermark). This method deeply integrates the watermark with the model decision logic through a multi-bit encoding strategy driven by user identity information without modifying the original model. By explicitly constraining the self-perturbing region through saliency mapping, hidden trigger samples closely related to model decisions are generated, thereby enhancing the robustness of the watermark and the interpretability of the embedding process. Experiments show that SBW demonstrates excellent model fidelity, concealment and anti-attack capability on multiple benchmark datasets. Especially under attacks such as model fine-tuning, pruning, and watermark coverage, watermark information can still be reliably extracted, significantly enhancing the copyright protection and leakage traceability capabilities in distributed model distribution scenarios.
14:45 - 15:00 CB798	Paper Title: Research on Thread Surface Defect Detection System Based on Deep Learning All Author: Zhecheng Luo and Bin Zheng Presenter: Bin Zheng, Panzhihua University, China Abstract: In response to the problems of relying on manual labor, low efficiency, and insufficient generalization ability of traditional methods for detecting surface defects on threads, a detection method based on YOLOv8 is studied and a system is developed. According to national standards, thread defects are classified into four categories: top damage, neck damage, side damage, and working face damage. The morphological

characteristics and imaging difficulties of each type of defect are analyzed. Based on the MVTec screw dataset, a dataset consisting of over 3000 images was constructed through data augmentation, and the training and validation sets were divided into an 8:2 ratio. In comparison with the YOLOv5, YOLOv7, YOLOv8, and YOLOv11 series models, the precision of YOLOv8n is0.84, the recall is 0.82 and mAP@0.5 is 0.83. The training process shows loss convergence and verifies the stability of the indicators. In typical defect detection, the model can detect small cracks, distinguish processing textures, and eliminate oil interference. Misdetection often occurs in the chamfered area of the end face, while missed detection occurs in extreme situations such as insufficient lighting or oil coverage. It supports automatic positioning and classification of four types of defects, and outputs visual results with bounding boxes and confidence. Research has shown that YOLOv8n achieves a balance between detection accuracy and speed, and the system can replace manual visual inspection, providing intelligent quality control measures for threaded fastener production.

15:00 - 15:15
CB800

Paper Title: RSODNet: Real-time Small Object Detection in Large Scenes by Exploiting TrellisNet Modularization Algorithm with X-ray Images
All Author: Qinghua Zhao, Jiatao Li, Zhenhua Zhang
Presenter: Qinghua Zhao , Nanjing University of Finance and Economics

Abstract: Small object detection remains a persistent bottleneck in computer vision, primarily due to the impoverished spatial resolution of targets. Objects spanning only a few pixels yield weak feature representations that are highly susceptible to background clutters, stochastic occlusions, and non-rigid deformations. While high-performance detectors have proliferated, their prohibitive computational footprints and excessive parametric complexity frequently preclude deployment on resource-constrained edge devices. To address this tension between architectural depth and on-device feasibility, we propose a lightweight, modular enhancement of the TrellisNet framework specifically optimized for scale-invariant feature extraction. Our contribution centers on the Tre module, a plug-and-play architectural component designed to augment local receptive fields and mitigate gradient vanishing in deep sequence modeling. By leveraging structural reparameterization and efficient channel-wise bottlenecking, the proposed architecture substantially reduces FLOPs and memory overhead without compromising representational capacity. Extensive empirical evaluations on the SiXray and PIDray security inspection benchmarks demonstrate that the Tre-integrated TrellisNet achieves a superior trade-off between mean Average Precision (mAP) and inference latency compared to current state-of-the-art (SOTA) methodologies. Notably, the module exhibits robust generalization in data-scarce regimes (few-shot learning) and under severe occlusion, validating its efficacy for high-stakes, real-world security screening applications.

15:15 - 15:30
CB810

Paper Title: Multimodal Object Detection with Prior Degradation Removal and Dynamic Routing Fusion
All Author: Li Tingyu, Zhou Jianhong, Niu Xianhua, Liu Bing
Presenter: Li Tingyu, Xihua University, China

Abstract: In complex urban environments, such as nighttime scenes, foggy conditions, and urban infrastructure monitoring scenarios, single-modality sensors often fail to capture comprehensive scene information, thereby posing significant challenges to

robust all-weather and multi-perspective environmental perception. Multimodal fusion of visible and infrared imagery has emerged as an effective solution for urban surveillance, intelligent traffic management, and nighttime safety inspection. However, the pronounced physical disparity between heterogeneous modalities poses a major obstacle to effective cross-modal fusion in urban object detection. Existing approaches mainly focus on deep feature fusion, yet they often struggle to simultaneously preserve input-level image quality and satisfy the requirement of real-time inference. To address this issue, this paper proposes an endto-end multimodal object detection framework that integrates prior degradation removal with dynamic routing feature fusion. Specifically, a Prior Degradation Removal (PDR) module is introduced in the pixel domain to alleviate the effects of haze scattering, low-light compression, and edge blurring, thereby recovering visible features with higher signal-to-noise ratios. On this basis, features from visible and infrared images are adaptively fused by a Dynamic Routing Fusion (DRG) module, which dynamically allocates computational resources according to sample difficulty and object scale. Furthermore, a densityaware inner loss, termed MPD-Inner IoU, is employed to improve localization robustness under degraded conditions. Extensive experiments on the FLIR and M3FD datasets demonstrate that the proposed method achieves a better trade-off between detection accuracy and computational efficiency than state-ofthe-art methods, highlighting its potential for practical urban multimodal perception.

15:30 - 15:45
CB3040

Paper Title: Rectangling Stitched Images with Hierarchical Fusion-Guided Thin-Plate Spline Deformation
All Author: Ruolan He, Xiaofeng Li, Minhang Zhang, Jia Yang, Xiaoqi Song
Presenter: Ruolan He, University of Electronic Science and Technology of China, China

Abstract: Image stitching expands the field of view but often introduces irregular boundaries in non-overlapping regions during geometric alignment, degrading visual quality and limiting practical applications. Image rectangling aims to reshape stitched images into regular rectangles while preserving content fidelity and structural consistency. However, existing deep learning-based grid deformation methods still suffer from geometric distortion, boundary artifacts, and content loss in complex scenes. To address these issues, we propose HF-TPSNet, a Hierarchical Fusion-guided Thin Plate Spline Network for image rectangling. The proposed method employs a Bidirectional Multi-resolution Feature Fusion module(BMFF) to jointly model local texture details and global structural information. Furthermore, a Hierarchical Fusion-guided TPS Deformation Module(HF-TPS) is designed to dynamically integrate multi-scale control point offsets, enabling the generation of a continuous and smooth global deformation field. Experimental results on the DIR-D dataset demonstrate that HF-TPSNet outperforms state-of-the-art methods in terms of SSIM and NIQE, effectively alleviating boundary distortions and content loss, and producing structurally stable and visually natural rectangled images.

15:45 - 16:00
CB3056

Paper Title: Lightweight Temporal Encoding and Fusion for Human Action Recognition
All Author: Lujayn Al-Amir, Sara Khalili
Presenter: Lujayn Al-Amir, Hamad Bin Khalifa University, Qatar

Abstract: Human action recognition from video requires effective temporal modeling while remaining computationally efficient In this work, we present a systematic study of

lightweight temporal representation and fusion strategies for action recognition using motion-aware cues derived from RGB frame differences and optical flow. We investigate multiple temporal aggregation mechanisms, including mean pooling, max pooling, and max-mean concatenation, and evaluate both early feature-level fusion and late decision-level fusion. Experiments on the KTH and UCF11 benchmark datasets show that the effectiveness of fusion is dataset-dependent. On KTH, late fusion with Logistic Regression achieves the best overall performance of 89.80 ± 7.39%, improving over the RGBdiff-only baseline and indicating that optical flow provides complementary motion information. On UCF11, however, the best result is obtained by the RGBdiff-only representation with Logistic Regression, achieving 94.07 ± 5.22%, while both early and late fusion reduce performance. These findings show that compact motion-aware representations combined with classical classifiers can achieve strong performance without relying on computationally intensive 3D convolutional or transformer-based architectures. The proposed framework therefore provides an interpretable and computationally efficient alternative for action recognition in resource constrained settings.

TECHNICAL SESSIONS

Session 4: Natural Language Processing and Sentiment Analysis

Chair: **Huifang Feng**, Xihua University, China

14:30-16:00 | Yaamdrok Meeting Room 2F

TAIK DETAILS	
Time	**Presentation**
14:30 - 14:45 **CB621**	Paper Title: Aspect-Based Sentiment Analysis of Student Evaluation of Teaching Texts: A Big Data-Driven Empirical Study All Author: Xueyan Yin Presenter: Xueyan Yin, Guangdong University of Foreign Studies, China Abstract: Student Evaluation of Teaching (SET) texts constitute a valuable yet underutilized source of pedagogical insights, as institutions typically lack systematic mechanisms for processing these unstructured textual data. Considering the gap of scarce fine-grained research, this study proposes a big data-driven, aspect-based sentiment analysis (ABSA) framework to investigate the embedded sentiments, sentiment orientations, and interrelationships among different pedagogical aspects in SET comments. Employing Jieba segmentation for Chinese text processing and SPSS-based statistical analysis, the research data-mines over 10 thousand comments collected in the past five years at a Chinese business college. Taking the 1,200 student comments pertaining to a single instructor as an illustrative case, the data-driven ABSA reveals three primary pedagogical dimensions of student concern: classroom interaction, instructional pace, and workload distribution, each exhibiting distinct sentiment patterns. Quantitative analysis demonstrates that average sentiment intensity (ASI) is a meaningful predictor of rating scores, though other factors clearly play important roles. Positive comment proportion (PCP), total comments (TC) and ASI collectively explain 89.6% of the variance in overall rating scores (ORS). Notably, positive feedback frequently highlights the instructor's conscientiousness, detail orientation, interactivity, and professionalism, while negative comments primarily target teaching pace and material support. Specifically, strong correlation (potential multicollinearity) has been found between ASI and ORS as well as PCP(r=0.739), thus, a preferred regression model irrespective of ASI is proposed for predicting teaching ratings and identifying areas for pedagogical improvement. This research contributes to transforming unstructured textual feedback into structured, quantifiable data amenable to rigorous statistical interrogation, thereby offering evidence-based frameworks for teaching quality assurance and data-driven instructional decision-making in higher education contexts.
14:45 - 15:00 **CB770**	Paper Title: Disentanglement Multi-Task Learning Based on Hyperbolic Space for Multimodal sentiment Analysis All Author: Siyuan Ni, Xianyong Li, Dong Huang, Yajun Du and Xiaoliang Chen Presenter: Siyuan Ni, Xihua University, China

Abstract: Multimodal representation learning faces significant challenges due to the heterogeneous nature of different modalities, which leads to feature distribution gaps and hinders effective fusion. To address the feature alignment problem in multimodal sentiment analysis, this paper proposes a Disentanglement Multi-Task Learning framework in Hyperbolic Space (DMLIH). The model disentangles unimodal representations through an encoder-decoder structure and aligns them in hyperbolic space to capture cross-modal similarity and differences. A multi-task learning strategy is introduced to jointly model modality consistency and modality-specific characteristics, while a weight adjustment mechanism balances the learning progress among subtasks. Experiments conducted on the MOSI and MOSEI datasets demonstrate that the proposed method achieves F1 scores of 86.4% and 87.1%, and accuracies of 86.3% and 86.4%, respectively, outperforming several existing approaches. The results verify the effectiveness of the proposed framework for multimodal sentiment analysis.

15:00 - 15:15
CB769

Paper Title: Scope-Enhanced Double-View Graph Transformer via Contrastive Learning for Aspect-Based Sentiment Analysis
All Author: Junhai Wen, Xiaoliang Chen, Baiyang Chen, Yajun Du, Xianyong Li
Presenter: Wen Junhai, Xihua University, China

Abstract: Aspect-based sentiment analysis (ABSA) requires a model to identify sentiment toward a target aspect while separating it from surrounding opinions, a challenge that becomes harder in sentences with multiple aspects and long-range dependencies. Existing graph-based methods face a trade-off: Graph Transformers capture deep contextual interactions but often introduce aspect-irrelevant noise through global attention, whereas scope-based methods reduce interference more directly but usually rely on shallow backbones that limit deeper semantic reasoning. To address this issue, this paper proposes the Scope-Enhanced Double-View Graph Transformer (SDV-GT), an end-to-end framework that combines deep contextual modeling with scope-guided denoising. SDV-GT constructs two aligned graph views for each sentence, a global dependency graph and a rectified scope subgraph, and encodes them with a dual-stream TextGT architecture. A scope-aware contrastive learning module then aligns the two views by using out-of-scope tokens as contrastive negatives, which guides noisy global representations toward cleaner local anchors. Experiments on the Restaurant, Laptop, and Twitter benchmarks show that SDV-GT achieves strong and consistent improvement. Relative to the direct backbone TextGT, it improves accuracy by 3.08% on Twitter and 1.12% on Laptop.

15:15 - 15:30
CB794

Paper Title: Poetry Generation System Based on Retrieval-Augmented Generation and Fact Enhanced Decoding: Addressing Imagery-Emotion Hallucination
All Author: Peidong Liu and Yihang Wang
Presenter: Peidong Liu, City University of Hong Kong, China

Abstract: English poetry is a valuable cultural heritage. Although large scale language models (LLMs) are quite mature in poetry generation, existing methods are often confronted with the problem of image-affective illusion, that is, the generated images are inconsistent with the expected emotional context and cannot capture the delicate emotions inherent in specific images. To cope with this challenge, we curate a comprehensive dataset of 17,702 valid prompt-response pairs tailored for emotion-

imagery alignment. Building upon this dataset, we propose a new framework named RAG-END (Retrieval-Augmented Generation with Fact-Enhanced Decoding). This framework is built based on DeepSeek-R1 model and integrates the parametric Retrieval-Augmented Generation (RAG) module and the Fact-Enhanced Decoding mechanism (END). Experimental results show that RAG-END has made significant breakthroughs in two key dimensions: accurate correspondence between image and emotion, and richness of emotion expression. In addition, to evaluate performance aspects that are difficult to quantify with traditional metrics, we set up an automatic evaluation framework by fine-tuning RoBERTa.

15:30 - 15:45
CB808

Paper Title: RG-Transformer: An Improved Transformer Algorithm via Gaussian Error Linear Units for Text Classification
All Author: Qinghua Zhao, Jiatao Li, Zhenhua Zhang
Presenter: Qinghua Zhao, Nanjing University of Finance and Economics, China

Abstract: Text classification remains a cornerstone of Natural Language Processing (NLP), underpinning diverse applications from sentiment analysis to intent recognition. Despite the dominance of Transformer architectures, their reliance on standard positional encoding often fails to capture the intricate relative dependencies and sequential nuances inherent in natural language. To address these limitations, we propose the Residual GRU Position-coded Joint Gaussian Error Linear Unit Transformer (RG-Transformer). Our approach introduces two primary architectural innovations: First, a bidirectional Gated Recurrent Unit (Bi-GRU) is integrated into the encoding phase to generate dynamic, context-aware positional embeddings. By processing the word vector matrix through the Bi-GRU, the model captures enhanced spatial and sequential relationships more effectively than traditional sinusoidal methods. Second, we incorporate the Gaussian Error Linear Unit (GELU) activation function within the Feed-Forward Network (FFN). The non-linear properties of GELU facilitate a form of stochastic regularization, optimizing the mapping of neuron inputs and enhancing the model's generalization capabilities. The proposed RG-Transformer was rigorously evaluated on the IMDB, TREC06, and Yelp benchmarks. Experimental results demonstrate that the model achieves superior accuracy rates of 93.68%, 99.79%, and 98.79%, respectively. These findings validate the efficacy of the RG-Transformer in augmenting the representational capacity of Transformer-based models for high-precision text classification tasks.

15:45 - 16:00
CB359

Paper Title: A Technology Difference Identification Method based on BERTopic and Cosine Similarity
All Author: Xu Sun, Lejiang Guo, Lijun Yi, Yuqin Gong
Presenter: Lijun Yi, Air Force Early Warning Academy, China

Abstract: This study proposes a method for identifying technical differences by integrating BERTopic and cosine similarity, demonstrating its feasibility using the "AI in Education" (AIED) in China and abroad as a case study. The procedure is as follows: First, collect and preprocess samples, and construct a customized lexicon and a stopword corpus. Next, perform two rounds of BERTopic topic identification separately for Chinese and foreign samples. Then, convert sentences into semantic vectors using Sentence-BERT, quantify topic similarity with cosine similarity, and construct a similarity matrix. Finally, extract representative values through an iterative screening method to

elucidate the technical differences between China and other countries in this domain based on numerical disparities.

TECHNICAL SESSIONS

Session 5: IoT, Edge Computing and UAV Systems

Chair: **Shiyang Zhou,** Xihua University, China

16:20-18:10 | Red Mountain Hall 17F

TAIK DETAILS	
Time	**Presentation**
16:20 - 16:40 **Invited Speaker**	Paper Title: Cloud Computing and Its Application in State Estimation of New Power Storage Systems Presenter: Shunli Wang, Sichuan University, China Abstract: Cloud computing and its application in state estimation of new power storage systems is not yet fully mature, facing numerous technical bottlenecks and challenges. This report delves into the methods of multi-time scale state monitoring and evaluation for energy storage and the new power system, aiming to achieve reliable monitoring of core state parameters. It constructs an electro-thermal-electrochemical multi-feature composite optimization model to accurately characterize the internal characteristics of batteries, breaking through the difficulties of dynamic response of electrical parameters and nonlinear analysis of electrical characteristics. A new algorithm for multi-dimensional information fusion online estimation is proposed, breaking through the bottleneck of collaborative prediction of multi-time scale state parameters. It achieves innovation in real-time monitoring and early warning of core state parameters, significantly enhancing the reliability of safety monitoring for energy storage systems. A dual amplification isolation and multiple EMC protection mechanism is formed, tackling extreme new energy and energy storage challenges from the device level to the system level. A smart new energy storage system is constructed, realizing the application of multi-time scale state monitoring and evaluation for energy storage and the new power system.
16:40 - 16:55 **CB208**	Paper Title: TPC-AD: IoT Time Series Anomaly Detection via Prototype Memory and Contrastive Learning All Author: Yingjie Chang, Xi Li, Peng Chen, Ang Bian, Junming Yin, Jia Gu Presenter: Yingjie Chang, Xihua University, China Abstract: Time series data plays is widely used in the Internet of Things (IoT) domain, such as equipment condition monitoring, environmental sensing, and industrial sensor data analysis. As a key task in time series analysis, anomaly detection is of great significance for achieving intelligent operation and maintenance, fault warning, and other relevant applications. A deep neural network-based reconstruction method is one of the current mainstream methods. However, it still faces several challenges in IoT scenarios: First, the fixed and limited input window size prevents the full capture of global contextual information; second, the model's inadequate ability to represent and memorize normal temporal features restricts its anomaly detection capabilities; third, relying solely on data reconstruction hampers effective enhancement of the model's

detection capability. To solve these problems, we propose a similarity-based time series anomaly detection method named TPC-AD. This method first proposes a Temporal PatchEmbedder feature extraction module based on learnable positional encoding for dynamic positional encoding and adaptive-wise channel relationship modeling for time series data. Then, combined with Prototype Memory, a global perception module based on a prototype attention mechanism was designed to enhance the model's explicit modeling and memory capacity for normal patterns. Finally, we introduce a ContrastFusion module based on contrastive learning to amplify the discriminability between normal and anomalous data, thus improving the detection accuracy for anomalous patterns. Experiments on four public IoT time series datasets demonstrate that our method achieves superior detection accuracy compared to state-of-the-art approaches, with an average improvement of 2.93% in F1-score and 3.19% in AUC.

16:55 - 17:10
CB354

Paper Title: Coverage-Driven 3D Trajectory Design and Resource Optimization for Heterogeneous UAV-HAP Collaborative MMEC
All Author: Fucheng Wang, Penghui Wang and Jiabao Cao
Presenter: Fucheng Wang, Qingdao University of Technology, China

Abstract: Aiming at the challenges of widely distributed Maritime Internet of Things devices (MIoTDs), complex dynamic environments, and high-latency satellite data transmission in vast sea areas, this paper proposes a hierarchical collaborative computing paradigm based on high-altitude platforms stations (HAPs) and heterogeneous UAV clusters. Due to the high-speed mobility of MIoTDs and the heterogeneity of the coverage range of UAVs, achieving low-latency services is particularly difficult. To solve this problem, we propose a new metric, the Coverage Efficiency Index (CEI), based on coverage rate, latency and energy consumption, to improve UAV services. Maximize CEI by jointly optimizing the 3D trajectory of UAVs, dynamic service placement, task offloading, and computing resource allocation. To solve this NP-hard problem, we propose the SLD_CTCM algorithm, which is an improvement of the competition of tribes and cooperation of members (CTCM) algorithm through multiple strategies. After experiments, it was found that our algorithm is more exploratory than the benchmark algorithms.

17:10 - 17:25
CB368

Paper Title: Energy-Optimized Lightweight DRL for Computational Offloading in UAV-IoV Systems
All Author: Fitzgerald Quincy Clarke, Haifeng Sung*, Justice Odumu, Ruth S. Kubvoruno, and Ayesha Farheen
Presenter: Fitzgerald Quincy Clarke, Southwest University of Science and Technology, China

Abstract: Abstract-The integration of 5G/6G networks with the Internet of Vehicles (IoV) requires efficient computational offloading for data-intensive applications such as autonomous driving and augmented reality. Although Unmanned Aerial Vehicles (UAVs) offer agile mobile edge computing (MEC) capabilities, their operational efficiency is hampered by high mobility, limited battery life, and the complexity of joint resource optimization. Existing offloading strategies often fail to simultaneously optimize latency, energy consumption, and resource utilization under dynamic IoV conditions. This paper proposes a novel Energy- Optimized Lightweight Deep Reinforcement Learning (DRL) framework for intelligent task offloading in UAV-assisted

IoV networks. Our approach leverages a simplified Double Deep Q- Network (DDQN) to dynamically manage task partitioning by intelligent offloading decisions, UAV trajectory planning through optimized path forecasting, and resource allocation through adaptive computation distribution. Key innovations include a streamlined state-space design that reduces computational over- head by 30% and a composite reward function that balances latency and energy objectives. These are realized by a prioritized experience replay mechanism and a target network separation strategy that enhances learning stability. Experimental results demonstrate that our framework achieves a task success rate of 98.5%, reduces latency by 40%, and maintains a 78.1% The results confirm the framework's superiority, demonstrating significant improvements over its base architecture (DQN), its enhanced variant (DDQN), and other state-of-the-art baselines like MADDPG and game-theoretic approaches, thereby providing a robust solution for practical UAV-IoV deployments. Index Terms—Internet of Vehicles (IoV), Unmanned Aerial Vehicles (UAVs), Mobile Edge Computing (MEC), Task Offloading, Energy Efficiency and Double Deep Q-Network (DDQN).

17:25 - 17:40
CB609

Paper Title: Navigating Entropy: A Cross-Cultural Machine Learning Study of Pedestrian Decision-Making in India and Morocco
All Author: Imane Elouaghzani, Kaliprasana Muduli, Prof. Indrajit Ghosh
Presenter: Imane Elouaghzani, Indian Institute of Technology Roorkee, India

Abstract: Rapid urbanization and heterogeneous traffic flows in low- and middle income countries have made pedestrian safety a critical global public health issue. This study compares pedestrian crossing habits in India and Morocco, ktwo regions with high traffic fatality rates. It examines how differences in infrastructure, law enforcement, and traffic regulations across these countries influence pedestrian behavior and overall safety risk. Using a dataset of 1,061 video-annotated pedestrian samples, the work integrates statistical analysis, and machine learning classifiers were employed to model crossing decisions. The results reveal a fundamental contrast in decision drivers. In India's highly heterogeneous, weakly regulated traffic, pedestrians behave in a stochastic, time-pressured manner, with crossing decision primarily governed by kinematic variables such as vehicle speed and acceleration. On the contrary Moroccan behavior is more strongly linked to regulatory and infrastructure cues, echoing evidence that built environment, markings, and control measures can strongly influence compliance and safety in LMICs. Model performance reflects this structural difference, as the non-linear dynamics of Indian traffic were best captured by Random Forest algorithms (67\% accuracy), while the structured Moroccan context was effectively modeled using Logistic Regression (66\% accuracy). These insights have broad relevance for the world scientific and policy community. They underscore that pedestrian safety interventions are not directly transferable across countries,infrastructure-agnostic, conservative designs, and speed management come more from the enforcement and optimization of formal facilities. The study contributes comparative evidence based on ML needed for culturally and context-sensitive pedestrian safety strategies in global road safety initiatives.

17:40 - 17:55
CB793

Paper Title: DHMAB: Dynamic Heterogeneous Multi-Armed Bandits for Non-Stationary Multi-Player Bandits over Capacity-Limited Control Channels
All Author: Rui Deng, Bing Liu and Jianhong Zhou
Presenter: Deng Rui, Xihua University, China

Abstract: Multi-player multi-armed bandits (MP-MAB) have been widely studied due to their applications in cognitive radio networks, where multiple users compete for wireless channels without centralized scheduling. However, in practical dynamic networks, the environment is often non-stationary, while explicit communication is severely constrained by limited bandwidth, transmission delay, and packet loss. Under such conditions, frequent collisions may occur and significantly degrade the overall system performance. In this paper, we propose DHMAB, a dynamic heterogeneous multi-armed bandit algorithm for nonstationary MP-MAB with a capacity-limited explicit control channel. Instead of relying on continuous information exchange, DHMAB adopts a lightweight reset-and-synchronization protocol that is autonomously triggered by local change detection or persistent collisions. During coordination, the players execute a three-stage procedure including orthogonalization, information collection, and assignment broadcast. To further reduce communication overhead, the proposed method incorporates quantized messages and incremental reporting. In this way, the players can efficiently track environment changes, maintain coordinated channel allocation, and avoid persistent synchronization deadlock. Extensive simulations under stringent communication budgets demonstrate that DHMAB achieves lower cumulative regret and collision rate than strong baseline methods.

17:55 - 18:10
CB2036

Paper Title: TinyML-Driven Resource-Efficient MPPT Model for STM32F767
All Author: Zhipan Wu, Zhanhong Huang, Junjie Ji, Huaying Du, Jinxiong Chen, Guoming Lai,
Presenter: Zhipan Wu, Huizhou University, China

Abstract: This paper addresses the high computational complexity and excessive resource consumption of traditional Maximum Power Point Tracking (MPPT) algorithms in photovoltaic (PV) systems. A lightweight MPPT model based on Tiny Machine Learning (TinyML) is proposed, with the STM32F767 microcontroller as the core. It integrates multi-dimensional sensors to collect light intensity, temperature, voltage, and current, and uses a Feed-Forward Neural Network (FFNN) for accurate power point prediction in dynamic environments. Focusing on lightweight optimization, INT8 quantization compresses the model to 10 KB with an inference time of 0.45 ms, while maintaining acceptable accuracy. As the core of this study, simulation tests show a response time ≤ 200 ms under sudden light changes and steady-state efficiency exceeding 95%, fully verifying the effectiveness and superiority of the proposed TinyML-MPPT model. To lay a foundation for the subsequent physical implementation of the simulation model and verify the engineering realizability of the proposed model, a comprehensive feasibility analysis of STM32F767-based hardware implementation is conducted, including real-time performance, resource occupancy, and error analysis, providing an efficient, low-power solution for embedded PV systems.

TECHNICAL SESSIONS

Session 6: Cybersecurity and Fraud Detection

Chair: **Boran Yang**, Xihua University, China

16:20-17:50 | Namtso Meeting Room 2F

TAIK DETAILS	
Time	**Presentation**
16:20 - 16:35 CB357	Paper Title: Performance Analysis of Improved AES Algorithm Based on Feature Matrix Analysis Method All Author: Jianjun Wang, Jinbo Wang, Xinfeng Dong, Hao Tan and Yu Han Presenter: Jianjun Wang, China Electronics Technology Group Corporation, China Abstract: The diffusion layer of the standard AES algorithm released by NIST employs a fixed MDS matrix. Its limited matrix size and high hardware implementation cost constrain the algorithm's potential for achieving dynamic configurability and lightweight application in resource-constrained environments. Based on a previously proposed parameterized MDS matrix construction method—which utilizes dual-variable parameters (π, α) and redefines multiplication operations via cyclic permutation and XOR operations—this paper successfully leverage these large-scale MDS matrices constructed to improve the original AES-128 Algorithm. Building upon this research, we apply the aforementioned parameterized matrices to an improved AES algorithm, realizing a dynamically variable design for the diffusion layer. Simultaneously, by employing the characteristic matrix analysis method proposed by scholar Sun Bing from National University of Defense Technology, we conduct bit-level modeling of the operations within the AES round function. The characteristic matrix precisely characterizes the correlation between input and output bits, thereby enabling quantitative analysis of security metrics such as the full diffusion round count at the bit level. Experimental results indicate that, under the premise of maintaining consistency with the original AES-MDS matrix in terms of security metrics like branch number and full diffusion round count, the general MDS matrices constructed using our proposed method reduce the optimal hardware implementation cost of the diffusion layer by approximately 10% (from 608 to an optimal 544). Furthermore, we investigate the relationship between parameter selection and hardware implementation cost, concluding that the number of d-xors exhibits a positive This work is supported by the National Key Laboratory of Security Communication Foundation (2025, 6142103042507). correlation with the bit length n corresponding to the selected parameters. Additionally, when the number of non-zero elements ("1"s) in the binary representation of the selected parameters does not exceed 4, the implementation cost is consistently superior to that of the original algorithm
16:35 - 16:50 CB595	Paper Title: Detecting Modern Phishing via Large Language Model-based Cross-Modal Consistency Reasoning All Author: Lin Li, Zhangling Yan, Yuanyuan Huang Presenter: Lin Li, Chengdu Jincheng College, China

Abstract: Modern phishing attacks, particularly Business Email Compromise (BEC) and sophisticated social engineering, have evolved beyond simple keyword matching and statistical anomalies, rendering traditional detection methods increasingly ineffective. In this paper, we propose a novel detection frame work leveraging Large Language Models (LLMs) with Cross Modal Consistency Reasoning. Our approach explicitly verifies the logical alignment between email headers (e.g., Return-Path, From-Domain) and the semantic context of the email body. We evaluate our system on a balanced dataset of 1,822 samples, achieving a final accuracy of 98.68%. Furthermore, our optimized data preprocessing pipeline reduces token usage by 81.35%, making the deployment of large-scale reasoning models computationally feasible. Experimental results confirm that our consistency-focused strategy significantly outperforms baseline methods, particularly in detecting subtle spoofing attacks where header-body mismatches are the only indicator of malicious intent.

16:50 - 17:05
CB606

Paper Title: Hierarchical Anchor Learning for Budget-Constrained Bitcoin Fraud Investigation
All Author: Hai-Nam Vu, Manh-Hung Ha, Minh-Ha To, Thi-Minh-Ngoc Luu, Zhang Yuemei, Pham Thi Thanh Thuy
Presenter: Manh-Hung Ha, Vietnam National University, Viet Nam

Abstract: This paper proposes a decision-oriented framework for illicit transaction detection that addresses fundamental limitations of existing classification-centric approaches on the Elliptic Bitcoin dataset. First, we propose a principled sampling strategy that ensures broad temporal and structural coverage while maintaining realistic class proportions during training. Second, we develop a multi-view risk fusion framework that combines complementary representations from multiple graph neural architectures, leveraging ensemble diversity to improve discrimination between licit and illicit transactions. Third, we formulate investigation selection as a budget-aware coverage optimization problem, transforming risk prioritization from a ranking task into a submodular maximization objective that explicitly accounts for graph-induced redundancy. Empirical evaluation demonstrates that anchor-based training achieves su-perior temporal generalization compared to random or stratified sampling baselines, with particularly pronounced improvements in later time periods where class imbalance is most severe.

17:05 - 17:20
CB809

Paper Title: A Secure Mechanism for Nested GPU Containers in AI Developer Sandboxes
All Author: Bin Pan, Rongfu Leng, Hai Tang
Presenter: Bin Pan, Shanghai DaoCloud Network Technology Co., Ltd., China

Abstract: With the rapid development of artificial intelligence technology, the demand for AI Agent research and debugging is growing. AI Agent sandbox, as an isolated execution environment, provides a secure and controllable experimental platform for intelligent agent development. However, requirements such as building images, launching containers, and accessing GPU resources within the sandbox environment pose new challenges for existing container technologies. Traditional Docker outside Docker (DoD) solutions have security and isolation weaknesses, while Docker in Docker (DinD) solutions rely on privileged mode operation, thus breaking container

security boundaries. To address these issues, this paper proposes a secure container nesting mechanism for AI Agent sandboxes. It achieves non-privileged container nesting operation through a webhook and sidecar container architecture. Meanwhile, we achieve the isolation of GPU resources and secure access control through a Docker proxy. Experimental results demonstrate that our approach achieves secure, non-privileged container nesting while maintaining near-native performance for sandboxed AI workloads.

17:20 - 17:35
CB585

Paper Title: A Lightweight Keyword and Logistic Regression Hybrid for Triage of Local E-Complaints with Messenger Chatbot Integration
All Author: John Clement Escobañez, Ganesh Kumar, Mark Lagman, Marco Paulo Burgos, John Carlo Torres, Mark Francis Mallari
Presenter: John Clement S. Escobanez, National University, Philippines

Abstract: Local government complaint portals and Facebook Messenger pages often receive short, noisy, bilingual reports that require fast routing to the correct office. Manual triage does not scale and it is difficult to audit. We present a practical hybrid approach that combines bilingual keyword rules with a confidence gate and a TF-IDF Logistic Regression fallback, designed for CPU-only deployment and for direct integration with Facebook Messenger chatbots used by Philippine cities and their barangays. The system is explainable by construction through matched-term evidence and model feature contributions, and it aligns with public sector transparency needs documented in recent policy research. We describe a dataset protocol for five hundred to one thousand anonymized complaints with barangay cues, two independent raters, adjudication, and Cohen's Kappa agreement. Evaluation uses five-fold cross validation, per-class precision, recall, F1, Macro-F1, jurisdiction accuracy, auto-routing rate, and estimated time saved in queue. Baselines include rules-only and Logistic Regression-only models. We position this design within e- governance complaint classification and municipal chatbot deployments, and we motivate our choice of interpretable, low- compute methods as suitable for public administration.

17:35 - 17:50
CB817

Paper Title: A formal approach to llm hallucination detection and mitigation
All Author: Zhiyin Wang, William Wei Song，Yanqing Liu
Presenter: Zhiyin Wang, Jiangxi University of Finance and Economics, China

Abstract: This study focuses on ”LLM hallucinations” -a core risk in real-world multi-team projects-and provides its definition, classification, formalized description, as well as an initial approach to mitigation of LLM hallucinations. Through experiments, we demonstrate that hallucinations are an inherent deficit of language models which tend to ‘over-complete’the users’ requirements and can be effectively mitigated by using structured instructions combined with systematic reviews. This research provides usable theoretical frameworks and practical methodologies for improving the factual reliability of LLM-generated content in project-oriented scenarios.

TECHNICAL SESSIONS

Session 7: Advanced AI and Emerging Technologies

Chair: **Yanping Wang**, Xihua University, China

16:20-18:10 | Manasarovar Meeting Room 2F

TAIK DETAILS	
Time	**Presentation**
16:20 - 16:40 **Invited Speaker**	Paper Title: CSO Operational Monitoring System and Key Technologies for Hot Product Supply Chain Presenter: Xiaoping Qiu, Southwest Jiaotong University, China Abstract: The operational monitoring of hot product supply chain is different from others. Based on the management requirements of CSO (chief supply chain officer), the paper starts the 4-stage lifecycle of hot product firstly includes introduction, growth, mature, and decline, followed by 5-aspect operational monitoring of it includes supply, inventory, lifecycle, sale and order. Then the key technologies related to those aspects are introduced with the evaluating indicators of hot product supply chain, and the cloud software frame of the system is cooperated the cooresponding data model. Finally, the designed interfaces are demostrated with future knowledge management.
16:40 - 16:55 **CB590**	Paper Title: Research on the Construction and Alignment of Multimodal Knowledge Graphs for the Intelligent Activation of Cultural Heritage All Author: Hui Li Presenter: Hui Li, Chengdu Agricultural College, China Abstract: To achieve in-depth understanding and cross-modal retrieval of the Tianfu Farming cultural heritage, this study addresses key challenges in constructing its multimodal knowledge graph-specifically, image-text entity alignment, semantic interpretation of visual features, and transforming unstructured descriptions into structured knowledge. A joint alignment framework integrating visual language models and ontological reasoning(VLM-OR) is proposed. An independently constructed "Tianfu Farming Multimodal Alignment Test Set" was used to conduct comparative experiments with three mainstream baseline methods, while ablation studies validated the contribution of each framework component. Experimental results show that the framework achieved an Acc@1 of 76.9% and an MAP of 0.823 in the entity alignment task, and significantly outperformed baseline methods in cross-modal retrieval (Recall@10 of 86.0%) and visual question answering (accuracy of 84.0%). The framework requires no extensive manual annotation, balancing performance with practicality. It provides reliable technical support for the intelligent activation of Tianfu Farming culture and can be extended to the construction of multimodal knowledge graphs for similar cultural heritage.

Paper Title: User-Space Network Stack with Legacy Compatibility
All Author: Dhruthan M N, Divya Rao, Ananya Krishna, Anand Desai, Prafullata Kiran Auradkar
Presenter: Dhruthan M N, PES University, India

16:55 - 17:10
CB783

Abstract: The ubiquitous Linux networking stack, which is developed as monolithic, general-purpose stack introduces inherent performance limitations. It has limitations due to high overhead, the use of interrupt-driven system calls and resource contention issues. These limitations are characterized especially by high volumes of small, frequent requests. In overcoming these kernel weaknesses, this paper discusses the design, implementation, and assessment of a high-performance, secure, and programmable user-space networking-Stack using kernel bypass. This is achieved by using Data Plane Development Kit (DPDK), which makes it possible to access the Network Interface Card(NIC) directly through Poll Mode Drivers (PMDs), migrating functions such as Packet handling and connections completely to the user space. An essential architectural achievement is modifications to GNU C Library to catch the POSIX socket API calls. Thus, unaltered legacy applications such as Nginx, can run effortlessly atop the customized stack. Comparative results of benchmarking prove that the user-space stack ensures it has consistent and predictable latency regardless of varying loads in stark contrast with exponentially increasing latency. Seen in the traditional Linux stack under similar stress, justifying this strategy as a superior, scalable, and maintainable one cloud infrastructure of today.

Paper Title: A Deterministic Geometric Feature Reduction Framework for Scalable and Interpretable AI
All Author: Masrat Rasool, Adnan Khan, and Samir Brahim Belhaouari
Presenter: Adnan Khan, Hamad bin Khalifa University, Qatar

17:10 - 17:25
CB2028

Abstract: Artificial intelligence systems use dimensional feature representations a lot. These representations have many dimensions, making them difficult to work with. They take up a lot of space and are complicated to understand. This paper describes a way to train a free geometric feature-reduction vector with many dimensions. Turns it into a smaller five- dimensional representation. This new way of doing things looks at things like how big something is, which direction it is going, and how it is arranged. It also looks at how these things interact with each other and if they are enhanced. All of these things have a meaning. The advantage of this approach is that it does not require training. It does not need any settings or access to special data. It can handle inputs and always gives a small output. This makes it well-suited for artificial intelligence systems that lack many resources. We tried this approach with five different data sets. It worked well and retained the important parts of the data even when it was reduced by a factor of 10. It performed well in principal component analysis and better than random projection.

Paper Title: A Frequency Decounpled Meshfeee Neural Network for Transonic Supercritical Airfoil Flow Dynamics
All Author: Chen Biao, Xia yi Fan, Kong Yun, Zhang Jifa
Presenter: Chen Biao, Zhejiang University, China

17:25 - 17:40
CB4079-A

Abstract: Transonic aerodynamics of supercritical airfoils is governed by intricate

multiscale phenomena, heavily dictated by the tight coupling between abrupt shock discontinuities and delicate wall-bounded viscous layers. Standard coordinate-based networks are frequently crippled by inherent spectral bias when mapping such flows; they either over-smooth critical high-frequency singularities in favor of broad low-frequency trends, or generate spurious, non-physical Gibbs ringing when global encodings are forced to fit localized shocks. To bypass these fundamental limitations, we introduce a frequency-decoupled meshfree neural network driven by an explicit spectral separation paradigm. This novel architecture employs a bifurcated design, dividing the flow-field prediction into a low-frequency manifold branch for the aerodynamic baseline and a high-frequency residual branch for localized corrections. Grounded in multi-resolution hash grid encoding, the framework leverages the locally compact support of fine grids to capture shock transitions with unparalleled sharpness, while the coarse levels secure the overarching global flow consistency. Through the Neural Tangent Kernel theory, we mathematically validate this architecture, proving that multi-scale hash sub-kernels effectively neutralize the high-frequency eigenvalue decay that causes spectral bias. Rigorous testing on high-fidelity supercritical airfoil datasets reveals that our model demonstrate striking precision in predicting surface pressure profiles and exact shock locations. Delivering inference speeds over four orders of magnitude faster than traditional CFD solvers, this meshfree approach provides a highly reliable and computationally lightweight surrogate for rapid aerodynamic shape exploration and optimization.

17:40 - 17:55
CB4078

Paper Title: Attention-Guided Phased Reinforcement Learning for High-Precision Dual-Arm Collaborative Manipulation
All Author: Wei Liu, Haotian Han, Huifen Tong, Ping Yu, Dongyu Sun
Presenter: Haotian Han, Fuzhou University, China

Abstract: Dual-arm robots present immense potential in complex collaborative tasks, yet their high-dimensional state action spaces and strong physical coupling challenge existing deep reinforcement learning (DRL) methods. Traditional DRL faces two core bottlenecks: insufficient representation of cross-arm geometric and dynamic dependencies using conventional MLPs, and the exploration-exploitation dilemma where single algorithms struggle to balance broad exploration with stable convergence. To address these issues, we propose a novel DRL framework integrating a multi-head attention mechanism with phased curriculum training. First, a bimanual attention network serves as the state encoder to explicitly model interactive dependencies like spatial alignment and internal force balance, overcoming multi entity representation blind spots. Second, an adaptive SAC-to PPO hybrid training paradigm is designed: SAC drives early stage exploration to avoid local optima, smoothly transitioning to PPO for high-precision, low-variance deterministic fine-tuning. Evaluated on strongly coupled bimanual manipulation tasks under an underlying dynamics controller, our method achieves a highly precise Root Mean Square Error (RMSE) of 5.40 mm. Ablation studies confirm the attention mechanism reduces system error by 17.7%, while phased training outperforms pure PPO and SAC by 7.1% and 9.1%, respectively. Furthermore, visualizing attention weights demystifies the policy's "black box," providing valuable interpretability for the network's adaptive learning of physical coordination.

Paper Title: AI-Based Latency-Throughput Tradeoff Optimization for Stream Processing
All Author: Zhongwei Zhang, Baogang Sun, Ye Yan, Yong Pi, Kaibing Liu, Qian Xu, Guiwen Gan
Presenter: Zhongwei Zhang, Chongqing College of Humanities, Science & Technology, China

17:55 - 18:10
CB4085

Abstract: The extensive deployment of real-time stream processing systems in domains such as the Internet of Things (IoT), industrial monitoring, and video stream transmission, etc. imposes stringent requirements on the collaborative optimization of latency and throughput. However, the inherent trade-off between these two performance metrics remains a critical bottleneck that limits overall system efficiency. Traditional static scheduling strategies struggle to adapt to the dynamic spatiotemporal characteristics of streaming data, failing to achieve an optimal dynamical tradeoff. This paper proposes an Artificial Intelligence-based Latency-Throughput Tradeoff Optimization method (AI-TO) to address this issue. This method integrates reinforcement learning with adaptive feature extraction to construct a tradeoff optimization model tailored to the dynamic characteristics of stream data, enabling real-time adaptive adjustment of resource scheduling and task allocation. Experimental results demonstrate that, compared with traditional strategies, the proposed method reduces latency by 18.3%~29.7% and improves throughput by 12.5%~21.6% under varying data flow rates and load fluctuation scenarios. It also exhibits superior robustness in high dynamic stream data scenarios, effectively achieving a globally optimal latency-throughput tradeoff.

TECHNICAL SESSIONS

Session 8: Cloud Computing and Security

Chair: **Chunli Sun,** Xihua University, China

16:20-17:50 |Yaamdrok Meeting Room 2F

TAIK DETAILS	
Time	**Presentation**
16:20 - 16:35 CB222	Paper Title: Environmental Impact of Cloud-Hosted Large Language Models All Author: Arif Faheem Khan, Dan O'Connor, Daren Luttman, and Qing Tan Presenter: Qing Tan, Athabasca University, Canada Abstract: Cloud-hosted large language models (LLMs) are now core workloads in modern cloud computing, yet their workload-level environmental impacts remain poorly quantified due to limited transparency and the absence of standardized reporting. However, the environmental cost of developing and running these models, especially their energy consumption, carbon emissions, and water use, remains underreported and poorly regulated. This paper examines the environmental footprint of cloud-hosted LLMs using data from cloud service providers, regulatory bodies, and recent research. By analyzing resource usage, this study aims to quantify CO_2 emissions and water consumption across different infrastructure setups and geographic regions. A literature review reveals inconsistent reporting standards and a lack of environmental oversight as adoption scales. The paper concludes with recommendations for mitigating the environmental impact of LLMs through sustainable design, energy-efficient model architectures, and policy-level changes in AI governance.
16:35 - 16:50 CB343	Paper Title: Benchmarking Deep Learning Models for Anomaly Detection in Real-World Cloud Telemetry All Author: Sumit Dhyani and Sougata Mukherjea Presenter: Sumit Dhyani, Indian Institute of Technology Delhi, India Abstract: Modern cloud platforms generate high-dimensional, noisy telemetry from thousands of microservices. Unlike classical anomaly detection benchmarks, cloud anomalies are short-lived, irregular, and largely non-periodic, making timely detection challenging. We present an empirical benchmark of deep learning models for anomaly detection using a real-world IBM Cloud Console dataset containing 39,000+ time steps, 117,000 service-feature combinations, and 25 labeled anomaly windows. We evaluate GRU, Transformer, TimesNet, and Autoformer architectures using the Numenta Anomaly Benchmark (NAB), a timing-aware metric that accounts for early detection and false alarms. TimesNet achieves the highest NAB scores due to strong early-detection sensitivity. Transformer models also detect anomalies early but incur higher false-positive rates. An improved GRU autoencoder, incorporating robust scoring and persistence rules, achieves competitive performance with a more stable false-alarm profile. Overall, the modest performance differences suggest that real cloud anomalies are dominated by short-term deviations rather than persistent periodic

structure, emphasizing the importance of timing-aware evaluation and robust post-processing.

16:50 - 17:05
CB587

Paper Title: Lightweight and Fast Range DSSE with Zero Server-Side Update Leakage
All Author: Binqi Liu, Wenqi Zhang, Ke Huang, Xiong Li and Xiaosong Zhang
Presenter: Binqi Liu, University of Electronic Science and Technology of China, China

Abstract: Dynamic Searchable Symmetric Encryption (DSSE) enables secure keyword searches while supporting insertions and deletions on encrypted data on untrusted servers. However, recent DSSE studies have primarily focused on enhancing forward and backward privacy, typically supporting only point queries and incurring substantial overheads due to reliance on long bitmaps and chained computations. Meanwhile, the static SSE scheme VH-RSSE enables efficient range queries via a tree structure but lacks dynamic update support.
To address these gaps, we propose DSSE-CTRQ, a dynamic range-query DSSE scheme that extends VH-RSSE with adjacency lists and Red-Black Trees. Unlike traditional server-side update models, DSSE-CTRQ delegates updates to the trusted client. This design avoids server-side update leakage (e.g., forward/backward privacy concerns) and ensures high efficiency.
Experimental results demonstrate the scalability and efficiency of our scheme. On a large-scale dataset of 6 million documents, our scheme achieves an index construction time of approximately 1.9s and a query latency of 10.9ms for 48k-range searches. In comparative evaluations against the baseline FB-DSSE, our scheme exhibits superior performance: a 1109x speedup in index construction (0.74s vs. 822s), a 93.2% reduction in storage overhead (286MB vs. 4196MB), and a dramatic server-side processing speedup of over 100,000x, resulting in an end-to-end latency reduction of approximately 13.7x (12.49ms vs. 171.04ms).

17:05 - 17:20
CB626

Paper Title: Supporting Root Cause Analysis Decision in Cloud Microservices Using Hybrid AI Techniques
All Author: Gayathiri Elambooranan, Pranay Sood, Muhammad Hussnain Uz Zaman, Krintanpreet Singh and Yan Liu
Presenter: Yan Liu, Concordia University, Canada

Abstract: Root cause analysis (RCA) for cloud microservices is increasingly addressed using AI-driven and large language model (LLM)–based techniques. However, existing state-of-the-art solutions are often evaluated on proprietary datasets with opaque service dependency models, and primarily focus on fault localization accuracy rather than the quality of explanations and decision support provided to operators. These limitations hinder reproducibility and obscure how RCA systems reason about service dependencies, fault propagation paths, and mitigation actions. This paper presents a hybrid, decision-support–oriented methodology for RCA in cloud microservices that emphasizes explanation quality rather than pure detection performance. The methodology integrates open-source microservice benchmarks with synthetically injected faults to construct 68 fine-grained RCA scenarios with explicit ground truth, including root cause nodes, target services, dependency paths, and affected metrics. Using this controlled setting, we evaluate multiple AI-assisted RCA strategies that combine statistical anomaly detection, hybrid information retrieval, dependency-aware context modelling, and LLM-based reasoning. Experimental results show that

augmenting LLM-based RCA with explicit dependency context and historical fault information improves the coherence and completeness of explanations, while also revealing trade-offs between precision, explanation depth, and reasoning stability. The proposed methodology provides a reproducible base for designing AI-assisted RCA systems that support operational decision-making in cloud environments.

17:20 - 17:35
CB741

Paper Title: HARC: Hotness-Aware Replicated Consistent Hashing for Load Balancing in Skewed and Dynamic Workloads
All Author: Qiuyong Yang, Lin Qian, Huanxing Qi, Haowen Du
Presenter: Lin Qian, China Southern Power Grid Company Limited, China

Abstract: Consistent hashing has been widely adopted for distributed storage systems due to its simplicity and scalability. However, its inherent weakness lies in handling skewed request distributions, where hot keys can lead to load imbalance and high tail latency. In this paper, we propose a novel approach called \textbf{HARC} (Hotness-Aware Replicated Consistent hashing), which combines the benefits of deterministic top-K candidate selection, adaptive replication based on online hotness estimation, and stability controls to address the problem of load imbalance. Through extensive experiments on several synthetic workloads, we demonstrate that HARC substantially outperforms classical consistent hashing and a two-choice baseline (KCH-2) in terms of tail latency, drop rate, and load balance under highly skewed and dynamic workloads. For instance, under a high load scenario ($\lambda=1200$), HARC achieves a p_{99} latency of 0.17s, compared to 3.8s for CH-1 and 0.25s for KCH-2, with zero drop rates across all tested loads. In Zipf skew scenarios with $\lambda=1000$ and $s=1.25$, HARC reduces the p_{99} latency from 3.81s for KCH-2 to 0.087s, and achieves a lower load CV of 0.39 compared to 0.52 for KCH-2. Additionally, HARC's stability controls provide resilience against drifting hotspots, maintaining zero drop rates and low tail latency during high skew and dynamic load changes. These results highlight the value of hotness-driven replication beyond multi-choice routing, offering a scalable and robust solution for distributed systems facing non-stationary and skewed request patterns.

17:35 - 17:50
CB807

Paper Title: Online Uncertainty-Aware Hierarchical Scheduling for Heterogeneous Cloud Workloads Using Deep Reinforcement Learning
All Author: Sunday Awine, Jinwei Liu
Presenter: Sunday Awine, Florida Agricultural and Mechanical University, USA

Abstract: Modern cloud datacenters increasingly execute heterogeneous workloads composed of latency-sensitive short jobs and resource-intensive long jobs, often exhibiting complex task dependency structures and significant runtime uncertainty. Existing cluster schedulers rely primarily on static heuristics and handcrafted policies, which struggle to simultaneously achieve low tail latency, high resource utilization, and robustness to execution-time mis-estimation at scale. In this paper, we propose an online uncertainty-aware hierarchical scheduling framework that integrates Deep Reinforcement Learning (DRL) into a hybrid cloud scheduler. By formulating the scheduling problem as a Markov Decision Process (MDP), the scheduler dynamically learns to select scheduling targets, probing aggressiveness, and priority modes based on observed system states. To validate our approach, we implemented a custom discrete-event simulation environment using CloudSim, generating dynamic workloads

inspired by production cluster traces. Experimental results demonstrate that our learning-based scheduler prevents queue saturation entirely, effectively mitigating head-of-line blocking and providing near-instantaneous recovery from transient workload spikes compared to traditional static sampling techniques.

POSTER SESSION

PS01: AI and Machine Learning Applications

Chair: **Zhongwei Zhang,** Chongqing College of Humanities, Science & Technology, China

14:30-16:00 | Himalaya Hall 17F

PAPER DETAILS		
No.	**Paper ID**	**Presentation**
1	CB224	Paper Title: Learning Analysis Using Machine Learning and Affective Computing on the "Reflections" Section of IT Experiment Reports All Author: Yongshi Xu, Lewei He, Jing Huang Presenter: Yongshi Xu, Guangzhou College of Commerce, China
2	CB217	Paper Title: Prospects for Integrated Energy Services Development: A Policy Topic Modeling Study Based on BERTopic All Author: Xiaoping Xia, Dehua Yao, Biao Wang, Wanting Cai, Xizijun He, Conglin Wu, Lu Yang, Jun Zhang* Presenter: Xizijun He, Guangdong Science and Technology Library, China
3	CB352	Paper Title: A Multimodal Session-based Recommendation Method with Data Enhancement and Dynamic Fusion All Author: Tao Chen，Yongquan Fan，Yajun Du，Xianyong Li Presenter: Tao Chen, Xihua University, China
4	CB362	Paper Title: An Improved YOLOv8 Object Detection Method with Dual Attention and Adaptive Weighting All Author: Zhao Peng, Wang Jiaming, Lu Bo Presenter: Wang Jiaming, Taiyuan Normal University, China
5	CB607	Paper Title: Large Language Model-Assisted SQL Teaching Based on the CSpider Dataset All Author: Yongshi Xu, Yanfang Hou, Jing Huang, Lewei He, Jiateng Duan and Ziran Huang Presenter: Yongshi Xu, Guangzhou College of Commerce, China
6	CB597	Paper Title: Prediction of tea quality based on Data Mining All Author: Yichen Hu, Shaowu Zeng, Chaofan Yin, Tian Xia and Mao Jiawei Presenter: Yichen Hu, Hubei Polytechnic Institute, China
7	CB583	Paper Title: ST-AttTSN: Social Relationship Prediction via Graph Representation Learning of Spatio-Temporal Trajectories All Author: Junjie Zhou, Huibing Zhang and Lei Zhang Presenter: Junjie Zhou, Guilin University of Electronic Technology, China
8	CB611	Paper Title: A Noise-Free Method for Generating Speech Adversarial Examples Against ASR Systems All Author: Ningduo Peng, Lihua Li, Xiaobo Li, Shuai Ji Presenter: Ningduo Peng, Chengdu Jincheng College, China

9	CB592	Paper Title: Design and Implementation of an LLM-Driven Intelligent E-Commerce Data Analytics System All Author: Zhengguang Zheng, Tao Liu, Han Hu, Qing Wang, Liyan Lin Presenter: Zhengguang Zheng, China Mobile Internet Co., Ltd., China
10	CB757	Paper Title: An Algorithm for Cross-Spectrum Gait Recognition via Gait Energy Images and Transfer Learning All Author: Yuhuang Zheng Presenter: Yuhuang Zheng, Guangdong University of Education, China
11	CB787	Paper Title: Intelligent Wire Pairing Method Based on Machine Vision for Aircraft Cable Breakage Repair All Author: Mingjun Huang, Saltanat Jengshan and Xiaoliang Jia Presenter: Xiaoliang Jia, Northwestern Polytechnical University, China
12	CB784	Paper Title: Intelligent Reading Recognition Method Based on Deep Learning for Liquid Crystal Digital Display Instruments Real-time Data Towards Smart Manufacturing All Author: Mingjun Huang, Lun Wang and Xiaoliang Jia Presenter: Xiaoliang Jia, Northwestern Polytechnical University, China
13	CB801	Paper Title: Mitigating Negative Transfer in Composite Bearing Fault Diagnosis under Few-Shot Conditions: A Class-Aware Balanced Mix Strategy All Author: Yuheng He, Yuanshan Liao, Weijin Song Presenter: Yuheng He, Sichuan University, China
14	CB777	Paper Title: Optimizing Resource Scheduling for Intelligent Cockpit SoCs Using Deep Reinforcement Learning All Author: Zhongzhe Song, Zhibin Gao, Weijian Xu, Zhida Ke, Lianyou Lai, Ziyang Chen, Long Yan and Zihang Shao Presenter: Zhongzhe Song, Jimei University, China
15	CB818	Paper Title: Max Production Recommendation Using Machine Learning Techniques All Author: Xia Hu, Siyang Li and Hongjun Wang Presenter: Siyang Li, Southwest Jiaotong University, China
16	CB1002	Paper Title: A Mixture of Agents Approach for Test Case Generation All Author: Run-Wei Wang, Ming-Xing Luo Presenter: Run-Wei Wang, Southwest Jiaotong University, China
17	CB1007-A	Paper Title: STSNet: A Spatio-temporal-spectral Deep Learning Network Model for Depth of Anesthesia Estimation from EEG Signals All Author: Heng Dai, Jing Chen Presenter: Heng Dai, Chongqing Health Center for Women and Children, China
18	CB2037	Paper Title: Event Propagation Modeling for Ultra-Long Narrative Video Reasoning All Author: Yuan Zhang, Jianbin Jiao Presenter: Yuan Zhang, University of Chinese Academy of Sciences, China
19	CB2029	Paper Title: Hierarchical Agent-Tool Scheduling for Dense Counting in High-resolution Remote Sensing All Author: Wei Yang, Jiaming Zhao Presenter: Wei Yang, University of Chinese Academy of Sciences, China
20	CB2021	Paper Title: DG-SConv-LKRF: A Retinal Vessel Segmentation Method for Connectivity Modeling of Elongated Structures

		All Author: Jingjing Ma, Chaoying Tan, Zhiqiang Guo*(Corresponding author) Presenter: Jingjing Ma, Sichuan Vocational College of Finance and Economics, China
21	CB2032	Paper Title: Zero-Shot Referring Expression Comprehension via Differentiable Fourier Descriptors All Author: Wenyu Ma, Xuesong Yang, Yu Zhang Presenter: Yu Zhang, University of Chinese Academy of Sciences, China
22	CB3049	Paper Title: Research on Intelligent Museum Tour Guide System Based on Artificial Intelligence All Author: Huijuan Zhang, Kejia Wang, Baiquan Shi, Wenzhan Zhu Presenter: Huijuan Zhang, Inner Mongolia Electronic Information Vocational Technical College, China
23	CB3051	Paper Title: OwenNet: A Partition-Aware Harsanyi Network for Grouped Feature Attribution All Author: Zheng Li, Jian Wang, XiaoSong Meng Presenter: Zheng Li, Air Force Engineering University, China
24	CB1008	Paper Title: FiE-YOLO: A Distortion-Adaptive Object Detection Framework for Fisheye Cameras All Author: Yuanshun Cheng Presenter: Yuanshun Cheng, Xihua University, China
25	CB3045	Paper Title: Multi-omics Brain Aging Classification: A Graph-based Shared Subspace Fusion Approach All Author: Pengxiang Wang Presenter: PengXiang Wang, City University of Macau, China
26	CB3050	Paper Title: LLM-Driven Abstractive Semantic Descriptions: A Paradigm for Multimodal Semantic Extraction All Author: Yunyang Sun, Changbao Li Presenter: Yunyang Sun, China Electronics Technology Group Corporation, China
27	CB4067	Paper Title: A Knowledge-Driven Parametric Framework for Controllable AIGC Generation of Chinese All Author: Huichen Liu, Ratanachote Thienmongkol, Natirath Weeranakin Presenter: Huichen Liu, Mahasarakham University, Thailand
28	CB4057	Paper Title: Improving Few-Shot Event Detection with Multi-view Prototype Contrastive Pre-training All Author: Hao Pan Presenter: Hao Pan, University of Electronic Science and Technology of China, China
29	CB2019	Paper Title: Real-Time Safety Monitoring for Tinplating Production Lines Based on Video Fusion All Author: Dongliang Yang, Liang Hao, Hongpeng Li, Haitao Miao, Yingqi Xu, Nan Zhang Presenter: Dongliang Yang, China
30	CB4072	Paper Title: A Deep Q-Network Framework with Hierarchical Pre-screening for Embodied Intelligent Fault Diagnosis All Author: Wenjie Liu, Xin Zhao, Yangyu Zhao Presenter: Xin Zhao, Shanxi Datong University, China

31	CB4086	Paper Title: From Generation to Simulation: Modeling Social Conflict Dynamics via Dual-Process and Graph-Constrained Agents All Author: Haowei Wang, Zhongying Niu, Kai Zhou, Yanan Bai, Juan Ning Presenter: Haowei Wang, China Aerospace Science & Industry Corporation, China

POSTER SESSION

PS02: Cloud Computing, Security and Data Analytics

Chair: **Petrov Alexey**, Polar State University, Russia

16:20-18:00 | Himalaya Hall 17F

PAPER DETAILS		
No.	**Paper ID**	**Presentation**
1	CB230	Paper Title: A Stream-Batch integrated Road Damage Detection System in Big Data Scenarios All Author: Guo Yuning, Liu Haowen Presenter: Guo Yuning, Hubei University, China
2	CB361	Paper Title: Design and Implementation of an Automated Deployment Framework for Cloud Microservices All Author: Lina Liu , Jiao Zhou Presenter: Lina Liu, Chengdu Jincheng College, China
3	CB364	Paper Title: ICS Protocol Field Type Inference: A Machine Learning-Based Approach via Behavioral Feature Analysis All Author: Rongbao Kang, Xin Tan, Xiao Zhang, Yongdong Zhang and Zhihong Rao Presenter: Xin Tan, China Electronics Technology Group Corporation, China
4	CB367	Paper Title: AeroLink: Decentralized Service Discovery for UAV Swarms via Logical Links All Author: Beibei Zhang, Tieying Li, Liwei Shen Presenter: Beibei Zhang, Fudan University, China
5	CB356	Paper Title: APSM: An Automatic Parallel Strategy Search Algorithm for Large Model Training on MindSpore All Author: Ruiming Wen, Jingyu Zhang, Jie Ou, Shashikant Ilager and Wenhong Tian Presenter: Jie Ou, University of Electronic Science and Technology of China, China
6	CB350	Paper Title: A Backdoor Defense Method for Federated Learning based on Adversarial Attacks All Author: Jinhao Sun, Jie Zhou, Jin Zhao and Wenqi Chen Presenter: Jinhao Sun, Xihua University, China
7	CB337	Paper Title: Lightweight Dynamic Priority Scheduling Algorithm Based on Spatio-Temporal Prediction All Author: Jianhang Miao,Xiaodong Yu,Huijuan Wang,Wei Huang Presenter: Jianhang Miao, Beijing Institute of Technology, China
8	CB336	Paper Title: Two-Stage Constraint-Aware NSGA-III for Spatio-Temporal Task Allocation in Edge Computing All Author: Weiyi Zhang, Xiaodong Yu, Huijuan Wang, Wei Huang Presenter: Weiyi Zhang, Beijing Institute of Technology, China

9	CB365	Paper Title: Lightweight NSH Proxy for Heterogeneous Secure Service Chaining All Author: Yingying Xu,Xiaodan Guo, Xuemei Huang, Shai Ji Presenter: Yingying Xu, Chengdu Jincheng College, China
10	CB586	Paper Title: Recognition Algorithm of Ciphertext Based on Entropy All Author: Shuai Ji, Xiaodan Guo, Yinging Xu, Ningduo Peng Presenter: Shuai Ji, Chengdu Jincheng College, China
11	CB578	Paper Title: Refactoring the Security System of Campus Network with Zero Trust Model All Author: Wen Sheng Hu Presenter: Wen Sheng Hu, Guizhou Communications Polytechnic University, China
12	CB589	Paper Title: Cloud-Native Big Data Analytics for Optimizing Antibody-Drug Conjugates (ADCs) Clinical Trial Design in Pancreatobiliary Cancers All Author: JUNKUN ZHU Presenter: Junkun Zhu, The Chinese University of Hong Kong, China
13	CB604	Paper Title: A Maturity Model for Industry Cloud Operation Portals All Author: Yuxuan Wang, Shuo Zhu, Xuesen Liu, Zhe Li and Chengyu Cai Presenter: Yuxuan Wang, China Academy of Information and Communications Technology, China
14	CB605	Paper Title: Research on AI Cloud Operations Maturity Assessment Model Based on Empirical Analysis All Author: Xuesen Liu, Yuxuan Wang, Shuo Zhu, Xianghua Wang and Chengyu Cai Presenter: Xuesen Liu, China Academy of Information and Communications Technology, China
15	CB603	Paper Title: A Layered Technical Capability Maturity Model for Industry Cloud Infrastructure All Author: Xianghua Wang, Xuesen Liu, Yuxuan Wang, Shuo Zhu, Fei Ma and Chengyu Cai Presenter: Xuesen Liu, China Academy of Information and Communications Technology, China
16	CB619	Paper Title: The Evolution of Government Data Open Policy Architecture Based on Text Mining All Author: Qiang Yan Presenter: Qiang Yan, Southwest University of Science and Technology, China
17	CB799	Paper Title: Analyzing Causal Pathways in Regional Sustainability: A Time-Series Data Mining Approach All Author: Jiangshan Hu, Yunyun Sui Presenter: Yunyun Sui, Weifang University, China
18	CB796	Paper Title: Spatial Data Mining for Environmental Carrying Capacity Assessment: A Case Study of Shandong Province, China All Author: Jiangshan Hu, Yunyun Sui Presenter: Yunyun Sui, Weifang University, China

19	CB805	Paper Title: Preference-Aware Field-to-Ontology Matching for Urban Public Data Integration All Author: Zhuhu Que, Xiuwen Yi, Chunyang Li, Junbo Zhang Presenter: Zhuhu Que, Southwest Jiaotong University, China
20	CB797	Paper Title: A Digital-Intelligent Evaluation System for College Entrance Examination Scoring Based on Cloud Computing and Big Data Analysis — Empowering Secondary School Teaching Practice All Author: Xiaoling Yang, Lei Zhang, Mingxi Yang and Zhaohui Feng Presenter: Xiaoling Yang, Sichuan Educational Examination Authority, China
21	CB790	Paper Title: A Pairing-Free Matchmaking Bilateral Access Control Scheme with Equality Testing for Cloud-Fog-Assisted Secure IoT-Based EHR Sharing All Author: Junaid Hassan, Zhen Qin, Muhammad Arslan Rauf, Umar Aftab, Abdul Hadi and Abdur Rafay Presenter: Junaid Hassan, University of Electronic Science and Technology of China, China
22	CB814	Paper Title: A Systematic Evaluation of LLM Security in Cloud Environments: Failure Modes in Malicious URL and Jailbreak Detection All Author: Meixi Lin, Yang Liu, Xiang Fu, Yijin Wang, Zihan Fan Presenter: Meixi Lin, Sichuan University, China
23	CB815	Paper Title: A Risk-Aware Privacy Protection Model Based on Token-Level PII Detection for Cloud Data Governance All Author: Ning Borui, Wang Lichen, Ning Haoxiang Presenter: Wang Lichen, Sichuan University, China
24	CB816	Paper Title: CAT-LDP: Cloud-edge Adaptive Taxonomy under Local Differential Privacy All Author: Junzhe Yang, Chang Xia, Xiyun Wang, Anren Sun, Wenbo Ding and Xinye Chen Presenter: Junzhe Yang, Sichuan University, China
25	CB2017	Paper Title: Interpretable Adversarial Transfer Learning for Multi-Agent Supply Chain Optimization: A Dynamic Domain Adaptation Framework All Author: Chaoying Tan, Zhiqiang Guo, Jingwen Huang, Jingjing Ma Presenter: Chaoying Tan, Sichuan Vocational College of Finance and Economics, China
26	CB4064	Paper Title: Spatial-only representations for Multi-Channel Speaker Diarization All Author: Zewei Li, Yongke Yang, Yuze Li, Shan Liang, Yin Cao Presenter: Zewei Li, Xi'an Jiaotong-Liverpool University, China
27	CB4084	Paper Title: Task-Aware Dynamic LoRA for Multiple-Choice Environmental Audio Question Answering All Author: Hengyu Hu, Fang Kang, Shan Liang, Yin Cao Presenter: Hengyu Hu, Xi' an Jiaotong-Liverpool University, China
28	CB4082	Paper Title: InterMF: Uncertainty-Guided Adaptive Iterative Decoding for Signal-Aware Motion Forecasting at Intersections All Author: Ao Yang, Liping Lu Presenter: Ao Yang, Wuhan University of Technology, China
29	CB4087	Paper Title: Progressive Rationale-Augmented Multimodal Fake News Detection with Structured Reasoning and Emotional Integration

		All Author: Xiao Han，Heyu Chang*，Nianwen Si，Dan Qu Presenter: Xiao Han, Information Engineering University, China
30	CB615	Paper Title: Graph Topology-Driven Adaptive Optimization Stitching Method for Multi-Strip UAV Imagery All Author: Chen Jun, Tang Honghua, Li jianhui, Yan Dongmei Presenter: Jun chen, Chinese Academy of Sciences, China

ONLINE SESSIONS

Online Session 1: AI for Healthcare and Medical Applications

Chair: **Hongjun Wang**, Southwest Jiaotong University, China

10:00-11:35 | 895 9753 0118 Password: 042426

TAIK DETAILS	
Time	**Presentation**
10:00 - 10:20 **Invited Speaker**	Paper Title: Decentralized Privacy-Preserving Federated Multi-Architecture Deep Ensemble Framework for Lung Cancer Presenter: Radhakrishna Bhat, Manipal Institute of Technology, India Abstract: Early detection of lung cancer improves patient survival outcomes and identifies the most effective treatment options. Deep learning models have played a vital role in lung cancer classification with significant drawbacks about centralized systems, including single points of failure, scaling issues across healthcare networks, and limited access to multi-institutional datasets. Our study presents a blockchain-coordinated federated learning framework that enables secure multi-hospital collaboration to increase the precision of diagnosis. In this approach, we integrate three pre-trained convolutional neural network (CNN) models and develop a meta-model ensemble architecture, ensuring privacy protection of sensitive data by differential privacy. By using an interplanetary file system (IPFS) for decentralized model storage and ethereum smart contracts for transparent coordination, the proposed methodology removes single points of failure and permits multiple institutions to collaboratively develop models.
10:20 - 10:35 **CB225**	Paper Title: Optimal Timing of Personalized Cancer Chemotherapy via Mathematical Optimization All Author: Optimal Timing of Personalized Cancer Chemotherapy via Mathematical Optimization Presenter: Qiwu Liu, Hefei University of Technology, China Abstract: Clinical trials have demonstrated that adaptive therapy confers superior therapeutic efficacy relative to conventional cancer treatment approaches, while maintaining patient quality of life and improving cost effectiveness. Despite these advantages, current investigations into adaptive therapy remain largely qualitative at the patient level and frequently overlook the essential requirement for individualized optimization of therapeutic strategies. In this study, we present a clinical decision making framework that integrates optimal control theory with personalized treatment design. Using mathematical optimization methods, the framework determines the patient specific optimal timing of therapy and incorporates individualized clinical variables and tumor dynamic characteristics to ensure that treatment administration aligns with each patient's distinct disease course. The findings indicate that this individualized approach not only enables precise scheduling of therapy but also reflects patientspecific tumor biology, thereby providing theoretical support for improving

patient survival outcomes.

10:35 - 10:50
CB612

Paper Title: Visualization of Medical Data Management Trends in the Big Data Era
All Author: Shangyue Yang, Lizhen Cao, Biran Zhu
Presenter: Shangyue Yang, Wuhan University of Technology, China

Abstract: With the deep integration of big data technology and life sciences, medical data management has become a core engine for precision medicine and medical informatization. Using the Web of Science Core Collection as the data source, this paper employs CiteSpace bibliometric software to visually analyze 330 core articles in the field of medical data management from 2013 to 2025. By deconstructing publication trends, author co-citation networks, and keyword maps, this study reveals the logical evolution of the field from "resource integration" to "ubiquitous collection" and "secure computing." The results identify three major research hotspots: big data-empowered precision medicine, the deep integration of next-generation information technologies, and blockchain-driven data security sharing. This study aims to clarify the technological evolution of medical data management and provide theoretical guidance and trend references for future research.

10:50 - 11:05
CB1010

Paper Title: DINOv2-MoE for Pasture Biomass Estimation from Top-View RGB Images
All Author: Ni Ding
Presenter: Ni Ding, Beijing Institute of Technology, China

Abstract: Estimating pasture biomass from top-view RGB images is important for precision agriculture but remains challenging because of the limited labeled data, noisy ground truth, and large environmental variation. This study investigates the effectiveness of large self-supervised vision backbones combined with conditional regression heads for the CSIRO Image2Biomass challenge. Specifically, we adopt DINOv2 (ViT-B/14) as a feature extractor and compare lightweight single-MLP regressors against a dense Mixture-of-Experts (MoE) regression head, and we also study the role of NDVI as an auxiliary training target. Through systematic experiments and ablation on the CSIRO pasture dataset, we find that DINOv2 features substantially improve predictive performance compared to conventional CNN backbones, that naive NDVI augmentation degrades performance owing to feature space redundancy and optimization conflict, and that the MoE head's benefits depend strongly on expert count and data scale. Our gating analyses confirm that the MoE successfully learns to partition data heterogeneity and specialize experts on specific biomass components like clover, but its overall performance did not exceed the single-MLP baseline, likely due to limited training data. We discuss practical model designs for biomass regression under limited data.

11:05 - 11:20
CB4088

Paper Title: FRM-EPPS: Enhanced Polyp Segmentation Network via Feature Refinement and Channel Attention
All Author: Han-Cheng Hsiang, Penghui Zeng, Lei Yang
Presenter: Penghui Zeng, Xiamen Institute of Technology, China

Abstract: Accurate segmentation of colorectal polyps is crucial for the early computer-aided diagnosis of colorectal cancer. Existing Edge-Prioritized Polyp Segmentation (EPPS) models have improved segmentation accuracy through edge information

injection and selective feature decoupling. However, during the feature recovery phase in the decoder, issues such as ambiguous semantic representations and residual background noise persist. This limits further breakthroughs in evaluation metrics like mean Intersection over Union (mIoU), which measures regional matching precision. To address this, we propose an embedded Feature Refinement Module (FRM). By integrating residual connections and channel attention mechanisms, this module performs secondary filtering and semantic enhancement on decoded features, effectively suppressing redundant background noise. Extensive experiments on three public datasets (Kvasir-SEG, CVC-ClinicDB, and Kvasir-Sessile) demonstrate that the proposed FRM-EPPS model significantly outperforms the baseline EPPS model in both mIoU and mean Dice Similarity Coefficient (mDSC). These results validate the superior efficacy of FRM in optimizing feature representations and improving the matching accuracy of complex boundaries.

11:20 - 11:35
CB588

Paper Title: Research on Public Willingness to Use AI Health Intervention Programs
All Author: Li-Ping Chen, Ying Pu and Guoqing Qin
Presenter: Li-Ping Chen, Yunnan University of Chinese Medicine, China

Abstract: This study integrates Self-efficacy Theory and the Technology Acceptance Model to construct a structural equation model, exploring public acceptance and behavior toward AI-based health interventions. The results show that public perceived usefulness of AI-based health intervention programs is not only the core factor but also a key inducement of the behavioral generation mechanism; perceived ease of use and self-efficacy exert an effect on behavioral intention through the indirect path of usage attitude.It is concluded that AI tools' functional value should be prioritized to meet public health needs, with lower use thresholds, better cross-platform compatibility, enhanced multi-level self-efficacy and established social support networks.

ONLINE SESSIONS

Online Session 2: Multimodal AI and Sentiment Analysis

Chair: **Bin Zheng,** Chengdu Technological University, China

10:00-11:50 | 899 2400 0098 Password: 042426

TAIK DETAILS	
Time	**Presentation**
10:00 - 10:20 **Invited Speaker**	Paper Title: From Multimodal LLM to Human-level AI Presenter: Anand Nayyar, Duy Tan University, Vietnam Abstract: This keynote explores the rapidly evolving journey from multimodal large language models (LLMs) toward human-level AI, highlighting both the extraordinary progress achieved and the scientific challenges that remain. Recent advances in multimodal foundation models have enabled AI systems to process and reason across text, images, audio, video, code, and sensor data, opening new possibilities for intelligent assistants, autonomous systems, scientific discovery, healthcare, education, robotics, and smart infrastructure. The talk examines how multimodal LLMs are transforming from language-centric systems into more general-purpose cognitive architectures capable of perception, reasoning, planning, memory integration, tool use, and adaptive decision-making. It will discuss the core technologies driving this transition, including transformer-based architectures, retrieval-augmented generation, agentic workflows, multimodal fusion, reinforcement learning, and neuro-symbolic reasoning. At the same time, the keynote will address critical limitations such as hallucination, contextual inconsistency, lack of grounded understanding, interpretability challenges, safety risks, and constraints in long-horizon autonomy. By connecting current research trends with future directions, this keynote provides a balanced perspective on what it would take to move beyond today′ s powerful yet narrow systems toward AI that more closely resembles human-level intelligence. The session will emphasize not only capability expansion, but also the importance of trustworthy, explainable, aligned, and human-centered AI for real-world deployment and societal benefit.
10:20 - 10:35 **CB228**	Paper Title: MM-Dy: A Multimodal Dynamic Channel Fusion Method for Rainfall Nowcasting All Author: Wu Taiyan, Cui Wei, Wang Haixia, Fan Lukai Presenter: Fan Lukai, Shandong University of Science and Technology, China Abstract: Rainfall nowcasting refers to high-resolution andhigh-timeliness precipitation prediction for rainfall conditions within the next 0–2 hours. In recent years, exacerbated climate change and frequent weather events have posed more severe challenges to socio-economy and public safety, while also raising requirements for short-term meteorological prediction. Deep learning technologies have provided new data-driven

solutions for spatiotemporal prediction; however, traditional unimodal methods currently rely solely on single data sources such as radar or satellites, and still have limitations in capturing the characteristics of complex weather systems. To address this issue, this paper proposes a multimodal short-term rainfall prediction model (MM-Dy) based on dynamic channel fusion, aiming to improve the accuracy of short-term rainfall prediction. Experiments are conducted on the public meteorological dataset [StormEVent ImageRy (SEVIR)], realizing 1-hour rainfall nowcasting. Experimental results using the Critical Success Index (CSI) as the main evaluation metric verify that the proposed model exhibits stable and accurate prediction performance under various rainfall intensity thresholds. The research findings demonstrate that MM-Dy provides a concise and efficient feasible solution for short-term rainfall nowcasting.

10:35 - 10:50
CB582

Paper Title: ACC-PM: An Online Actor-Critic Collaborative Framework with Probability Margin for Implicit Sentiment Analysis
All Author: Da Long Li; Yu Xiang Liu
Presenter: Da Long Li, Dalian Minzu University, China

Abstract: Implicit sentiment analysis remains a significant challenge due to the scarcity of explicit sentiment markers and the complexity of rhetorical expressions. Although Large Language Models (LLMs) have enhanced inference capabilities, existing methods predominantly rely on static reasoning, which limits the self-correction of inferential biases. To address this, we propose an Online Actor-Critic Framework with Probability Margin (ACC-PM). Specifically, we design a parameter co-evolution mechanism that mitigates distribution shifts typically found in offline training. Furthermore, to tackle the challenge of sparse feedback in sentiment modeling, we introduce a probability margin index to quantify information gain without external reward models, thereby facilitating the generation of high-quality preference pairs for Direct Preference Optimization (DPO). Extensive experiments on SemEval-2014 and SMP2019-ECISA datasets demonstrate that ACC-PM achieves superior performance in detecting irony and metaphor. Compared to Supervised Fine-Tuning (SFT) and static multi-agent baselines, our method improves F1-score and Accuracy metrics, validating its effectiveness in handling complex implicit sentiments.

10:50 - 11:05
CB616

Paper Title: An AI-Driven Multi-Level Faculty Evaluation Through Dual Sentiment Analysis and Decision Rules
All Author: Janette Tanquis, Larmie Feliscuzo, Cherry Lyn Sta Romana
Presenter: Janette Q. Tanquis, Cebu Institute of Technology-University, Philippines

Abstract: This study presents a scalable and transparent system that integrates ratings and student comments for improved evaluation analysis. It processes over 1.15 million records across academic levels, modalities, and semesters. Two sentiment scores are derived from comments: a lexicon-based score and a contextual score inspired by transformer models; these are combined with ratings and classified using rule-based logic into strength, weakness, or neutral categories. For clarity, sentiment distribution (positive, neutral, negative) is also computed independently. Validation on 120,000 records shows strong agreement between rule-based and machine learning models, with near-perfect macro F1 scores. These results indicate mainly positive feedback, supported by high ratings and consistent sentiment measures. Furthermore, statistical analysis reveals significant differences across educational levels ($p < 0.001$). These

findings demonstrate that integrating ratings, sentiment analysis, and interpretable rule-based classification yields a reliable, decision-oriented faculty evaluation framework.

11:05 - 11:20
CB1006

Paper Title: Pairwise Consistency Deepfake Detection Based on GAM_PCL
All Author: Yuhang Song, Jiayuan Wen, Rui Wu, Junjie Liu, Jinwei Hu
Presenter: Yuhang Song, Chengdu Neusoft University, China

Abstract: This study proposes a deepfake detection method based on Pairwise Consistency Learning (PCL) and Global Attention Mechanism (GAM), which achieves high-precision detection by identifying feature inconsistencies in fake images. To address PCL's over-reliance on local features, a GAM_Facial module is designed, which integrates channel and spatial attention. By embedding this module into the Backbone and the ResBlock of the classification branch in the PCL framework, the model's capability of global feature modeling is enhanced. Combined with the Inconsistency Image Generator (I2G), pixel-level annotated data are generated to optimize training. Experiments on the DFDC and DFDCP datasets verify the performance of GAM_Facial-PCL: the AUC on the DFDC dataset increases from 90.03% to 92.1% (a 2.07% improvement), and reaches 99.09% on the DFDCP dataset. Additionally, the consistency maps generated by the model achieve precise localization of forged regions, enhancing interpretability. The results demonstrate that GAM_Facial-PCL effectively overcomes the limitations of PCL in global feature modeling and complex scenarios, exhibiting superior detection performance and generalization ability.

11:20 - 11:35
CB4068

Paper Title: Signal Singularity Analysis for Robust Deep Audio Splicing Detection and Localization
All Author: Yuze Li, Yongke Yang, Zewei Li, Shan Liang, Yin Cao
Presenter: Yuze Li, Xi'an Jiaotong-Liverpool University, China

Abstract: Deep learning has achieved strong performance in utterance-level audio anti-spoofing, yet spliced or partially manipulated speech remains difficult to detect because only short manipulated segments are embedded within otherwise realistic speech utterances. Building on prior singularity analysis for audio splicing, this work constructs a wavelet-reconstructed singularity detection feature (SDF) and employs a dedicated encoder to extract discriminative SDF embedding. The resulting embedding is concatenated with linear frequency cepstral coefficients (LFCCs) and processed by a Light Convolutional Neural Network (LCNN) and a sequence model to capture both local boundary artifacts and temporal dependencies for frame-level detection. In addition, auxiliary supervision is applied to the SDF branch during training to encourage more discriminative SDF representations. Experiments on the HAD benchmark show consistent improvements over LFCC-based baselines, while results on the unseen split and under additive-noise conditions further support the effectiveness of the jointly trained SDF embedding under the evaluated conditions.

11:35 - 11:50
CB1004

Paper Title: A Text Classification Model that Balances Operational Efficiency and Classification Accuracy
All Author: Jing Chen, Lu Liu, Wei Xie
Presenter: Lu Liu, Tianjin University of Technology and Education, China

Abstract: In order to solve a series of problems in traditional text classification methods, such as high resource consumption, high complexity of model architecture, difficulty in balancing performance and efficiency, and poor feature extraction ability, a text classification method based on DistilBERT-CNN_LSTM_Att was proposed. The knowledge distillation technology adopted by the Distil BERT model effectively inherits the core semantic understanding function of the BERT model, and at the same time, the complexity of the model is greatly reduced through the optimization of model parameters and the efficient use of computing resources. The proposed model has the best comprehensive performance among the mainstream models of text sentiment classification in the IMDB dataset and shows obvious efficiency advantages.

ONLINE SESSIONS

Online Session 3: Multi-Agent Systems and Orchestration

Chair: **John Clement S. Escobanez**, National University, Philippines

10:00-11:50 | 894 4253 2020 Password:042426

TAIK DETAILS	
Time	**Presentation**
10:00 - 10:20 **Invited Speaker**	Paper Title: Multi-Agent Generative AI for Renewable Integration and Grid Operations Presenter: Abhishek Kumar, Chandigarh University Punjab, India Abstract: Rapid renewable penetration is increasing variability and operational complexity across power systems, while electrification and rising AI-driven loads intensify the need for reliability, flexibility, and resilience. This paper proposes an AI-centric framework that unifies (i) foundation-model and generative-AI assistants for operator decision support and automated workflow orchestration, (ii) real-time digital twins to mirror grid and renewable-asset states for what-if analysis and predictive maintenance, and (iii) reinforcement-learning control for adaptive dispatch, microgrid energy management, and storage coordination under uncertainty. We synthesize recent advances in renewable forecasting and control-highlighting how modern AI can improve solar/wind prediction accuracy and enable multi-objective optimization balancing cost, emissions, and resilience. Finally, we discuss deployment considerations-data governance, cybersecurity, and model validation-emphasizing safe integration of AI into critical infrastructure and measurable pathways to accelerate the renewable energy transformation at scale.
10:20 - 10:35 **CB341**	Paper Title: A Meta-Prompting Multi-Agent Framework with Self-Media Filtering for Authentic Smart Cultural Tourism Planning All Author: Shuai Yan, Jinyu Xi, Shuhao Zou, Ying Wang, Yang Xu and Ke Wang Presenter: Shuai Yan, Chengdu Jincheng College, China Abstract: Smart cultural tourism demands authentic, dynamic decision support—yet LLMs hallucinate and raw UGC is noisy. To bridge this, we propose a meta-prompting multi-agent framework that filters self-media noise via a lightweight DQC pipeline (32 KB, 0.6 s/post) and coordinates domain-specific knowledge via parallel prompt generation. The end-to-end workflow completes planning in ≈ 1.83$ minutes, enabling real-time deployment on edge devices. Evaluated on Tibet travel planning, our method outperforms baselines in authenticity (+49.25% ablation gain), cost-effectiveness, and usability, with automated 9-dim evaluation confirming robustness. The framework enables reliable, experience-grounded LLM reasoning in vertical domains.

Paper Title: Multimodal Analysis of Classroom Behavior Guided by Marxist Philosophy of Practice: A "Cognition-Behavior" Consistency Assessment Model Based on Video and Speech Signal Fusion
All Author: Li Zhang, Ruiyu Song
Presenter: Li Zhang, Taishan College of Science and Technology, China

10:35 - 10:50
CB4070

Abstract: This study develops a "cognition-behavior" consistency assessment framework for classroom behavior guided by Marxist philosophy of practice, with multimodal (video and speech signal fusion) principles as its theoretical basis. Adopting a mixed-methods design, it combines qualitative video-speech data collection and analysis (120 class hours of data from 10 universities, analyzed via behavioral recognition and acoustic/semantic algorithms) and quantitative surveys. Data were collected from 335 participants via stratified random sampling from 10 Shandong universities and validated through EFA. Key findings identify five core dimensions: Marxist philosophy integration in teaching, student cognitive/behavioral engagement (based on video-speech data), classroom type, and cognition-behavior consistency. Corresponding management guidelines are proposed. This study focuses on actual video/speech data and focus group discussion expert suggestion collection and analysis to construct multimodal indicators, laying a theoretical foundation for digitalized Marxist teaching assessment.

Paper Title: A Multi-Agent Machine Learning System for Prediction and Prevention of Permafrost Degradation under Urban Infrastructure: A Case Study from Norilsk, Russia
All Author: Igor Beliaev, Alexey Petrov
Presenter: Igor Beliaev, Fedorovsky Polar State University, Russia

10:50 - 11:05
CB355

Abstract: Climate change is accelerating permafrost degradation in Arctic regions, threatening urban infrastructure stability. This paper presents a multi-agent machine learning system for proactive prediction and prevention of permafrost thaw beneath buildings. By analyzing temperature data from two buildings in Norilsk, Russia—one stable (Building B) and one with severe degradation (Building A)—we demonstrate clear thermal indicators of foundation distress. We conduct a classification experiment using Random Forest (RF) and Support Vector Machine (SVM) models to distinguish between stable and degrading states based on 48-hour thermal data windows. Both models achieved 100% accuracy and F1-score, perfectly classifying the building states and validating the efficacy of using short-term thermal profiles for diagnostics. The proposed system architecture integrates three layers of autonomous agents for data acquisition (Investor Agents), predictive analysis (Operator Agents), and decision-making (Regulator Agents). This research provides a validated case study and a technical blueprint for a next-generation monitoring system to mitigate risks in Arctic urban environments.

Paper Title: The Profiler-Agent: A Retrieval-Augmented and Latent-State Reasoning Framework for Complex Narrative Data
All Author: Shuai Yan, Yan Pan, Junjie Jiang, Chengxin Feng and Shan He
Presenter: Shuai Yan, Chengdu Jincheng College, China

11:05 - 11:20
CB623

Abstract: Although large language models (LLMs) excel in unstructured text processing, extracting and reasoning over latent variables-such as implicit human

intentions-remains a significant challenge in complex narrative data. Existing reasoning frameworks typically operate as purely logical state machines, systematically overlooking implicit features and causing "logically coherent but factually distorted" hallucinations in behavioral attribution. To address this, we propose Profiler-Agent, an enhanced text analytics and reflective reasoning framework. It introduces the Profile-Inference Engine (PIE), a latent state estimator that injects explicit psychological profiling constraints into the reasoning loop, upgrading the LLM into a "psycho-logical joint state machine". To quantitatively evaluate this capability, we constructed ScriptKillerQA, a high-complexity narrative benchmark featuring explicit "Psychological Motivation Chain (PMC)" annotations. Experimental results show that Profiler-Agent achieves 45.8% accuracy on deep psychological inference tasks, outperforming the ThinkThrice baseline by 25 percentage points. Additionally, it reaches an overall accuracy of 40.2% (ROUGE-L 0.387) and 51.7% in multi-agent culprit identification tasks, validating its effectiveness in expanding the latent feature inference capabilities of foundational models.

11:20 - 11:35
CB765

Paper Title: Design and Orchestration of Multi-Agent LLM Systems for Real-Time Enterprise Supply Chain Optimization
All Author: Nirmal Kumar Jingar
Presenter: Nirmal Kumar Jingar, Wayfair, USA

Abstract: The current supply chain in corporate enterprises is highly dynamic and has features of volatility in demands, geopolitical uncertainties, transportation effects, and a rise in complexity of operations. Conventional centralized optimization, and single model AI solutions do not typically provide the flexibility and dynamism on the fly reasoning necessary to deal with such uncertainty. The paper will suggest a new supply chain Multi-Agent Large Language Model (MA-LLM) Supply Chain Orchestration System, which is capable of providing real-time, distributed, and intelligent decision-making on enterprise supply chain networks. The suggested system breaks down the operations of the supply chain into specialized reasoning agents, which are demand forecasting, inventory management, transportation planning, and risk assessment each being driven by Large Language Models and coordinated by a central orchestration system. The system coordinates relevant reasoning, cross-domain negotiation and global optimization to generate coordinated decisions, which consider the cost, service level and resiliency goals. According to the experimental comparisons with the other advanced AI-based supply chain models, including the LSTM-PSO Supply Chain Optimization Model and the ResilientAI-SCM with OptimX, the proposed approach has a high forecasting accuracy, low cost, high reliability, and high disruption response. Findings confirm that multi-agent LLM coordinate has a scalable and resilient answer to real-time enterprise supply chain optimization.

11:35 - 11:50
CB4069

Paper Title: Multimodal Behavioral Analysis Guided by Marxist Values: A Framework for Assessing Adolescents' Moral Literacy through Video and Speech Signal Fusion
All Author: Li Zhang,Yuanfen Lu
Presenter: Li Zhang, Taishan College of Science and Technology, China

Abstract: Scientific assessment of adolescents' moral literacy is crucial for ideological and political education. Traditional evaluation over-reliance on subjective reports fails to capture real-time behavioral characteristics. This study, grounded in Marxist values

(collectivism, moral practice, unity of cognition and behavior), constructs a theoretical framework for adolescent moral literacy assessment with multimodal behavioral analysis (video/speech fusion) as the core indicator. To address the gap between theoretical framework and empirical validation, this study adopts a mixed-methods design (expert evaluation + educator questionnaire + adolescent behavioral observation) to verify the rationality and operability of the framework.

Quantitative data were collected from 603 valid responses, including 120 expert evaluations and 483 front-line moral education educators in Shandong Province; qualitative data were obtained from 80 adolescent behavioral observation records and 20 in-depth interviews. Exploratory Factor Analysis (EFA) and Structural Equation Model (SEM) were used to test the factor structure and path relationships.

The results show that: (1) The framework consists of five core dimensions: contextual integration of marxist values, prosocial behavioral manifestations, collectivist group atmosphere, multimodal observability, and comprehensive moral literacy;(2)Contextual integration of marxist values significantly promotes prosocial behavioral manifestations), which in turn improves Moral Literacy;(3) Multimodal observability and Collectivist Atmosphere play positive moderating roles.

This study revises the sample deviation, optimizes the research design, and transforms the basic hypothesis into a mechanism verification with practical orientation. It provides a standardized theoretical basis and empirical support for the subsequent development of video-speech multimodal AI analysis systems, and promotes the digital and precise evaluation of moral education.

ONLINE SESSIONS

Online Session 4: Federated Learning and Cybersecurity

Chair: **Yanru Chen,** Sichuan University, China

14:00-15:20 | 895 9753 0118 Password: 042426

TAIK DETAILS	
Time	**Presentation**
14:00 - 14:20 **Invited Speaker**	Paper Title: Architectures of Next Generation Wireless Networks Presenter: Pascal Lorenz, University of Haute-Alsace, France Abstract: Internet Quality of Service (QoS) mechanisms are expected to enable wide spread use of real time services. New standards and new communication architectures allowing guaranteed QoS services are now developed. We will cover the issues of QoS provisioning in heterogeneous networks, Internet access over 5G networks and discusses most emerging technologies in networks and telecommunications such as IoT, SDN, Edge Computing and MEC networking. We will also present routing, security, baseline architectures of the inter-networking protocols and end-to-end traffic management issues.
14:20 - 14:35 **CB353**	Paper Title: FedSecure-EGA: Efficient Byzantine-Resilient Federated Learning via Encrypted Gradient Auditing with Johnson–Lindenstrauss Compression All Author: Talib Hussain, Farooque Azam, Muhammad Waseem Anwar Presenter: Talib Hussain, National University of Sciences and Technology, Pakistan Abstract: Federated Learning (FL) enables collaborative model training while preserving data privacy, but remains vulnerable to Byzantine attacks where malicious clients poison gradient updates. Existing privacy-preserving Byzantine detection suffers from prohibitive computational costs due to homomorphic encryption on high-dimensional gradients. We propose FedSecure EGA, a novel framework that applies Johnson-Lindenstrauss(JL)compression before encryption to preserve detection-critical similarity patterns while dramatically reducing costs. Our approach achieves 80% communication reduction (from 12.7MB to 2.5 MB) with improved accuracy (92.34% vs. 91.89% on MNIST). We demonstrate robust Byzantine detection with F1 scores of 0.80-0.91 across three attack types (sign-flip, noise injection, label-flip) and Byzantine fractions up to 30%. Comprehensive experiments across three datasets (MNIST, CIFAR-10, FEMNIST) with scalability testing from 10 to 100 clients validate practical deployment feasibility.
14:35 - 14:50 **CB795**	Paper Title: A Multi-World Collaborative Approach for Evolutionary Analysis of APT Attack Behaviors All Author: Binhui Tang, Yishan Lu. Caiyun Li Presenter: Binhui Tang, Chengdu Agricultural College, China Abstract: Advanced Persistent Threat (APT) attacks exhibit long-term stealth, stage-

wise progression, and dynamically adaptive strategies, resulting in clear temporal evolution patterns. Existing analysis approaches typically rely on a single knowledge representation that models factual evidence, statistical relationships, and reasoning assumptions within the same structure, leading to semantic mixing, opaque reasoning processes, and limited predictive capability.

To address these challenges, this paper proposes a multi-world collaborative method for evolutionary analysis of APT attack behaviors. The framework constructs three complementary analytical worlds: the Fact Evidence World, Attack Stage World, and Semantic Vector World, which respectively model historical attack paths, stage evolution hypotheses, and fragmented log evidence. An L0–L4 multi-layer behavioral abstraction framework is further introduced to enable cross-world semantic alignment and collaborative reasoning. Experimental results show that the proposed method outperforms traditional approaches-including knowledge graph–based methods, rule-based matching, and graph neural networks-in attack path reconstruction, threat actor attribution, and attack stage prediction, while also providing improved interpretability and system scalability.

14:50 - 15:05
CB213

"Paper Title: Reinforcement Learning-Based Graph Neural Network for Cyber Risk Mitigation in Edge Networks

All Author: Santosh Datta Bompally

Presenter: Santosh Datta Bompally, Webster University, USA

Abstract: The adoption of edge computing in modern network infrastructures is fast, and it has highly improved the processing capabilities of distributed data and reduced the latency, but it has also made us more susceptible to cyber threats as a result of decentralized control and heterogeneous system configurations. To overcome these difficulties, a Reinforcement Learning Based Graph Neural Network (RL-GNN) framework for proactive cyber risk mitigation in edge environments is presented in this study. The proposed RL-GNN combines the adaptive policy optimization ability of reinforcement learning and the topologies reasoning and relational threat analysis ability of the graph neural network. By being able to constantly interact with the dynamic network conditions, RL-GNN automatically determines, prioritizes and mitigates cyber risks, requiring minimal human supervision. The experimentation has shown that the RL-GNN outperforms current methods like GraphTunnel and SPGNN-API significantly in terms of high detection accuracy, lesser false alarms, and higher flexibility to new and updated attack vectors. In addition, the model is highly scalable across different edge computing architectures, which lays a solid foundation for autonomous self-learning cybersecurity systems that can provide real-time defence in distributed network environments."

15:05 - 15:20
CB2023

Paper Title: Can LLMs Replace Static Analysis? An Empirical Study on Vulnerability Detection in IIoT Software

All Author: Binbin Huang, Yimeng Li, Zengyang Li, Hui Liu

Presenter: Binbin Huang, Central China Normal University, China

Abstract: Static Application Security Testing (SAST) tools like CodeQL often struggle with complex Industrial Internet of Things (IIoT) logic. This paper empirically compares

an off-the-shelf LLM (GPT-4o-mini) against CodeQL across five IIoT software projects covering the edge-to-cloud lifecycle. Analyzing 57,868 function snippets, we found a distinct ``functional dichotomy'': while GPT-4o-mini showed low consistency with CodeQL's baseline, it demonstrated strong complementarity by uncovering 790 valid, unique vulnerabilities missed by traditional rules of CodeQL. We conclude that LLMs should not replace SAST tools but serve as a critical semantic augmentation layer for detecting latent vulnerabilities.

ONLINE SESSIONS

Online Session 5: Cloud Computing and Data Management

Chair: **Abdelkrim Haqiq**, Hassan 1st University, Faculty of Sciences and Techniques, Settat, Morocco

14:00-15:50 | 899 2400 0098 Password: 042426

TAIK DETAILS	
Time	**Presentation**
14:00 - 14:20 **Invited Speaker**	Paper Title: Data Ops Engineering: A 9-Phase Framework for Building Agile, Automated Data Pipelines and Maximizing Data Science Impact Presenter: Anand Nayyar, Duy Tan University, Viet Nam Abstract: This lecture presents a comprehensive, practitioner-oriented exposition on DataOps-a methodology that converges Agile development, DevOps principles, and statistical process control to orchestrate end-to-end data pipeline automation and amplify data science throughput. We delineate a rigorous 9-step transformation framework encompassing environment provisioning, version-controlled data lineage, continuous integration/continuous deployment (CI/CD) for analytical workflows, automated data quality validation through schema enforcement and anomaly detection, infrastructure-as-code (IaC) orchestration, containerized model serving, observability-driven monitoring via telemetry instrumentation, cross-functional governance, and feedback-loop optimization for iterative model retraining. The discourse further examines best practices in constructing fault-tolerant, idempotent, and horizontally scalable ETL/ELT pipelines leveraging directed acyclic graph (DAG)-based orchestration engines, event-driven microservices architectures, and declarative data transformation paradigms. Key topics include metadata-driven pipeline parameterization, data contract enforcement across producer-consumer boundaries, SLA-aware scheduling, drift detection mechanisms, and reproducibility guarantees through deterministic execution environments. Attendees will gain actionable insights into reducing pipeline technical debt, minimizing mean-time-to-recovery (MTTR), achieving sub-linear operational overhead scaling, and establishing a culture of continuous improvement through DataOps maturity modeling. This lecture bridges the gap between theoretical data engineering constructs and production-grade implementation patterns for enterprise-scale analytical ecosystems.
14:20 - 14:35 **CB791**	Paper Title: Decoupling Error Attribution in Cloud-Native Graph-RAG: A Data Integrity Diagnostic Framework All Author: Shuai Yan, Yuhang Wu, Xiaodong Huang and Ke Wang Presenter: Shuai Yan, Chengdu Jincheng College, China Abstract: Graph-RAG systems often assume pristine data quality, overlooking the severe impact of perturbations in cloud-native databases. This paper proposes a three-layer decoupled diagnostic framework to orthogonally attribute system errors to reasoning loss, Knowledge Graph (KG) defects, and Cypher generation errors.

Evaluated on a spatio-temporal ecological KG of the Southeastern Tibet region with eight defect types, results reveal that data integrity-rather than algorithmic reasoning-is the dominant performance bottleneck, with structural defects degrading system accuracy from 0.93 to 0.39. Crucially, we observe a masking-like phenomenon termed the Parametric Knowledge Masking Effect (PKME), suggesting LLMs compensate for broken retrieval paths using internal memory. This shrinks apparent query generation errors by over 70%, obscuring actual storage deterioration and increasing the risk of false negatives for automated monitoring. This work provides a quantitative foundation for auditing and optimizing data integrity in cloud-based information fusion systems.

14:35 - 14:50
CB349

Paper Title: An Empirical Study of VM, Container, and Hybrid Deployment Models for Microservices Under Resource Contention
All Author: Zakaria Alomari
Presenter: Zakaria Alomari, New York Institute of Technology, Canada

Abstract: Virtualization technologies underpin modern cloud data centers, enabling scalable microservice deployment with varying trade-offs between performance efficiency and isolation. VMs provide strong hardware-assisted isolation, while containers offer lightweight execution with minimal overhead. To balance these properties, many platforms adopt hybrid deployments in which containers run inside VMs.
This paper presents an empirical evaluation of three microservice deployment models-VM-only, container-only, and containers-in-VM-under both baseline conditions and CPU-intensive noisy-neighbor interference. Using a controlled workload and consistent benchmarking methodology, we measure throughput, latency, and tail behavior while explicitly accounting for the impact of benchmarking topology.
Results show that container-only deployments achieve the highest baseline performance but are more sensitive to contention, while VM-only deployments provide more predictable isolation at higher overhead. Hybrid containers-in-VM deployments offer a balanced trade-off, improving performance relative to VM-only configurations while moderating interference effects. The study also demonstrates that network topology and client placement can significantly distort performance measurements. These findings provide practical guidance for selecting microservice deployment strategies in cloud environments.

14:50 - 15:05
CB802

Paper Title: From Phase Transition to Systemic Failure: A Decoupled Analytics Framework for GNN Robustness
All Author: Shuai Yan, Dan Peng, Jie Li, Xiaodong Huang and Ke Wang
Presenter: Shuai Yan, Chengdu Jincheng College, China

Abstract: Data quality is a major bottleneck for the reliable deployment of graph neural networks (GNNs) in real-world graph mining tasks. Among various sources of degradation, label noise and feature distribution shift (hereafter referred to as distribution shift) are two common yet fundamentally different challenges. To study their effects under controlled conditions, this paper constructs a synthetic homophilic graph regression benchmark in which the two factors can be manipulated separately. A total of 41 configurations and 410 runs are conducted to evaluate the behavior of representative GNN models under varying noise and shift conditions. The results show two distinct patterns. First, under additive label corruption, performance remains

relatively stable over a broad range of noise settings and begins to deteriorate sharply only after an observed transition region around the 50% noise ratio. Second, under extreme feature distribution shift, all tested models suffer substantial degradation, with test MSE increasing by 48 times to 316 times and correlation dropping by 73% to 89%. These findings suggest that, in the present controlled setting, GNNs are considerably more tolerant to moderate label perturbation than to severe distribution mismatch. The study provides a controlled empirical baseline for understanding how data quality affects GNN-based graph mining systems and offers practical implications for deployment-oriented monitoring and model maintenance.

15:05 - 15:20
CB782

Paper Title: Cloud Application Deployment and Automation
All Author: Prafullata Kiran Auradkar, Zhenkar Gowda K P, Satwik Pradeep Naik, Suman H N and Harshita Gujjar
Presenter: Harshita Gujjar, PES University, India

Deployment of applications in cloud environments usually demands tooling layers of configuration, such as developers. providing security policies and applications like networking, proving computers. Even with the presence of Infrastructure-as-Code (IaC), these activities are intricate and time consuming. tools, users still need to write and do detailed configuration. files and scripts. The following paper outlines an automatization based on templates. framework that is an abstracting of these low-level complexities and enables developers to implement applications to the cloud with minimum, high-level specifications. A web-based input is incorporated in the system. interface A backend orchestration layer, which prepares configuration. variables, and an already predefined terraform template to deploy applications to infrastructure provisioned using terraform. The framework is cloud-agnostic, although it was not intended to be cloud-specific. was tested on Amazon Web Services (AWS) with a template of standardized infrastructure with a bunch of networking components, a virtual machine, and managed MySQL database. Applications created with experimental assessment. Node.js, Flask and Django indicate that the proposed approach is that which facilitates deterministic deployments that are reproducible and at the same time. removing expertise on cloud or IaC. The results achieve great cuts in manual configuration effort and The deployment time, which emphasizes the functionality and scalability of iac scan bot automation to enhance the developer productivity of the cloud environment.

15:20 - 15:35
CB803

Paper Title: Decoding Deceptive Topologies: Heterogeneous Graph Fusion and Cyclic Verification for Complex Narratives
All Author: Shuai Yan, Xi Jinyu and Shan He
Presenter: Shuai Yan, Chengdu Jincheng College, China

Abstract: Compressing highly asymmetric, long-context narratives remains a critical bottleneck for Large Language Models (LLMs). Naive summarization invariably fragments key logical chains and loses critical anomaly features, particularly ``deceptive topologies'' (narrative misdirection). To address this, we propose a lightweight framework based on heterogeneous graph fusion and multi-agent cyclic verification. First, we construct a Three-Layer Fused Knowledge Graph (TL-FKG) comprising objective truth, subjective bias, and trick structures to explicitly model narrative conflicts as a Single Source of Logical Truth (SSLT). Second, an incremental

graph construction scheme using the Model Context Protocol (MCP) is introduced to bypass batch-processing costs, ensuring O(N) linear token scalability. Finally, a Multi-Agent Expert System dynamically reduces text dimensionality through a cyclic verification pipeline against the SSLT. Empirical results across multiple state-of-the-art LLMs demonstrate substantial statistical improvements over single-pass baselines, significantly improving Logical Coherence (Cohen's d = 2.24) and Information Coverage (d = 2.25) on the primary evaluated model. This paradigm successfully decodes deceptive topologies, achieving high-fidelity semantic compression for complex data analytics.

Paper Title: Verified Case Studies of Major Data Center Breaches: Recurring Failures and Evidence-Based Security Lessons
All Author: Zakaria Alomari
Presenter: Zakaria Alomari, New York Institute of Technology, Canada

Abstract: Large-scale data centers and cloud-backed in-frastructures have become high-value targets for nation-state actors, cybercriminal organizations, and malicious insiders. While numerous breach reports and surveys exist, many rely on secondary reporting with inconsistent victim counts, timelines, and attribution. This paper presents a verified cross-case analysis of six major data center breaches-OPM, Equifax, Marriott/Starwood, Capital One, Desjardins, and So-larWinds-occurring between 2014 and 2020. These incidents were selected based on impact, diversity of attack vectors, and the availability of authoritative investigative records.

Rather than relying on media summaries, the analysis pri-oritizes primary sources, including government accountability reports, regulatory enforcement actions, court documents, and official indictments, enabling accurate reconstruction of breach characteristics and contributing factors. Although significant breaches have continued beyond this period, comprehensive public documentation remains limited for many recent incidents. Accordingly, the selected cases are treated as representative exemplars for identifying persistent failure patterns in modern data center environments.

Cross-case analysis reveals recurring technical weaknesses in identity and access management, patch and configuration management, network segmentation, detection and response, and software supply-chain trust. These technical deficiencies were consistently amplified by organizational and governance failures, including inadequate security oversight, insufficient merger and acquisition due diligence, and under-resourced security functions, as documented in post-incident investigations and regulatory findings. Based on these empirically verified failures, the paper derives practical, evidence-based recommen-dations spanning technical controls, governance processes, and organizational culture to improve the resilience of contemporary data center and cloud infrastructures.

15:35 - 15:50
CB358

ONLINE SESSIONS

Online Session 6: Financial Systems and Fraud Detection

Chair: **Alessio Faccia**, University of Birmingham Dubai, UAE

14:00-15:35 | 894 4253 2020 Password: 042426

TAIK DETAILS	
Time	**Presentation**
14:00 - 14:20 **Invited Speaker**	Paper Title: Action Research and Case Studies in Information Science Presenter: Paulo Batista, University of Évora, Portugal Abstract: Following the Second World War an explosion in the quantity of documentation led to a dramatic change in Archiving, or the profession referred to as records managers/records management and archivists/archives. Starting in the 1980s, however, archivists in Quebec began to make great progress by changing their approach and looking at the entire documentary cycle from current to definitive information. Carol Couture and Jean- Yves Rousseau made a crucial contribution towards the understanding of the Three Age Theory that viewed Archiving as an integrated discipline centered on a structural understanding of archives. In 1994, their work Les Fundaments de la Discipline Archivistique, presented a new interpretation of Theodore Schellenberg's Three Age Theory. They called attention to the fact that the three phases of archival documents are not separate but, on the contrary, integrated. They argued that these three stages can even be looked at in a segmented way, provided the union between them is ensured. Their great innovation relative to Schellenberg's work lay, precisely, in critiquing the division and separation between the three ages of archival documents. Couture and Rousseau thereby brought together all the phases of the lifecycle of records, from production to dissemination, in opposition to the sterile distinction advocated by traditional archivists and document managers. In my opinion, however, the best approach to integrating information management is known as records continuum, which place archives in a post-custodial, informational, and scientific paradigm. This Australian concept arose in the 1990s amid the huge explosion of information, communication technologies and new media. This context forced Information Science to redefine its object of study. Records continuum is closely related to the integrated management model of Couture and Rousseau, while it carries their innovation further, perfecting it and replacing it with systemic dynamics and providing continuity between archives. In fact, records continuum means, literally, continuous management. It looks at the whole process from the production of records to their final archiving. Otherwise, we cannot speak of continuous management. That is why, when we speak of rigid archives-urrent, intermediate, and definitive, this approach is more theoretical than practical. There is, in fact, no separation between these phases, even less so from the point of view of the value of documents. The traditional distinction between information with probative and historical value ceases to exist. The information is simultaneous and is, in fact, the same.

14:20 - 14:35
CB360

Paper Title: A Hybrid Statistical Framework for Detecting Data Drift and Transactional Fraud in Financial Systems
All Author: Rohit Kumar Thakur, Raj Kumari
Presenter: Rohit Kumar Thakur, Panjab University, India

Abstract: Susceptibility in the financial and banking system has exposed us to fraudulent acts. So, This study presents a hybrid statistical framework for detecting data drift and transactional fraud in streaming financial systems. The approach which is implemented is the sliding window technique to maintain a reference dataset, enabling real-time comparison with incoming transaction data. A Drift Detection Module calculates shifts in numerical and categorical feature distributions using statistical methods such as Jensen-Shannon Distance, Wasserstein Distance, Kolmogorov-Smirnov tests, and Chi-squared tests. Fraudulent transactions within significantly drifted batches are flagged as potential fraud. Additionally, a Suspicious Travel Module detects geographically conflicting transactions occurring within short time frames. By combining statistical drift detection with spatiotemporal analysis, the framework ameliorates fraud detection capabilities in dynamic, real-time financial scenarios.

14:35 - 14:50
CB572

Paper Title: Dynamic Model Averaging with Neural Networks for Sector ETF Return Prediction
All Author: Yuanjia Liu
Presenter: Yuanjia Liu, Chengdu Polytechnic, China

Abstract: In recent years, with the advancement of machine learning technologies, the application of neural networks to predict financial asset prices has become a research focus. This study attempts to apply deep learning models to forecast the prices of Exchange-Traded Funds (ETFs). By constructing a hybrid neural network model incorporating Long Short-Term Memory (LSTM) and Attention mechanisms, the research aims to capture complex nonlinear features and long-term temporal dependencies within ETF market price sequences. The model inputs not only include multi-dimensional market data such as historical prices and trading volumes but also innovatively integrate processed net asset value data, overall market volatility, and macroeconomic sentiment indicators to more comprehensively reflect the multi-source information influencing ETF pricing. Empirical results indicate that, compared to traditional time series models (such as ARIMA and GARCH), this neural network model performs better across multiple error metrics and exhibits stronger out-of-sample forecasting capability. Further analysis reveals that the model demonstrates high predictive sensitivity to short-term pricing deviations driven by market sentiment and liquidity. This study demonstrates that deep learning methods provide a powerful tool for understanding and forecasting ETF price dynamics. Their advantages in automatic feature extraction and complex pattern recognition help uncover pricing patterns that are difficult for traditional econometric models to capture, offering a new technological pathway for the development of smart investment advisory and quantitative strategies.

14:50 - 15:05
CB728

Paper Title: Sequential Pattern Mining of Fire Incident Escalation and High-Damage Precursors in Central Luzon: A Provincial and Municipal Scale Analysis
All Author: Mark Anthony A. Castro, Vernon Grace M. Maniago, Aileen P. De Leon, Genesis C. Tiria, Christian S. Mallari, Jonh Ray B. Medina, John Paul P. Miranda
Presenter: Jonh Ray B. Medina, National University Philippines, Philippines

Abstract: This study identifies temporal structural, escalation, and high-damage precursor sequences in fire incident records from Central Luzon using sequential pattern mining. A validated dataset of fire incidents spanning eight years was preprocessed through origin standardization, alarm normalization, and damage severity classification. Annual event sequences were constructed at Province–Year and Municipality-Year levels to model temporally ordered fire dynamics. Baseline structural analysis revealed that dominant transitions clustered among Electrical Ignition, Open Flame or Smoking Materials, and Other or Accidental origins, predominantly under 1st Alarm conditions. Escalation analysis restricted to 2nd Alarm and above transitions showed that higher response-level progressions were infrequent yet consistently associated with Electrical Ignition at both geographic scales. High-damage precursor analysis further demonstrated that severe financial loss frequently occurred under 1st Alarm classifications, with electrical-origin incidents constituting the most stable high-damage sequences. Collectively, the findings indicate that electrical-related fires exhibit the most consistent patterns of temporal escalation and financial severity in the region, and that alarm level alone is an insufficient proxy for damage magnitude. These results underscore the utility of multi-scale sequential modeling in distinguishing baseline structural dominance from operational escalation and damage progression dynamics.

15:05 - 15:20
CB599

Paper Title: Big Data Analysis of College English Learning Behaviors Based on Spark Framework: Construction of a Learning Effectiveness Prediction Model
All Author: Liying Li
Presenter: Liying Li, Shanghai Zhongqiao Vocational and Technical University, China

Abstract: To solve the problems of lagging learning effectiveness prediction and lack of targeted interventions in college English teaching, this paper proposes a big data analysis scheme based on the Spark framework and constructs a learning effectiveness prediction model. Using the Learning Management System (LMS) data of 1200 non-English major freshmen (6 core online learning behavior indicators and final exam scores), systematic data preprocessing and feature selection are completed via Spark. Three machine learning models are built based on Spark MLlib, and the Random Forest (RF) model achieves optimal performance with an accuracy of 86.3% and an AUC of 0.890. The results show that Spark can efficiently process large-scale and heterogeneous college English learning behavior big data, and learning depth has a more significant impact on learning effectiveness than simple learning participation. This study provides a feasible technical paradigm and practical suggestions for the intelligent and precise reform of college English teaching.

15:20 - 15:35
CB4077

Paper Title: A Cross-Generational Value Co-creation Framework Based on Artificial Intelligence: Strategic Transformation of Knowledge Assets
All Author: Chen-Jie Hsiao
Presenter: Chen-Jie Hsiao, National Yang Ming Chiao Tung University, China

Abstract: Addressing the global challenge of the strategic transfer of professional knowledge assets brought about by population and workforce aging, this study proposes a sustainable knowledge transfer model based on the "silver economy." This research introduces game theory into the artificial intelligence-driven mechanism,

quantifies human experience, and constructs a dynamic payoff structure framework for the "knowledge asset management and transfer" of senior experts, thereby achieving Nash equilibrium between human and machine systems. The research results provide a strategic foundation for social innovation, ensuring that the professional knowledge of older workers is preserved and transformed into digital assets in the era of artificial intelligence. This not only transforms the work challenges of an aging society into a catalyst for digital economic growth but also enhances social resilience.

ONLINE SESSIONS

Online Session 7: Large Language Models and Knowledge Graphs

Chair: **Abu Bakar bin Ibrahim**, Universiti Pendidikan Sultan Idris, Malaysia

16:00-17:50 | 895 9753 0118 Password: 042426

TAIK DETAILS	
Time	**Presentation**
16:00 - 16:20 **Invited Speaker**	Paper Title: Fuzzy Natural Logic and Generalized Quantifiers in AI Presenter: Vilem Novak, University of Ostrava, Czech Republic Abstract: Artificial Intelligence includes many theories and methods that are capable of performing tasks associated with human intelligence. Among them, the leading role is played by techniques of machine learning and neural networks. We argue that important role in AI plays also formal logic. In this talk we will mention the concept of Fuzzy Natural Logic (FNL) that is a system of theories of mathematical fuzzy logic enabling us to model special ways of human reasoning that is based on the use of natural language. FNL stems from the results of classical linguistics, logical analysis of concepts and semantics of natural language and is formalized using higher-order mathematical fuzzy logic. A constituent of FNL is the theory of generalized quantifiers that are special natural language expressions using which we quantify the number of elements in various contexts. Typical examples are ``Many, most, a lot of, a few, several, almost all'' that form a subclass called ``intermediate quantifiers''. In this talk we will present results obtained in a formal theory of the latter. We will also describe reasoning using generalized syllogisms in which intermediate quantifiers occur. We argue that methods of formal logic are indispensable for their theory because using the latter we can distinguish valid syllogisms from those which are not valid and, therefore, cannot be used in human reasoning. We will also show that AI without logic fails when checking validity of syllogisms. We will demonstrate valid as well as invalid syllogisms on examples. Along with it, we will discuss graded square of opposition as a general scheme for human reasoning. Finally we will touch non-monotonic reasoning and show that our theory is capable of solving typical problems of it. Namely, we will prove that the classical example ``Most birds fly'' and ``Tweety is a penguin which does not fly'' does not lead to contradiction in our theory. We argue that this is the consequence of capability of FNL to model the meaning of vague concepts.
16:20 - 16:35 **CB622**	Paper Title: Complexity-Aware Adaptive Routing for RAG: A Data-Efficient Framework for Domain-Specific Analytics All Author: Shuai Yan, Ling Hua and Ke Wang Presenter: Shuai Yan, Chengdu Jincheng College, China Abstract: Retrieval-Augmented Generation (RAG) has become a foundational technique for grounding Large Language Models (LLMs) in domain-specific

knowledge. However, deploying RAG for complex data analytics reveals a critical inefficiency: the prevalence of static retrieval paradigms. While structured graph mining (e.g., GraphRAG) enhances multi-hop reasoning, its dynamic traversal overhead makes it inefficient for simple factual queries. Conversely, traditional vector retrieval lacks the structural awareness required for complex constraints. To bridge this gap, we propose a Complexity-Aware Adaptive Routing Framework for domain QA. Our approach introduces a lightweight Query Routing Module (QRM) that adopts an asymmetric, safety-first routing policy based on semantic complexity. Unambiguous simple queries are dynamically routed to a streamlined vector pipeline, while queries with semantic ambiguity trigger a Graph Mining branch. Crucially, to optimize graph analytics, this pathway leverages offline-computed static community summaries, circumventing the prohibitive memory bottlenecks associated with dynamic full-graph traversals. Evaluated on a high-density vertical domain benchmark, our method achieves a 9.3% improvement in factual accuracy on complex queries over traditional baselines. Furthermore, it strictly caps inference memory footprint (2.4 GB) while maintaining efficient average latency for mixed traffic, demonstrating a robust architecture for foundational models in big data analytics.

16:35 - 16:50
CB786

Paper Title: Big Data Meets Large Language Models: A Knowledge Graph and Evolutionary Analysis
All Author: Shangyue Yang, Biran Zhu
Presenter: Shangyue Yang, Wuhan University of Technology, China

Abstract: Driven by the rapid expansion and increasing heterogeneity of global data, traditional analytical paradigms face significant computational and generalization bottlenecks when processing massive unstructured datasets. This study employs CiteSpace to conduct a visual bibliometric analysis of 1,382 documents from the Web of Science Core Collection (20172026) at the intersection of big data and large language models (LLMs). Findings reveal a surge in publication volume since 2022. The United States and China lead the global research network, exhibiting high academic centrality (Betweenness Centrality > 0.1) and anchoring an industry-academia collaborative framework alongside core institutions such as the Chinese Academy of Sciences, Tsinghua University, and Harvard Medical School. Foundational knowledge has transitioned from early feature extraction to a Transformer-based generative pre-training paradigm, while current research hotspots focus on deep learning optimization, natural language processing, and large-scale predictive modeling. Ultimately, this study outlines the evolutionary trajectory of the field, offering theoretical insights for dismantling data silos, addressing ethical challenges, and developing domain-specific LLMs for vertical industries.

16:50 - 17:05
CB2024

Paper Title: Understanding Cross-Language Bug Fixing: An Empirical Study with CodeLMs and LLMs
All Author: Yimeng Li, Binbin Huang, Zengyang Li, Hui Liu
Presenter: Yimeng Li, Central China Normal University, China

Abstract: Cross-language bugs (CLBs) are bugs caused by inappropriate interactions between programming languages. They are a critical reliability concern in multi-language software systems. However, evidence on the quality of CLB fixes and their impacts on other bugs remains limited, which may result in unreliable bug fixes and

unintended CLB or SLB introduction. In this work, we present a large-scale analysis of CLB fixing in open-source multi-language software projects on GitHub, focusing on the reliability of CLB fixes, the co-occurrence of CLBs with single-language bugs (SLBs), and the impact of CLB fixing on SLBs. By leveraging pre-trained code language models (CodeLMs) and large language models (LLMs), bug detection is conducted using ensemble learning and zero-shot analysis methods. Experimental results show that around one quarter of CLB fixes carry a risk of CLB introduction, CLBs co-occur with SLBs in 37.68% of samples, and CLB fixes affect the introduction or elimination of SLBs in 11.79% of cases. We reveal the complexity of CLB fixing behaviors in multi-language software systems and provides evidence to support cross-language software maintenance.

17:05 - 17:20
CB3054

Paper Title: Study of Examples Effect on the LLM Performance
All Author: Ansaerjiang Ainiwaer, Qibang Liu, Merve Lily
Presenter: Merve Lily, Boston University, USA

Abstract: This paper presents a systematic analysis of LLM performance under varying numbers of examples in prompts. Across diverse tasks, we evaluate accuracy and latency, introducing two metrics to quantify the trade-off between predictive performance and computational cost. Our results show that while additional examples improve accuracy, gains quickly diminish as latency rises non-linearly. These insights offer practical guidance for optimizing LLM deployment, balancing task-specific performance with computational constraints.

17:20 - 17:35
CB3055

Paper Title: How LLMs Works Efficiently? A Comprehensive Study
All Author: Qibang Liu, Ansaerjiang Ainiwaer, Zhi Lin
Presenter: Zhi Lin, Boston University, USA

Abstract: Prompt engineering has become a central technique for improving the performance of large language models (LLMs). In this paper, we conduct a systematic study across domain-specific tasks to quantify how different example counts affect model performance in terms of accuracy, latency, and efficiency. By experiments under four representative settings with diverse example counts, our results show that although additional examples consistently improve F1 scores, the accompanying increase in latency grows at a much faster rate, causing overall efficiency to decline significantly. Notably, regarding realistic scenarios, prompts with lower counts ($N=1–3$) offer a balance, yielding moderate accuracy gains and computational cost. These findings provide prompting strategies for real-world LLM applications.

17:35 - 17:50
CB2035

Paper Title: Research on AIGC Technical Solutions and Tool Evaluation for Emotion-Driven Virtual Experiences
All Author: Yu Yao, Kaiqiang Sun, Long He, Mingfang Zhang,
Presenter: Long He, OriginXR Technology Co., Ltd., China

Abstract: With the deepening application of Artificial Intelligence Generated Content (AIGC) technology in immersive virtual experiences, how generated content can effectively adapt to users' emotional states has become an issue that urgently requires attention. In response to the current situation in which existing AIGC systems generally rely on static prompts and lack emotion perception and dynamic response capabilities,

this study focuses on the application requirements of emotion-driven immersive virtual experiences and conducts a systematic evaluation of the adaptability between emotion perception solutions and AIGC tools. From a practical application perspective, the research comparatively analyzes multiple emotion data acquisition technologies in terms of recognition performance, impact on user experience, and deployment feasibility. The results indicate that multimodal, low-intrusive emotion acquisition solutions that integrate physiological and behavioral signals demonstrate superior overall adaptability in virtual experience scenarios. On this basis, under unified testing conditions, this study conducts comparative experiments on multiple data collection and organization AI tools as well as image-generation AI tools, evaluating their performance differences in emotion-driven prompt generation and complex visual scene construction, and identifies tool combinations that are more suitable for emotion-driven virtual experience applications. The related conclusions provide reference support for technology selection in emotion-aware virtual experience systems.

ONLINE SESSIONS

Online Session 8: Computer Vision and Object Detection

Chair: **Jingjing Ma**, Sichuan Vocational College of Finance and Economics, China

16:00-18:05 | 899 2400 0098 Password: 042426

TAIK DETAILS	
Time	**Presentation**
16:00 - 16:20 **Invited Speaker**	Paper Title: Leveraging Mathematics to Address AI and Security Challenges Presenter: Samir Brahim Belhaouari, Hamad Bin Khalifa University, Qatar Abstract: Solving complex computer science problems becomes more manageable by harnessing the power of unsolved mathematical puzzles and inspiration from nature. Mathematics provides the foundation for crafting advanced algorithms in optimization, hashing, data compression, and model refinement, which are essential for tackling a wide range of challenges in artificial intelligence (AI) and cybersecurity. This talk will explore several key projects that illustrate the pivotal role of mathematics in addressing these issues.Highlights include smart pruning techniques for deep neural networks (Green LLMs, CNNs, etc.), Green AI from Deep to shallow learning, the Walking Algorithm for Longitudinal Key Signatures (WALKS), and optimizing dimensionality reduction and visualization using enhanced clustering and optimal transport. We will also discuss a novel time-frequency decomposition, KNNOR-a method for oversampling and downsampling imbalanced datasets-and chaos-based hashing combined with Gaussian Kernel LSH for improved data security and similarity search. Other topics include feature selection for high-dimensional data, extending the Komló s Conjecture for categorical variable encoding, and various deep learning innovations, such as architectural designs, fine-tuning methods, specialized loss functions, and activation functions. Additionally, we'll cover anomaly detection, clustering techniques, and a dynamic Markov Chain coupled with reinforcement learning for optimization and feature selection. Applications of these techniques in biomedical and bioinformatics domains will be examined, along with the use of number theory in security, particularly in hashing and RSA encryption. Through these projects, we demonstrate how mathematical insights lead to cutting-edge solutions in AI and cybersecurity
16:20 - 16:35 **CB226**	Paper Title: Human behavior detection and recognition based on AFSD sensor signals All Author: Fan Lukai, Cui Wei, Wang Haixia, Wu Taiyan Presenter: Wu Taiyan, Shandong University of Science and Technology, China Abstract: Temporal action detection (TAD) has traditionally focused on video data, yet sensor-based action analysis is increasingly important for privacy-preserving and ubiquitous human-computer interaction. This work investigates the applicability of the Anchor-Free Temporal Action Localization (AFSD) framework to untrimmed smartphone sensor signals. We adopt an I3D-based spatio-temporal feature extractor to model multi-channel inertial data and incorporate an anchor-free two-step prediction module for boundary localization and action classification. A sensory dataset covering

seven daily activities was collected to evaluate the method. Experimental results demonstrate that the proposed model achieves superior performance compared with recent TAD baselines across multiple IoU thresholds, confirming the effectiveness of adapting AFSD to sensor-based temporal action detection. The findings highlight the potential of sensor-signal-driven TAD as a practical, privacy-friendly alternative to vision-based approaches.

16:35 - 16:50
CB3047

Paper Title: Research on Intelligent Monitoring for Smart Ports: Based on RSD-YOLOv11 and PortGPT
All Author: Yongkang Wang, Jiachen Li, Changyue Li, Ruibo Yang
Presenter: Yongkang Wang, Tianjin Port (Group) Co., Ltd., China

Abstract: In recent years, intelligent port management has emerged as a pivotal approach to enhancing the efficiency and security of logistics hubs. Addressing prominent limitations of traditional port surveillance systems-such as heavy reliance on manual monitoring, delayed response, and weak multi-scenario coordination-this study proposes a collaborative" perception-decision' intelligent surveillance framework tailored for smart ports. The framework integrates the RSD-YOLOv11 (Reparametrized and Spatial-Channel Decoupled YOLOv11) with PortGPT, enabling precise identification and intelligent reasoning of typical violations and risk events in complex port operational environments. Through deployment and validation at the Port of Tianjin, the proposed approach achieves millisecond-level event detection during the reasoning stage and cross-scene warning coordination across multiple video streams. Moreover, by leveraging the decision model to link discrete alerts into logical event chains, it provides control centers with auxiliary decision support featuring causal interpretability

16:50 - 17:05
CB3048

Paper Title: Semantic-Enhanced Visual Feature Aggregation for Few-Shot Object Detection
All Author: Anjin Wang, Hongping Yan
Presenter: Anjin Wang, China University of Geosciences, China

Abstract: Few-shot object detection (FSOD) remains a challenging task due to feature shift and insufficient generalization caused by scarce novel-class samples. We propose a Semantic enhanced Visual Feature Aggregation (SVFA) framework that addresses these challenges through three key strategies. First, Semantic-Enhanced Novel-class Query Initialization (SENQI) leverages CLIP to encode textual semantics into visual queries, mitigating base-novel feature discrepancies. Second, at the high-level feature aggregation stage, we introduce Adaptive Support Sample Sampling (ASSS) to balance positive and negative support examples across different shot conditions and employ Attention-based Non-Linear Fusion (ANLF) to enhance the alignment between Region of Interest (RoI) features and class prototypes. Finally, Attention Prototype Augmentation (APA) refines prototype-to-query alignment through a dual-attention mechanism in complex scenarios. Experiments on PASCAL VOC and MS COCO benchmarks show that our method consistently outperforms existing meta-learning frameworks, demonstrating the effectiveness of integrating semantic guidance and dynamic feature aggregation for FSOD. Our code will be released publicly on GitHub.

Paper Title: End-to-End Autonomous Driving Trajectory Planning with Diffusion Transformer
All Author: Xinyu Wang, Heng Wang, Yundi Li, Mingjuan Guo
Presenter: Xinyu Wang, University of Science and Technology Beijing, China

17:05 - 17:20
CB3053

Abstract: Generating safe and diverse multimodal trajectory in complex environments is a fundamental challenge for end-to-end autonomous driving. While diffusion models have emerged as powerful tools for trajectory generation, their practical deployment is often hindered by the excessive computational overhead and high inference latency caused by the numerous iterative denoising steps. To solve this issue, we propose an efficient trajectory planning framework that incorporates rule-based priors to accelerate convergence and improve diversity. Specifically, we introduce a Spatial Rebalancing Algorithm to mitigate the data distribution bias in naturalistic driving datasets before clustering trajectory anchors. Instead of starting from pure Gaussian noise, our diffusion decoder utilizes these rebalanced anchors as initial states, iteratively refining them into high-fidelity trajectory guided by fused BEV and agent-centric features. This strategy significantly reduces the required denoising steps while effectively capturing complex interactions. Experiments on the NAVSIM benchmark demonstrate that our method achieves a Predictive Driving Model Score (PDMS) of 88.5, outperforming state-of-the-art baselines in both safety and planning performance.

Paper Title: Improved RTM-PoseFS Universal AI Fitness Guidance System
All Author: Xiangxiang Lu, Xianfeng Zeng, Haixiang Zhao, Junyun Wu
Presenter: Xiangxiang Lu, Guangdong University of Foreign Studies, China

17:20 - 17:35
CB4080

Abstract: In response to the growing demand for scientific and personalized fitness guidance, this paper proposes an improved AI-powered motion assessment system based on an enhanced RTMpose-FS pose estimation framework. The system addresses key limitations of existing approaches, including poor generalization, imbalanced real-time performance and accuracy, and oversimplified evaluation outputs. The core innovation lies in the RTMpose-FS network, which integrates FasterNest Blocks, SimAM attention mechanisms, and Depth Blocks to replace large-kernel convolutions, significantly improving feature extraction while reducing computational overhead. To handle temporal discrepancies between user movements and reference videos, the Fast Dynamic Time Warping (FastDTW) algorithm is employed for nonlinear sequence alignment, ensuring geometrically consistent pose matching. Furthermore, a multimodal evaluation model combining joint spatial distances, skeletal angles, and motion phase differences enables frame-level scoring and real-time feedback. Personalized thresholds are introduced to accommodate different body types, enhancing system adaptability. Extensive experiments on the COCO dataset demonstrate that RTMpose-FS achieves with 87.6% AP, 14.1M parameters, and 34 FPS, outperforming mainstream models such as HRNet and ViTPose. Comparative studies with human expert evaluations further validate the system's reliability and practical applicability.

17:35 - 17:50
CB4066

Paper Title: Research on the Application Strategies Of Generative Artificial Intelligence In User Interface Design
All Author: Zhang Hui, Li Rong Ping,
Presenter: Hui Zhang, Chengdu Jincheng College, China

Abstract: Rapid and high-fidelity user interface (UI) prototype development serves as a critical bridge between design intent and software engineering implementation. However, traditional manual coding approaches have long been constrained by inefficient style debugging and component reuse challenges. To evaluate the practical efficacy of generative artificial intelligence (GenAI) in industrial-scale front-end development, a controlled comparative experiment was designed and conducted with 12 professional developers. Using hierarchical randomization, the study systematically compared an automated workflow based on Bolt.new (integrated with Claude Sonnet 4.5) with traditional React manual development for the "Traffic Data Visualization Dashboard" task. Multidimensional quantitative assessment data revealed that the AI-assisted group achieved a 59.2% significant reduction in task completion time (TCT), while maintaining near-perfect coverage in static visual fidelity and component integrity. However, code usability index (CUI) analysis indicated that generated code exhibited significantly increased interaction failure risks when handling complex temporal logic such as map rendering and multi-level filtering, with diminishing marginal effects of prompt strategies in dynamic logic correction. The findings delineate the current application boundaries of the Vibe Coding paradigm: production-level capabilities at the visual layer require manual intervention at the logical layer. Based on these insights, a hierarchical hybrid development model termed "Visual Scaffolding" is proposed, providing empirical evidence and strategic guidance for enterprises to safely integrate GenAI tools throughout the software lifecycle.

17:50 - 18:05
CB4071

Paper Title: Influencing Factors and Intervention Strategies of multimodal audiovisual signal analysis for instrumental performance assessment: investigating the impact of family music education investment on performance skills and learning motivation

All Author: Kai Li
Presenter: Kai Li, Conservatorio di Musica San Pietro a Majella di Napoli, China

Abstract: This study aims to explore the current situation and relational mechanisms of factors affecting instrumental performance assessment via multimodal audiovisual signal analysis—focusing on family music education investment's impact on students' performance skills and learning motivation—and to verify core variables' hypothetical relationships for optimizing such assessment. Adopting a mixed-methods approach, it collected 432 valid questionnaires from music instructors at 8 Henan universities and multimodal audiovisual data (instrumental audio and playing posture/movement video) from 120 typical students. Using EFA and SEM, all six research hypotheses were supported (standardized path coefficients: 0.336–0.852). Key findings: family investment positively affects structured daily practice quality; practice quality, baseline musical aptitude, and digital resource accessibility boost performance skills and motivation; aptitude and digital accessibility also enhance practice quality. Conclusions: Core factors interact synergistically; family investment indirectly promotes students' comprehensive development via practice quality, with aptitude and digital resources as regulators. Multimodal data confirmed practice quality's correlation with objective indicators, bridging research gaps and providing a foundation for optimizing assessment.

ONLINE SESSIONS

Online Session 9: Edge Computing, IoT and Industrial Applications

Chair: **Anand Nayyar**, Duy Tan University, Viet Nam

16:00-18:05 | 894 4253 2020 Password:042426

TAIK DETAILS	
Time	**Presentation**
16:00 - 16:20 **Invited Speaker**	Paper Title: Modeling and Analysis of Unsteady Hydromagnetic Flows with Radiative and Newtonian Thermal Conditions Presenter: S.Anne Susan Georgena, Sri Ramakrishna Institute of Technology, India Abstract: The modeling of multi-physical transport phenomena involving magnetic fields and thermal effects is essential in advanced engineering and high-temperature industrial systems. This lecture presents a comprehensive analysis of unsteady hydromagnetic (MHD) boundary layer flows over stretching and shrinking surfaces incorporating radiative heat transfer and Newtonian heating conditions. Advanced computational modeling plays a critical role in understanding complex transport phenomena encountered in modern engineering systems. This lecture presents a detailed numerical investigation of unsteady hydromagnetic (MHD) boundary layer flows over stretching and shrinking surfaces incorporating radiative heat transfer and Newtonian heating effects. The mathematical formulation considers a two-dimensional, viscous, incompressible, electrically conducting fluid subjected to a transverse magnetic field. Thermal radiation is modeled using Rosseland approximation, while convective surface heating is represented through Newtonian heating conditions. The governing nonlinear partial differential equations are transformed into similarity-based ordinary differential equations and solved using an efficient fourth-order Runge-Kutta shooting algorithm coupled with an iterative boundary correction scheme. A comprehensive parametric analysis is performed to examine the influence of magnetic interaction, radiation parameter, unsteadiness, suction, Biot number, viscous dissipation, slip effects, and chemical reaction on velocity, temperature, and concentration distributions. The results reveal strong nonlinear coupling between magnetic damping and thermal enhancement mechanisms. The study demonstrates how advanced numerical techniques and intelligent computational frameworks can be employed to analyze multi-physics transport processes, offering insights relevant to high-temperature materials processing, energy systems, plasma engineering, and thermally optimized industrial designs.
16:20 - 16:35 **CB591**	Paper Title: Maximizing Task Completion in Dynamic Maritime Edge Computing: A Hierarchical MARL Framework with Collaborative UAVs and Buoys All Author: Meidan Liu, Jinfeng Dou Presenter: Meidan Liu, Ocean University of China, China Abstract: Dynamic Maritime Mobile Edge Computing (MMEC) faces significant challenges due to the stochastic arrival of computation-intensive tasks from mobile

Unmanned Surface Vehicles (USVs) and the highly volatile maritime environment. To address these issues, this paper investigates a collaborative architecture that leverages both stationary buoys and mobile Unmanned Aerial Vehicles (UAVs) as edge servers. We formulate a joint optimization problem encompassing service placement, task offloading, and UAV trajectory control, with the objective of maximizing the long-term Task Completion Ratio (TCR). To tackle this problem, we propose a Hierarchical Multi-Agent Reinforcement Learning (H-MARL) framework. The framework decomposes the problem into two tiers: a slow-timescale upper layer that uses a Proximal Policy Optimization (PPO) agent to make strategic service placement decisions, and a fast-timescale lower layer where multiple cooperative agents, coordinated via the Q-value Mixing(QMIX) algorithm, perform real-time task offloading and discretized UAV trajectory control. Extensive simulations demonstrate that our proposed H-MARL framework significantly outperforms baseline methods. The results validate the efficacy of H-MARL framework in dynamic MMEC systems.

16:35 - 16:50
CB776

Paper Title: Machine Learning-Based Fertilizer NPK Grade Classification and Application Rate Estimation for Hybrid and Inbred Rice in Cebu, Philippines
All Author: Gibe S. Tirol, Chris Jordan G. Aliac, Larmie S. Feliscuzo
Presenter: Gibe S. Tirol, Cebu Institute of Technology-University, Philippines

Abstract: Rice is vital for food security in the Philippines, but selecting the right fertilizer NPK grade and rate is difficult due to soil variability, seasonality, and rice variety differences. In Cebu Province, with about 2,000 hectares of mostly moderate to low fertility, a localized recommendation system is needed. This study developed a machine learning-based framework for NPK grade classification and rate estimation for hybrid and inbred rice using Cebu-specific soil maps and guides. The study's contribution is the Cebu-specific calibration and a dual-output model predicting fertilizer grade and application rate (bags/ha). After cleaning, 2,666 records were used. Fertilizer grade was modeled as a multiclass classification task, and application rate as a regression task using 17 agronomic and nutrient features. CatBoost, XGBoost, and a neural network were compared using leakage-safe preprocessing and 5-fold cross-validation. CatBoost performed best, with balanced accuracy above 0.82 for grade classification and R^2 of about 0.66 for rate estimation, with a mean absolute error of about 0.56 bags/ha. Confusion analysis showed strong separability for fertilizer formulations, with most errors in the nitrogen-only class. Results suggest machine learning can support province-calibrated recommendations, though field validation and dynamic environmental factors are needed for better generalizability.

16:50 - 17:05
CB2020

Paper Title: Neural Network-Based High-Altitude Wind Acquisition and Prediction for Rocket Load Reduction Control
All Author: Chenxiao Fan, Hutao Cui, Yang Zhao, Yang Li, Renwei Jiang
Presenter: Chenxiao Fan, Harbin Institute of Technology, China

Abstract: High-altitude wind is a critical factor affecting the recovery safety of reusable rockets, significantly altering aerodynamic loads, flight attitudes, and trajectories. Currently, accurate advance prediction of landing site wind fields is difficult with poor real-time performance. This study proposes a deep learning-based approach for wind field estimation and prediction, using directly measurable attitude angles and apparent acceleration deviations of the rocket as inputs to train a dedicated deep neural network.

Furthermore, a non-recursive simplified high-order sliding mode control method with online wind disturbance compensation is designed to achieve finite-time convergence. Simulation results verify the effectiveness and engineering feasibility of the proposed method, obtaining root mean square error (RMSE), mean square error (MSE) and coefficient of determination ( ) of wind field prediction with superior performance against traditional statistical (ARIMA) and shallow learning (MLP) models-achieving RMSE↓ 59.6%, MSE↓83.7%, ↑4.8% vs. MLP and RMSE↓68.9%, MSE↓89.9%, ↑8.6% vs. ARIMA-significantly reducing wind-induced disturbance torque and required control torque.

17:05 - 17:20
CB4090

Paper Title: MFF-AGRU: An Intelligent Risk Identification Method for Power Terminal Data Interaction in Distributed Business Scenarios
All Author: Xu Dong, Jiakai Hao, Chang Liu, Nan Xu, Yujia Zhai, Xianzhou Gao
Presenter: Yujia Zhai, China Electric Power Research Institute, China

Abstract: In distributed business scenarios of power systems, power terminal data interactions exhibit heterogeneous node structures, complex communication relationships, and highly concealed risk behaviors, which make traditional single-point detection methods insufficient for accurate risk identification. To address this issue, this paper proposes an intelligent risk identification method for power terminal data interaction based on multi-dimensional feature fusion, termed MFF-AGRU. First, the data interaction process among terminals, edge gateways, and master stations is modeled through a spatio-temporal interaction topology and behavior state transition mechanism. On this basis, risk information is extracted from four complementary dimensions, including statistical features, temporal behavioral features, protocol semantic features, and association features, and then fused into a unified representation. Subsequently, a gated recurrent unit with an attention mechanism is employed to capture the temporal evolution of terminal interaction behaviors and identify potential risks. In addition, a risk scoring mechanism is introduced to quantify the severity of abnormal interactions. Experimental results on a simulation environment and a laboratory-built test platform show that the proposed method outperforms rule-based detection, SVM, random forest, and standard LSTM in terms of accuracy, precision, recall, and F1-score. The method can effectively identify multiple risk categories, including unauthorized access, abnormal communication frequency, data tampering, abnormal command invocation, and replay attacks, demonstrating strong accuracy, robustness, and practical applicability in power terminal security protection.

17:20 - 17:35
CB4076

Paper Title: Edge-Pruned Global Context Modeling for Text-Attributed Graphs Representation Learning
All Author: Zhuangwei Liu, Zhengqi Wen, Cunhang Fan, Jianhua Tao
Presenter: Zhengqi Wen, Tsinghua University, China

Abstract: Text-attributed graphs (TAGs) are ubiquitous in real-world applications, yet existing representation learning methods often suffer from two critical limitations: the isolation of local textual encoding from global structural aggregation, and the prevalence of semantically irrelevant edges that introduce noise and cause semantic-structural misalignment. To address these challenges, we propose a novel framework that jointly performs semantic-aware edge pruning and global-contextual modeling.

First, we leverage an instruction-tuned large language model (LLM) to assess the semantic relevance of each edge, pruning those with low relevance to produce a purified, sparse graph structure. Subsequently, on this pruned graph, we concatenate each node's textual attributes with those of its sampled neighbors, feed the sequence into a pretrained language model (LM) to obtain contextual embeddings, and finally refine these representations with a lightweight graph neural network (GNN). Extensive experiments on five benchmark datasets demonstrate that our method consistently outperforms state-of-the-art baselines while significantly improving efficiency, reducing training time and GPU memory consumption.

17:35 - 17:50
CB4083

Paper Title: Technical Debt Principal Prediction by Deep Learning
All Author: Yanying Li, Zengyang Li
Presenter: Yanying Li, Central China Normal University, China

Abstract: As a dynamically typed language widely adopted in deep learning and data science, Python enables efficient development yet introduces implicit maintainability risks due to its flexible syntax and late binding mechanism. Technical Debt (TD) represents the latent maintenance cost generated by short-term design compromises, and its principal-the effort required for full remediation-tends to accumulate over delayed issue resolution. However, existing prediction approaches for TD principal are heavily dominated by Java-centric studies, leaving a methodological gap for Python-dominated deep learning projects. To fill this gap, we curate a time-series dataset consisting of 1,554 sequential versions extracted from 10 representative open-source Python deep learning projects. Instead of using fixed forecasting windows, we tailor the prediction span to the actual issue resolution rhythm of each project by measuring its real-world issue lifecycle. We then design two sequence-oriented deep learning architectures, Long Short-Term Memory (LSTM) and Temporal Convolutional Network (TCN), to model the temporal evolution pattern of TD principal. Experimental results demonstrate that both models achieve strong predictive performance: all projects yield a Mean Absolute Percentage Error (MAPE) below 10%, and 8 out of 10 projects achieve MAPE lower than 4%. In most cases, TCN outperforms LSTM by better capturing long-range temporal dependencies while supporting parallel computation. This work validates the feasibility of deep learning for TD principal forecasting in Python deep learning projects and provides a time-aware prediction pipeline aligned with real development practices.

17:50 - 18:05
CB581

Paper Title: An Artificial Intelligence-Driven Study on the Prediction of Formation Pressures in Carbonate Strata
All Author: Qifu XIAO, Shenglin FAN, Bo ZOU
Presenter: Qifu XIAO, China National Petroleum Corporation, China

Abstract: This study addresses the challenge of predicting formation pressure in the structurally complex and highly heterogeneous reservoirs of the Western Chongqing Block, Sichuan Basin. Conventional methods often suffer from insufficient vertical resolution, posing risks to safe and efficient drilling operations. To overcome this, an intelligent formation pressure prediction method based on machine learning is proposed.The performance of several machine learning algorithms, including K-Nearest Neighbors (KNN), Decision Tree, and Random Forest, was compared. The Random Forest algorithm was selected for its strong resistance to overfitting and

effective handling of high-dimensional data. Key input features—natural gamma ray, well depth, well inclination, azimuth, density, shear wave slowness, and compressional wave slowness-were identified through Spearman's rank correlation analysis. These features were used to construct a model for high-precision prediction of pore pressure, fracture pressure, and collapse pressure.Application of the model in the Z203 well area of the Western Chongqing Block demonstrated its effectiveness. The Random Forest model achieved coefficients of determination (R^2) of 0.942, 0.912, and 0.933 for pore pressure, fracture pressure, and collapse pressure, respectively. The corresponding root mean square errors (RMSE) were 0.122, 0.145, and 0.109. Compared to conventional methods, the prediction accuracy improved by approximately 25% on average, with a significant enhancement in vertical resolution. Furthermore, the time required to predict a single well's pressure profile was reduced to under three minutes, representing an efficiency increase of over 98%.By integrating multi-source information, the proposed method significantly improves both the accuracy and vertical resolution of formation pressure prediction in fractured carbonate reservoirs. It exhibits strong generalization capability and substantial value for engineering applications, providing reliable technical support for the safe and efficient drilling of complex formations.

MEMO