ICCCBDA 2022

2022 THE 7TH INTERNATIONAL CONFERENCE ON CLOUD COMPUTING AND BIG DATA ANALYTICS

ISAI 2022

2022 THE 2ND INTERNATIONAL SYMPOSIUM ON AI

Chengdu, China | 22-24 April 2022 | Virtual Conference

Sponsored By IEEE 四川省電子學會 Sichuan Institute of Electronics

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Welcome Message

2022 the 7th International Conference on Cloud Computing and Big Data Analytics (ICCCBDA) (and its workshop: 2022 the 2nd International Symposium on AI), will be held in Chengdu, China, between 22-24 April 2022. ICCCBDA has been held since 2016. ICCCBDA 2022 aims at a key theme on cloud computing and big data analytics. ICCCBDA has been held since 2016, sponsored by IEEE and Sichuan Institute of Electronics, organized by Xihua University, co-organized by Southwest Jiaotong University and Sichuan University, China; technically supported by Key Lab of Cloud Computing & Intelligent Technology, Sichuan Province, and Chongqing University of Posts and Telecommunications, etc...

Since 2016, ICCCBDA conferences have been successfully held in Chengdu for four years, and been sponsored by IEEE. All the conference proceedings were included in IEEE Xplore already. It gradually makes it one of the leading international conferences for presenting novel advances in the fields of cloud computing and big data analytics. At the annual conference, participants gather to present research results, share visions and ideas, obtain updates on latest technologies and expand professional and social networking. These activities are realized through ICCCBDA's multiple diversified and exciting programs.

ICCCBDA2022 conference program includes 5 Keynote Speakers, they are: Prof. Nirwan Ansari, New Jersey Institute of Technology, USA; Prof. Dr. C. L. Philip Chens, South China University of Technology, China; Prof. Dr. Minyi Guo, Shanghai Jiao Tong University, China; Prof. Shangguang Wang, Beijing University of Posts and Telecommunications, China and Prof. Jixin Ma, University of Greenwich, UK, 1 invited speaker: Yan Huang, Scientist at China National GeneBank and 11 parallel technical sessions.

The chairman and keynote speakers played a great role in conducting the proceedings of the conference and on behalf of the conference committee, we would like to express sincere thanks for your long-term support and help on our work. We were grateful for the reviewers, who had also been very helpful in efficiently reviewing the manuscripts and made valuable suggestions for the authors to improve their work. At the same time, we also extended our heartfelt thanks to the understanding and support of every author.

We hope you could benefit from the conference, and looking forward to meeting you again!

ICCCBDA & ISAI 2022 Conference Committees

Attendees Guideline

Materials Prepared by the Presenters

Online Presentation: PowerPoint or PDF files. Please install ZOOM in advance and join our online session on time.

Duration of Each Presentation

Keynote Speech: 40 Minutes of Presentation including Q&A. Invited Speech: 30 Minutes of Presentation including Q&A.

Regular Oral Presentation: 15 Minutes of Presentation including Q&A.

Note:

The regular oral presentation time arrangement is for reference only. In case any absence or some presentations are less than 15 minutes, please join your session earlier.

An excellent presentation will be selected from each session which will be announced and awarded an excellent presentation certificate.

Zoom will be the online platform for this conference. Instructions are listed as below:

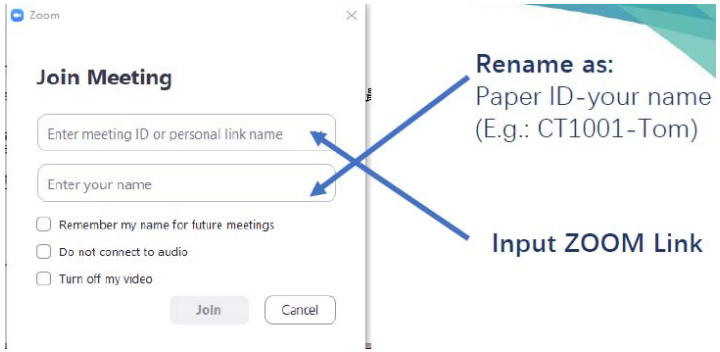
1. **Download the ZOOM on your PC and complete the ZOOM install.**

Zoom Download: https://zoom.us/ Author in China: https://zoom.com.cn/download

2. **Join in the conference by Room No. or Link.**

Note: The Room No. or Link will be available only during the scheduled time.

Note: Please find your Zoom Link according to the schedule.



3. **Set up your Name.**

- If you are conference committee member or keynote speaker, please set up your name by this format: your position-Full Name, such as, Keynote—Tracy Lee
- Or, if you are author, please set up your name by this format: Paper ID-Full Name, such as, R001—Gretchen Liu
- Or, if you are listener, please set up your name by this format: Listener-Full Name, such as, Listener—Gretchen Liu

Tips: Please unmute audio and start video while your presentation.

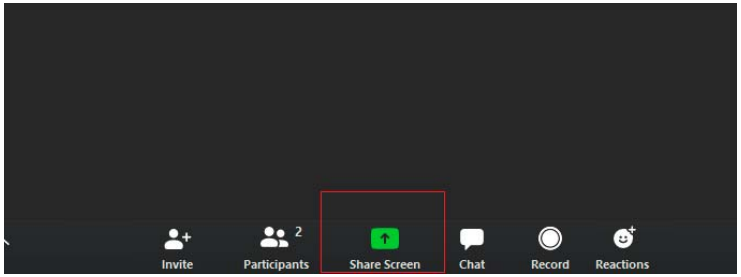
It's suggested to use headset with microphone or earphone with microphone.

Note: ZOOM conference rooms will be open 30 mins before scheduled time.

Attendees Guideline

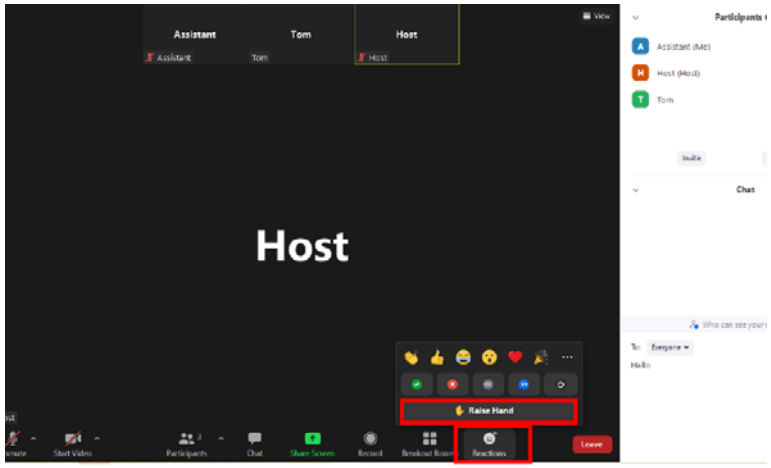
4. How to share your slides

Share your screen to all participants when you make the presentation, by click the following button. Please prepare your presentation file in advance.

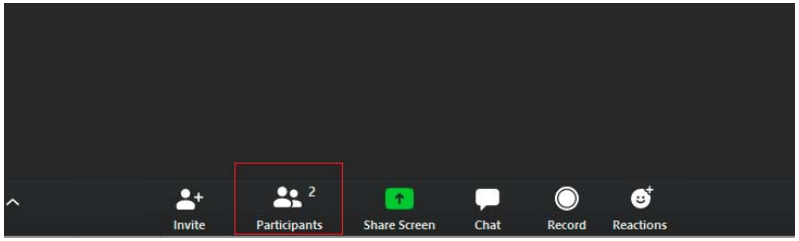


5. Other functions

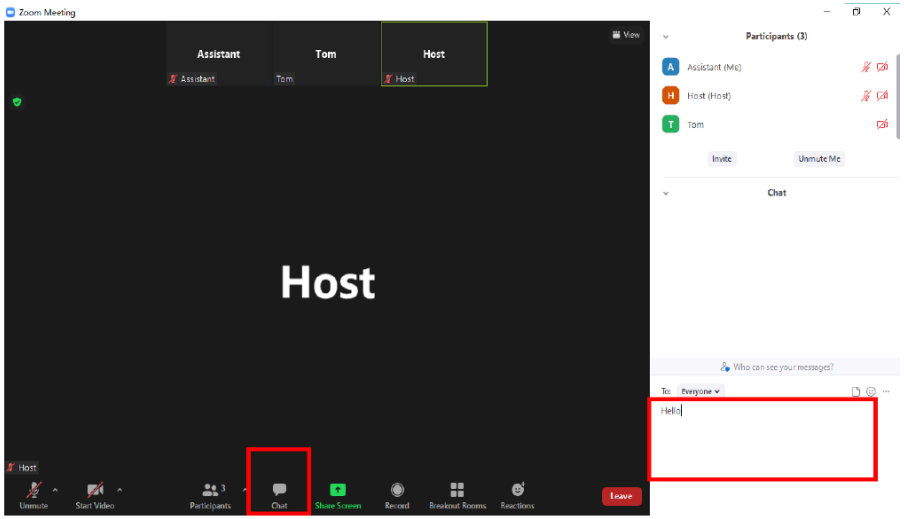
a. Click below button to raise your questions in Q&A session.



b. See all participants by click it.



c. Send messages or questions in Chat Window



Timetable (GMT+8)

Date	Arrangement	
April 22. 2022	Online Test-Speakers, Committees, Session Chairs & All authors (Presenters)	**Note: Only one password for all online room** **Password: 042224**
April 23. 2022	Opening Ceremony & Keynote Speeches & Invited Speeches Parallel Sessions (1-3)	
April 24. 2022	Parallel Sessions (4-11)	

April 22. 2022

	Online Test	Zoom Link (Password: 042224)
10:30-12:00	Keynote Speakers; Invited Speaker; Committee Members, Session Chairs	https://us02web.zoom.us/j/85700076636
10:30-11:30	Session 1- D0A55, D0A29, D0A35, D0A20, D0A96, D0A82, D0A93, D0A90, D0A62 Session 2- D2104, D0A78, D0A28, D0A39, D0A16, D0A14, D0A04, D0A91 Session 3- D2103, D2105, D2109, D2112, D1A05, D0A69, D0A10, D0A09 Session 4- D0A105, D1101, D0A77, D0A84, D0A51, D0A46, D0A18	https://us02web.zoom.us/j/82792835100
14:00-15:30	Session 5- D0A100, D0A101, D0A104, D0A66, D0A25, D0A33, D0A40 Session 6- D0A37, D0A74, D0A47, D0A71, D0A19, D0A21, D0A38, D101 Session 7- D0A85, D0A86, D0A98, D0A68, D0A59, D0A52, D0A26, D0A32 Session 8- D0A73, D1A04, D0A50, D0A30, D0A24, D0A02, D0A27, D1A03	
15:50-17:20	Session 9- D0A99, D0A22, D0A48, D0A94, D0A34, D0A08, D2107, D2101 Session 10- D2108, D2110, D1A06, D0A53, D0A60, D0A61, D0A57, D0A23 Session 11- D2111, D1A08, D0A87, D0A45, D0A63, D0A36, D1A02, D0A67, D2102	

April 23. 2022

Opening Ceremony & Keynote Speeches & Invited Speeches **Zoom Link: https://us02web.zoom.us/j/85700076636 (Password: 042224)** **Host: Mingxing He, Xihua University, China**	
9:00-9:05	**Welcome Message** Tao Xiang, Secretary-general, Sichuan Institute of Electronics
9:05-9:10	**Opening Remarks** Prof. Tianrui Li, Southwest Jiaotong University, China
9:10-9:50	**Keynote Speaker I** Prof. Nirwan Ansari, New Jersey Institute of Technology, USA **Title:** On Green Cloudlet Networks
9:50-10:30	**Keynote Speaker II** Prof. Dr. C. L. Philip Chen, South China University of Technology, China **Title:** Semantic Embedding Based Facial Expression Recognition Approach and Applications
10:30-10:50	**Group Photo & Break**
10:50-11:30	**Keynote Speaker III** Prof. Dr. Minyi Guo, Shanghai Jiao Tong University, China **Title:** Cloud Computing for Sprinting peak Services
11:30-12:10	**Keynote Speaker IV** Prof. Shangguang Wang, Beijing University of Posts and Telecommunications, China **Title:** Tiansuan Constellation: An Open Research Platform
12:10-13:30	**Break**

Keynote Speeches & Invited Speech **Zoom Link: https://us02web.zoom.us/j/85700076636 (Password: 042224)** **Host: Mingxing He, Xihua University, China**	
13:30-14:10	**Keynote Speaker V** Prof. Jixin Ma, University of Greenwich, UK **Title:** Time Makes Big Data Bigger
14:10-14:40	**Invited Speaker** Yan Huang, Scientist at China National GeneBank **Title:** STOMICS DataBase: a Path to the Endless Frontier of Spatio-Temporal Omics
14:40-15:00	**Break**
Parallel Sessions (Password: 042224) **Session 1: Zoom Link: https://us02web.zoom.us/j/85700076636** **Session 2: Zoom Link: https://us02web.zoom.us/j/82792835100** **Session 3: Zoom Link: https://us02web.zoom.us/j/81646883912**	
15:00-17:15	**Session 1- Software and Information Engineering** **Session Chair: Prof. Xun Gong, Southwest Jiaotong University, China** D0A55, D0A29, D0A35, D0A20, D0A96, D0A82, D0A93, D0A90, D0A62
15:00-17:00	**Session 2-Algorithm Design and Intelligent Computing** **Session Chair: Prof. Miroslav Popovic, Faculty of Technical Sciences, University of Novi Sad, Serbia** D2104, D0A78, D0A28, D0A39, D0A16, D0A14, D0A04, D0A91
15:00-17:00	**Session 3- Artificial Intelligence and Information Management** **Session Chair: Assoc. Prof. SK. Saidhbi, Semara University, Ethiopia** D2103, D2105, D2109, D2112, D1A05, D0A69, D0A10, D0A09

April 24. 2022

Parallel Sessions (Password: 042224) **Session 4&7&10: Zoom Link: https://us02web.zoom.us/j/85700076636** **Session 5&8&11: Zoom Link: https://us02web.zoom.us/j/82792835100** **Session 6&9: Zoom Link: https://us02web.zoom.us/j/81646883912**	
10:00-11:45	**Session 4- Computer Modeling and Computation** **Session Chair: Rasha, Southwest Jiaotong University, China** D0A105, D1101, D0A77, D0A84, D0A51, D0A46, D0A18
10:00-11:45	**Session 5- Big Data Analysis and Methods** **Session Chair: Taha, Southwest Jiaotong University, China** D0A100, D0A101, D0A104, D0A66, D0A25, D0A33, D0A40
10:00-12:00	**Session 6- Blockchain and Data Security** **Session Chair: Prof. Yoshifumi Manabe, Kogakuin University, Japan** D0A37, D0A74, D0A47, D0A71, D0A19, D0A21, D0A38, D101
12:00-13:30	**Break**
13:30-15:30	**Session 7- Cloud Computing and High Performance Computing** **Session Chair: Yang Li, Southwest Jiaotong University, China** D0A85, D0A86, D0A98, D0A68, D0A59, D0A52, D0A26, D0A32
13:30-15:30	**Session 8- Data Theory and Engineering** **Session Chair: Ghufran, Southwest Jiaotong University, China** D0A73, D1A04, D0A50, D0A30, D0A24, D0A02, D0A27, D1A03

13:30-15:30	**Session 9- Computer Vision and Virtual Technology** **Session Chair: Ma Mingbo, Southwest Jiaotong University, China** D0A99, D0A22, D0A48, D0A94, D0A34, D0A08, D2107, D2101
15:30-16:00	**Break**
16:00-18:00	**Session 10- Modern Information and Communication Technology** **Session Chair: Assoc. Prof. SK. Saidhbi, Semara University, Ethiopia** D2108, D2110, D1A06, D0A53, D0A60, D0A61, D0A57, D0A23
16:00-18:15	**Session 11- Object Recognition and Detection** **Session Chair: Dr. Muharrem Tuncay GENÇOĞLU, Fırat University, Turkey** D2111, D1A08, D0A87, D0A45, D0A63, D0A36, D1A02, D0A67, D2102

Speakers Introduction

Prof. Nirwan Ansari, New Jersey Institute of Technology, USA
IEEE Fellow, COMSOC Distinguished Lecturer
April. 23 | 9:10-9:50 | Zoom Link: https://us02web.zoom.us/j/85700076636 | Password: 042224

Speech Title: On Green Cloudlet Networks

Bio: Nirwan Ansari, Distinguished Professor of Electrical and Computer Engineering at the New Jersey Institute of Technology (NJIT), received his Ph.D. from Purdue University, MSEE from the University of Michigan, and BSEE (summa cum laude with a perfect GPA) from NJIT. He is a Fellow of IEEE as well as a fellow of National Academy of Inventors. He authored Green Mobile Networks: A Networking Perspective (Wiley-IEEE, 2017) with T. Han, and co-authored two other books. He has also (co-)authored more than 600 technical publications. He has guest-edited a number of special issues covering various emerging topics in communications and networking. He has served on the editorial/advisory board of over ten journals including as Associate Editor-in-Chief of IEEE Wireless Communications Magazine. His current research focuses on green communications and networking, cloud computing, drone-assisted networking, and various aspects of broadband networks. He was elected to serve in the IEEE Communications Society (ComSoc) Board of Governors as a member-at-large, has chaired some ComSoc technical and steering committees, is current Director of ComSoc Educational Services Board, has been serving in many committees such as the IEEE Fellow Committee, and has been actively organizing numerous IEEE International Conferences/Symposia/Workshops. He is frequently invited to deliver keynote addresses, distinguished lectures, tutorials, and invited talks. Some of his recognitions include several excellence in teaching awards, a few best paper awards, the NCE Excellence in Research Award, several ComSoc TC technical recognition awards, the NJ Inventors Hall of Fame Inventor of the Year Award, the Thomas Alva Edison Patent Award, Purdue University Outstanding Electrical and Computer Engineering Award, the NCE 100 Medal, and designation as a COMSOC Distinguished Lecturer. He has also been granted more than 40 U.S. patents.

Abstract: The term “Internet of Things” (IoT) was coined in 1999 to describe the phenomenon of having a myriad of physical entities (gadgets, devices, sensors, etc.) connected via the Internet to provision various applications and services. The number of IoT devices worldwide is forecast to triple within a decade from 2020 to 2030. Green cloudlet networks (GCNs) are envisioned to meet the challenge of provisioning IoT with quality of service guarantees in a secure and environmentally friendly manner. In the GCN architecture, each User Equipment (UE) is associated with an Avatar (a private virtual machine for executing its UE’s offloaded tasks) in a cloudlet located at the network edge. In order to reduce the operational expenditure for maintaining the distributed cloudlets, each cloudlet is powered by green energy and uses on-grid power as a backup. Owing to the spatial dynamics of energy demands and green energy generations, the energy gap among different cloudlets in the network is unbalanced. The unbalanced energy gap increases the on-grid power consumption of the cloudlets. This talk will delineate the Green-energy aware Avatar Placement (GAP) strategy to minimize the total on-grid power consumption of the cloudlets by migrating Avatars among the cloudlets according to the cloudlets’ residual green energy, while guaranteeing the service level agreement.

Prof. Dr. C. L. Philip Chen, South China University of Technology, China
IEEE Fellow, AAAS Fellow, IAPR Fellow, HKIE Fellow
April. 23 | 9:50-10:30 | Zoom Link: https://us02web.zoom.us/j/85700076636 | Password: 042224
Speech Title: Semantic Embedding Based Facial Expression Recognition Approach and Applications

Bio: C. L. Philip Chen (F'07) is the Chair Professor and Dean of the College of Computer Science and Engineering, South China University of Technology. Left his 23 years of professorship position in the USA, he became a Chair Professor of the Faculty of Science and Technology, University of Macau, where he was the former Dean (2010-2017). He is a Fellow of IEEE, AAAS, IAPR, CAA, and HKIE; a member of Academia Europaea (AE), European Academy of Sciences and Arts (EASA). He received IEEE Norbert Wiener Award in 2018 for his contribution in systems and cybernetics, and machine learnings, 2021 IEEE Joseph G. Wohl Career Award for his contributions in SMCS and IEEE, and 2021 Wu WenJun (吴文俊) Outstanding Contribution Award from the Chinese Association of AI. He was a recipient of the 2016 Outstanding Electrical and Computer Engineers Award from his alma mater, Purdue University. He received IEEE Transactions on Neural Networks and Learning Systems best transactions paper award two times for his papers in 2014 and 2018, Franklin Taylor best conference paper award in IEEE Int'l Conf. on SMC 2019. He is a highly cited researcher by Clarivate Analytics from 2018 to 2021 continuously.

In professional service, he was the Editor-in-Chief of the IEEE Transactions on Cybernetics (2020-2021) after he completed his term as the Editor-in-Chief of the IEEE Transactions on Systems, Man, and Cybernetics: Systems (2014-2019), followed by serving as the IEEE Systems, Man, and Cybernetics Society President from 2012 to 2013. Currently, he serves as a deputy director of CAAI Transactions on AI, an Associate Editor of the IEEE Transactions on AI, IEEE Trans on SMC: Systems, and IEEE Transactions on Fuzzy Systems, an Associate Editor of China Sciences: Information Sciences. He received Macau FDCT Natural Science Award three times and a First-rank Guangdong Province Scientific and Technology Advancement Award in 2019. His current research interests include cybernetics, computational intelligence, and systems.

Abstract: Emotions can reflect human's mental or physiological state and influence their behavioral tendencies. It's of a great significance to study and understand the related algorithms and technologies of human emotion in artificial intelligence. It has become a popular topic to make more accurate judgments and analysis of human behavior patterns and mental states, and to realize more humanized friendly interaction. As a visual signal, the facial expression contains rich emotional information. It plays an important role in intelligent emotion analysis and is widely used in human-computer interaction, virtual reality, intelligent education, mental state assessment, and other fields. This report mainly focuses on the problem of facial expression recognition and provides an in-depth analysis of facial semantics, innovative network structure, and application algorithm design. According to the characteristics of data and tasks, a method of facial visual emotion analysis and learning is introduced. From efficient processing algorithms and techniques such as privileged auxiliary units information embedding, facial structure semantic embedding, broad learning systems, and adaptive multi-scale dilated convolution, the research work and the application of scenarios such as mental state assessment and intelligent education are presented from multiple perspectives.

Prof. Dr. Minyi Guo, Shanghai Jiao Tong University, China
Zhiyuan Chair Professor, IEEE Fellow, CCF Fellow, ACM Distinguished Member
April. 23 | 10:50-11:30 | Zoom Link: https://us02web.zoom.us/j/85700076636 | Password: 042224

Speech Title: Cloud Computing for Sprinting peak Services

Bio: Minyi Guo received the BSc and ME degrees in computer science from Nanjing University, China; and the PhD degree in computer science from the University of Tsukuba, Japan. He is currently a Chair professor of Shanghai Jiao Tong University (SJTU), China. Before joined SJTU, Dr. Guo had been a professor of the school of computer science and engineering, University of Aizu, Japan. Dr. Guo received the national science fund for distinguished young scholars from NSFC in 2007, and was supported by "Recruitment program of Global Experts" in 2010. His present research interests include parallel/distributed computing, compiler optimizations, big data and cloud computing. He has more than 400 publications in major journals and international conferences in these areas. He received 7 best/highlight paper awards from international conferences including ALSPOS 2017 and ICCD 2018. He is now Editor-in-Chief of IEEE Transactions on Sustainable Computing, and on the editorial board of IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Cloud Computing and Journal of Parallel and Distributed Computing. Dr. Guo is a fellow of IEEE, a fellow of CCF, and a distinguished member of ACM.

Abstract: Many internet applications have the characteristics of "sprinting peak load", that is the requests could be significantly increased thousand times in adjacent time unit. For example, Wechat red packet on New Year's Eve, and Alibaba "Double Eleven" shopping carnival of e-commence platforms are such kind of applications. To support these internet services the traditional cloud systems could not satisfy the requirements due to lack of many efficient special means. In this talk, aim at such applications, the principal faultiness is designated for traditional cloud systems first. Then we try to improve in request latency, storage throughout capacity, container expansion speed, and fault-tolerance, to satisfy sprinting peak load service requirements. The system we developed has been applied in many real sprinting peak load scenarios.

Prof. Shangguang Wang, Beijing University of Posts and Telecommunications, China

April. 23 | 11:30-12:10 | Zoom Link: https://us02web.zoom.us/j/85700076636 | Password: 042224

Speech Title: Tiansuan Constellation: An Open Research Platform

Bio: Shangguang Wang is a Professor at the School of Computer Science, Beijing University of Posts and Telecommunications, China. He received his Ph.D. degree at Beijing University of Posts and Telecommunications in 2011. He has published more than 150 papers in journals such as IEEE JASC, TMC, TSC, and TCC, and conferences such as IJCAI, INFOCOM, AAAI and ICWS. His research interests include service computing, mobile edge computing, cloud computing, and Satellite Computing. He is currently serving as Chair of IEEE Technical Committee on Services Computing, and Vice-Chair of IEEE Technical Committee on Cloud Computing. He also served as General Chairs or Program Chairs of 10+ IEEE conferences, Advisor/Associate Editors of several journals such as Journal of Cloud Computing, Journal of Software: Practice and Experience, International Journal of Web and Grid Services, China Communications, and so on. He was a Fellow of the IET, and a senior member of the IEEE.

Abstract: Satellite network is the first step towards interstellarvoyages. It can provide global Internet connectivity everywhere on the earth, where most areas cannot access the Internet by the terrestrial infrastructure due to the geographic accessibility and high deployment cost. The space industry experiences a rise in large low-earth-orbit satellite constellations to achieve universal connectivity. The research community is also urgent to do some leading research to bridge the connectivity divide. Researchers now conduct their work by simulation, which is far from enough. However, experiments on real satellites are hindered by the exceptionally high bar of space technology, such as deployment cost and unknown risks. To solve the above challenges, we are eager to contribute to the universal connectivity and build an open research platform, Tiansuan constellation, to support experiments on real satellite networks. We discuss the potential research topics that would benefit from Tiansuan. We provide two case studies that have already been deployed in two experimental satellites of Tiansuan.

Prof. Jixin Ma, University of Greenwich, UK

April. 23 | 13:30-14:10 | Zoom Link: https://us02web.zoom.us/j/85700076636 | Password: 042224

Speech Title: Time Makes Big Data Bigger

Bio: Dr Jixin Ma is a Full Professor in the School of Computing and Mathematical Sciences, University of Greenwich, U.K. He is the Director of the Centre for Computer and Computational Science, and the Director of School's PhD/MPhil Programme. He is also a Visiting Professor of Beijing Normal University, Auhui University, Zhengzhou Light Industrial University, and City University of Macau.

Professor Ma obtained his BSc and MSc of Mathematics in 1982 and 1988, respectively, and PhD of Computer Sciences in 1994. His main research areas include Data Science, Artificial Intelligence and Information Systems, with special interests in Temporal Logic, Temporal Databases, Reasoning about Action and Change, Case-Based Reasoning, Pattern Recognition, Graph Matching and Information Security. He has been a member of British Computer Society, American Association of Artificial Intelligence, ICIS/IEEE, and Special Group of Artificial Intelligence of BCS. Professor Ma has been the Editor of several international journals and international conference proceedings, and Program Chair/Invited Keynote Speakers of many international conferences. He has published more than 150 research papers in international journals and conferences.

Abstract: Scenario recognition is an important technology in Data Science and Artificial Intelligence. It reveals historical patterns, trends and associations related to human behavior and time by computing and analyzing large-scale data sets. Scenario recognition can be used to solve the problems of prediction, decision-making, diagnosis, process management and supervision, historical reconstruction and so on. However, accurate representing and matching scene patterns in big data is a complex problem. This talk will introduce some basic concepts with respects to time, fluent, state and scenario, and related theories and application examples, as well as a framework for scene pattern representation and matching. The framework can effectively represent relative and absolute time knowledge, and solve the calculation problem of temporal similarity by transforming time similarity into graph similarity. As a special case, we will demonstrate how to apply the framework to represent the traffic light control problem of human intersection in time series and state series.

Yan Huang, Scientist at China National GeneBank

April. 23 | 14:10-14:40 | Zoom Link: https://us02web.zoom.us/j/85700076636 | Password: 042224

Speech Title: STOMICS DataBase: a Path to the Endless Frontier of Spatio-Temporal Omics

Bio: Yan Huang, an associated researcher of BGI-Shenzhen. Her main research areas are biological data resource integration, literature mining and bioinformatics. She has been deeply engaged in the cross-research of biology, medicine, and machine learning for more than 10 years. She has published two SCI papers (first author), and has one patent and 15 software copyrights. By integrating and analyzing private data and public data, she has built two large public databases and an analysis platform for tumor gene detection precise medical that covered more than 30 cancers.

Abstract: With the development of sequencing technology, the cost of sequencing continues decreasing, and the amount of sequencing data is growing, which results in an exponential increase in corresponding literature, detection methods, and analysis tools. The vast information makes biological analyses become a challenge. The processes of data collection, curation, and analysis are always labor- and time-consuming.

Here, we build a Spatio-Temporal Omics database (STOmicsDB) as a test case, to provide a solution to systematically integrate and mined the datasets, literature, researchers, detection methods, analysis tools, and other resources in a specific field, and combine with database, search and recommendation system technology to build the best path to the frontier of life science research.

Parelle Sessions

Session 1- Software and Information Engineering
April 23, 2022 | 15:00-17:15 | Zoom Link: https://us02web.zoom.us/j/85700076636 (Password:042224)
Session Chair: Prof. Xun Gong, Southwest Jiaotong University, China
D0A55, D0A29, D0A35, D0A20, D0A96, D0A82, D0A93, D0A90, D0A62

D0A55 15:00-15:15	Fault Localization for Microservice Applications with System Logs and Monitoring Metrics Qixun Zhang, Tong Jia, Zhonghai Wu, Qingxin Wu, Lichun Jia, Donglei Li, Yuqing Tao and Yutong Xiao Presenter: Donglei Li, Peking University, China Abstract: Microservices have been widely used in enterprises due to their excellent scalability and timely update capabilities. However, while the fine-grained modularity and service orientation decrease the complexity of system development, the complexity of system operation and maintenance has been greatly increased because system faults are becoming very frequent and complex. Therefore, fault localization, that is, diagnosing fault service and its root cause, is very important yet challenging for microservice applications. One of the most challenges of fault localization is fusing multiple data sources because system faults will exhibit different features in multiple data sources. Therefore, it is necessary to fuse multiple data sources and build a unified model for fault localization. In this paper, we propose a fault localization approach with the fusion of system logs and monitoring metrics. Our approach first discovers service dependencies and then utilizes system logs and monitoring metrics to detect anomalies for each microservice. Finally, it locates the fault service and recommends the root cause system metrics based on the service dependencies and detected anomalies. The experiment results show that the average precision of our approach is ~75%.
D0A29 15:15-15:30	Talent Recruitment Platform for Large-scale Group Enterprises Based on Deep Learning Liu Youping, Shen Jiangang Presenter: Youping Liu, China North Talent Research Institute, China Abstract: We have proposed a personalized recommendation algorithm based on deep learning model focusing on the issue of large domestic enterprises' talent screening during recruitment; and further developed the talent recruitment platform based on this algorithm. The algorithm initially adopted the item "necessary requirements" in the job description to screen candidates. Then it employs Deep Neural Network to calculate the correlation between candidates and positions, and recommends the candidates to the employers according to the correlation. It has been proved that the algorithm has a high success rate of recommendation.

D0A35 15:30-15:45	Critical challenges and solutions for an ultra-large-scale enterprise DevOps platform Mengxia Chen, Wensheng Yao, Jingxiang Chen, Huan Liang, Yong Chen, Hongming Qiao, Chengwei Yang, Man Li, Jiangang Tong Presenter: Mengxia Chen, Research Institute of China Telecom Co., Ltd. Guangzhou, China Abstract: As the enterprise IT systems continuously migrate to cloud, conventional waterfall development process model undermines system flexibility and brings some unacceptable disadvantages, such as slow delivery of business requirements, long release cycles and high risk of manual deployment. However, adopting the DevOps methodology can solve these problems as it helps enterprise develop and deliver IT systems and software products efficiently. Based on the widely adopted processes and toolchains, we have developed a novel ultra-large-scale enterprise application development platform, YunDao. Although it has achieved many successes and wide applications, some critical challenges still exist with the promotion and extensive use of this advanced platform. In this study, a preliminary analysis was conducted on the critical challenges during the operation and maintenance process. Some solutions were proposed and discussed to grapple with these issues to further optimize the platform. This work can contribute to the understanding the DevOps concept, yielding new insights into developing and optimizing other ultra-large-scale platforms.
D0A20 15:45-16:00	A Hybrid Page Ranking Algorithm Based on User Behavior Jiakun Zhao, Peihuang Wu Presenter: Peihuang Wu, Xi'an Jiaotong University, China Abstract: Search engine, one of the most important applications in our lives, is dependent on page ranking algorithm. User search experience is directly affected by the quality of the page ranking algorithm, and poor ranking leads to users spending much more time to find their desired webpage from the search results. This study, on the basis of the Weighted PageRank algorithm, proposes a new algorithm, the Topic Weighted PageRank algorithm, that considers topic relevance between webpage content and users' search queries, and ensures ranking results are strongly correlated to user needs. Subsequently, this study improved the Topic Weighted PageRank algorithm in many aspects after considering factors such as the popularity of webpages, user preference for websites, and user preference. Finally, indicators of page ranking algorithm effectiveness were defined, and experiments were conducted to verify the effectiveness of the page ranking method proposed in this study. The results show that the proposed page ranking method performs better in various indicators than many of page ranking algorithms declared in recent years.
D0A96 16:00-16:15	A knowledge point labeling method by introduce knowledge points labels information Wei Zhang, Longan Tan, Kaiyuan Qu, Xuanwen Yang Presenter: Longan Tan, Central China Normal University, China

	Abstract: Manual annotation of knowledge points is a high cost and labor-intensive task, while automatic annotation of knowledge points is a challenging task. The labels information of knowledge points can guide model annotation, but most of the existing automatic labeling methods ignore the labels information of knowledge points. By introducing knowledge point labels information, this paper proposes an end-to-end knowledge point annotation framework. The proposed framework is composed of feature extraction module and knowledge points annotation module introducing the labels information. We introduce and capture the information between labels based on graph convolutional networks (GCN), and combine Skip Connection to accelerate model convergence. We evaluated the proposed framework on a real-world dataset labeled by four high school courses, 29,813 sample exam questions, and 97 knowledge points. The proposed model achieves similar or better performance (2% to 15% improvement in Micro F1) than the most advanced knowledge point annotation model.
D0A82 16:15-16:30	Exploration on the development path of postdoctoral system in China based on Text Analysis Wenhui Wang, Mengyuan Luo Presenter: Mengyuan Luo, School of Safety Science and Emergency Management, Wuhan University of Technology Abstract: As a group of young scientific research talents with the most innovative vitality and development potential, postdoctoral fellow has become a main force in scientific research at home and abroad. System construction is the foundation of cultivating postdoctoral fellows into high-level innovative talents. With the change of the times, the ways and methods of talent training must be changed, but the system has a certain path dependence and lag. Based on the trend analysis of postdoctoral scale, this paper carries out semantic analysis on several typical texts of postdoctoral development system to explore the path of postdoctoral system construction.
D0A93 16:30-16:45	Influence of Active Search on Information Propagation on the Chinese Sina Microblog Tinghan Yang, Zhiwei Hu, Zhuo Chen, Yaqing Liang, Fulian Yin Presenter: Tinghan Yang, Communication University of China, China Abstract: Active search has become a major way for Internet users to obtain information. To better understand information dissemination, we propose an active search-based susceptible forwarding immune (A-SFI) propagation dynamic model. The model takes into the possibility of people actively searching for contact information on the basis SFI model. We numerically fit the model based on the data collected by Sina Microblog to verify its effectiveness. And our sensitivity analysis of the A-SFI model describes the importance of active search factors to information propagation. At the same time, we use the A-SFI model to predict with two methods respectively, the results show that the A-SFI model can predict the future development of information dissemination earlier and better than the SFI model. Finally, we conclude that the active search factor can not be ignored in the process of information dissemination, which is beneficial to put forward better strategies to deal with public opinion.

D0A90 16:45-17:00	DNN Diagnosis and Cure based on Aggregated Concentration Ratio and Residual Connection Chunpeng Wu, Bo Wang, Siyan Liu, Yunan Jin, Xin Wang, Peng Wu Presenter: Chunpeng Wu, Artificial Intelligence on Electric Power System State Grid Corporation Joint Laboratory, China Abstract: Designing deep neural network (DNN) models, empirically or automatically, has become a popular research area in recent years. Successful examples include ResNet, ConvNeXt, MnasNet, and NetAdaptV2. A standard pipeline of model users is to pretrain a designed DNN network, and concatenate it with additional layers which are specified for a downstream application. However, we find such paradigm, i.e., pretraining and concatenation, cannot always guarantee a satisfactory prediction ability, even if the pre-trained network has been extensively applied before. In this work, we propose a self-diagnosis and cure method for empirical DNN design. Our diagnosis method can automatically identify the layer that incurs the largest accuracy degradation. The diagnosis criterion, aggregated concentration ratio, adopts the difficulty of linearly representing a layer as the indicator, instead of traditional means such as subjective evaluation and extra datasets. Moreover, the problematic layer will be cured by adding a residual connection with a 3x3 convolutional kernel. Experiments on object detection show that accuracy of our cured detector with 2.8M parameters is close to ResNet-101 with 44.5M parameters. Experiments on unsupervised domain adaptation further show that accuracy of our cured domain adaptor with 2.8M parameters is close to AlexNet with 61M parameters. Sensitivity analysis validates that curing our identified layer achieves better accuracy compared to curing other 2, 3, 4, and 5 layers in a DNN.
D0A62 17:00-17:15	Decision-making under Open World with Generalized Evidence Theory Hao Fang Presenter: Hao Fang, University of Electronic Science and Technology of China, China Abstract: As an extension of Dempster-Shafer evidence theory, Generalized evidence theory can be used in an open world where some targets are unknown. How to make a proper decision under open world is an open issue. In this paper, we propose a method under uncertain environments based on generalized evidence theory, which is used for decision making. We use K-means clustering and elbow methods based on generalized evidence theory to generate a complete discernment framework. And under the framework, a new decision-making method is proposed. After experimental verification, the newly proposed method can well solve the decision-making problem under open world.

Parelle Sessions

Session 2- Algorithm Design and Intelligent Computing
April 23, 2022 | 15:00-17:00 | Zoom Link: https://us02web.zoom.us/j/82792835100 (Password:042224)
Session Chair: Prof. Miroslav Popovic, Faculty of Technical Sciences, University of Novi Sad, Serbia
D2104, D0A78, D0A28, D0A39, D0A16, D0A14, D0A04, D0A91

D2104 15:00-15:15	Clothing Parsing Based on Context Prior and Flow Alignment Pyramid Jingyi Fan, Shaoyu Wang, Xiao Ma, An Xu, Shaoping Ye, Xiujin Shi Presenter: Jingyi Fan, Donghua University, China Abstract: Clothing parsing plays an important role in the fashion industry, and it is also a significant branch of semantic segmentation. The advanced related work explores various methods to efficiently aggregate contextual information, but they do not clearly distinguish the difference of different contextual relationships. In this paper, we propose a novel network based on Context Prior and Flow Alignment Pyramid for clothing parsing. Specifically, we effectively establish an original context map to exploit intra-class and inter-class contextual information. We devise a new loss function to supervise the learning of the original context map mentioned above by using a standard context map. Considering the sizes of different classes have a large degree of variation in clothing images, we fuse semantic information from multiple levels of the network to avoid small-sized items from disappearing during network propagation. To circumvent the offset that occurs in fusion process, the Flow Alignment Module (FAM) is designed to make the output contains more spatial detail information. Experiments show that our method achieves promising performance on the CFPD dataset (51.71% of mIoU and 93.23% of PA) compared with other state-of-the-art methods.
D0A78 15:15-15:30	A Collaborative Grouping Aggregation Query Scheme on Heterogeneous Computing Systems Kailai Zhou, Xinwei Feng Presenter: Xinwei Feng, Zhengzhou University of Light Industry, China Abstract: Aggregation is one of the most common operations in data analytics systems, but complex aggregation query like grouping aggregation on massive data sets is a relatively expensive operation. Thus, improving the efficiency of aggregation query has become a hot topic for database researchers. The emergence of massively parallel coprocessors provides a way to solve this issue. Prior works focus mainly on aggregation optimization using one kind of coprocessors, but little is known about the performance impact on the heterogeneous computing system with diverse coprocessors, such as GPGPUs, MICs or FPGAs. To investigate the potential benefits of the use of heterogeneous computing systems in improving the performance of aggregation operation, in

	this paper, we design a grouping aggregation scheme with GPUs and MICs to work collaboratively. The scheme includes task partitioning method, data transfer mode, and aggregation algorithm optimization. To verify the effectiveness of our collective aggregation scheme, we performed a series of experiments on a heterogeneous platform with one Intel Xeon Phi coprocessor and one NVIDIA GPU coprocessor, and the results have shown that our aggregation processing strategy for the heterogeneous systems is effective and can achieve noticeable performance improvement comparing the CPU-only parallel computing system, even taking the communication overhead via PCI Express bus into account.
D0A28 15:30-15:45	Research on Classification Label Denoising Algorithm Based on Granular Ball Weiyu Kong, YanMin Wu, JinLi Qi, YanYi Chen Presenter: Weiyu Kong, Chongqing University of Posts and Telecommunications, China Abstract: This paper presents a granular ball denoising method (GBD) which can effectively improve the accuracy and robustness of classification algorithm. GBD method first uses the self-adaptive hypersphere to cover the data space, then eliminates the data not contained in the hypersphere and the noise data in the sphere, and finally uses only the hypersphere data for training, so as to reduce the sample data and improve the data quality. Experiments show that using the data obtained by this method for training can greatly improve the accuracy of the classification algorithm. In addition, because the hypersphere has good adaptive ability, GBD also has excellent robustness. The experiment shows that GBD sampling data training can still get good results after adding noise to the data set. Therefore, GBD is an efficient and robust denoising method.
D0A39 15:45-16:00	Decision-making under Extremely Uncertain Environments Based on Intuitionistic Evidence Set Jiawei Zou Presenter: Jiawei Zou, University of Electronic Science and Technology of China, China Abstract: Intuitionistic evidence set (IES) as a generalized Dempster-Shafer evidence theory (D-S theory) can express more uncertain information. How to make a reasonable decision under extremely uncertain environments is an open issue in data mining. In this paper, we proposed a new decision method based on IES, which utilized the fuzziness to handle the discord and nonspecificity in belief functions. After verification, the proposed method has better performance than D-S theory when the data set is few-shot.
D0A16 16:00-16:15	Research on Intelligent Sentiment Analysis and Theme Evolution of Personal Technology Blog Xiuzhang Yang, Shuai Wu, Tianshu Ren and Na Li Presenter: Xiu-zhang YANG, Guizhou University of Finance and Economics, China Abstract: Accurately mining the emotional trends and theme evolution laws of social media and personal blogs will help understand blog dynamics from

	different angles. Simultaneously, it can predict the author's emotional tendency in real-time and sort out the research direction, which is of great significance to the perception of public opinion events. This paper proposes a sentiment analysis and topic evolution method for personal technology blogs. This method uses the emotional time series analysis method of fusion emotional dictionary to predict the emotional trend of bloggers. It explores blog creation by constructing a topic relationship map and topic evolution method based on Price's law. The research in this paper will provide direction for social media and technical blog text mining under the new situation. This method will help to understand blog dynamics from different angles, predict the author's emotional tendency in real-time, and sort out the research direction, which is very important for the perception of public opinion events. Moreover, provide corresponding suggestions for public opinion monitoring and topic analysis of social media.
D0A14 16:15-16:30	Prediction of Ship Traffic Flow Based on Wavelet Decomposition and LSTM Zhengyang Dong Presenter: Zhengyang Dong, Wuhan University of Technology, China Abstract: The significant increase in water transportation has made the navigable environment of waters more and more complicated. In order to effectively alleviate traffic congestion, carry out accurate dynamic management and effective control of ship traffic flow in busy waters, and build an accurate traffic flow prediction model as the goal, this paper uses one-dimensional wavelet analysis tools to decompose traffic flow data into trends item and interference items, by comparing the results of direct use of LSTM time series prediction and the results of wavelet decomposition and time series prediction. A new combined prediction framework based on wavelet decomposition-LSTM is constructed. Through the quantitative comparative analysis of the prediction results, it is found that wavelet decomposition of the training data before the prediction of the LSTM time series then inputting the prediction separately can significantly improve the accuracy and robustness of the prediction. The training data is decomposed into a limited number of high and low frequency components, and the stability and regularity are obtained. The sub-data group with excellent performance on the above reduces the difficulty and interference of LSTM prediction to a certain extent, thereby optimizing the overall accuracy of the prediction. Experiments show that the scheme can be accurately and efficiently applied to the prediction of ship traffic flow.
D0A04 16:30-16:45	Statistical bound of genetic solutions to quadratic assignment problems Fang Zhao, Zheqian Hu, Xiangli Meng Presenter: Xiangli Meng, Dalarna University Sweden, China Abstract: Quadratic assignment problems (QAPs) are commonly solved by heuristic methods, where the optimum is sought iteratively. Heuristics are known to provide good solutions but the quality of the solutions, i.e., the confidence interval of the solution is unknown. This paper uses statistical optimum estimation techniques (SOETs) to assess the quality of Genetic algorithm solutions for QAPs. We examine the functioning of different SOETs regarding

	biasness, coverage rate and length of interval, and then we compare the SOET lower bound with deterministic ones. The commonly used deterministic bounds are confined to only a few algorithms. We show that, the Jackknife estimators have better performance than Weibull estimators, and when the number of heuristic solutions is as large as 100, higher order JK-estimators perform better than lower order ones. Compared with the deterministic bounds, the SOET lower bound performs significantly better than most deterministic lower bounds and is comparable with the best deterministic ones.
D0A91 16:56-17:00	GNSA: A CDN Node Scheduling Algorithm Based on Non-Cooperative Nash Equilibrium Game Zhaoteng Liu, Shuncheng Zhou, Ruichun Tang Presenter: Zhaoteng Liu, Ocean University of China, China Abstract: By studying the problem of small QoE value of users caused by uneven distribution of CDN network resources, this article studies the decision-making environment of CDN edge network and the use of non-cooperative game in decision-making. Firstly, the user experience evaluation model and resource model are constructed. Then using non-cooperative game theory, combined with the proposed user behavior game model, to obtain the Nash equilibrium solution of the scheduling decision, and summarizing the node scheduling algorithm based on non-cooperative Nash equilibrium game (GNSA). Simulation results show the effectiveness of the algorithm.

Parelle Sessions

Session 3- Artificial Intelligence and Information Management
April 23, 2022 | 15:00-17:00 | Zoom Link: https://us02web.zoom.us/j/81646883912 (Password:042224)
Session Chair: Assoc. Prof. SK. Saidhbi, Semara University, Ethiopia
D2103, D2105, D2109, D2112, D1A05, D0A69, D0A10, D0A09

D2103 15:00-15:15	Competitive and Collaborative Learning Accelerates the Convergence of Deep Convolutional Neural Networks Yanbin Dang, Yuliang Yang, Yueyun Chen, Mengyu Zhu, Dehui Yin Presenter: Yanbin Dang, University of Science and Technology Beijing, China Abstract: In the training of convolutional neural networks (CNNs), the layer-by-layer learning based on the backpropagation (BP) algorithm causes that in each round of weights update, the learning of the latter layer determines the learning of the former layer, while the former layer cannot directly affect the latter layer. This means that the flow of error information is unidirectional, causing non-cooperative learning between layers, thereby reducing the convergence speed of the networks. In this work, we propose a network structure that evaluates the relative contribution of each layer in the CNNs to the final output error. During training, it indirectly realizes the bidirectional flow of information between layers, achieving the purpose of cross-layer collaborative learning. Our algorithm also fuses features at different scales on the detection networks, which we call the flexible feature fusion network (FFN). On public datasets, we have conducted rich experiments. With the help of FFN, the convergence speed of the object detection model is greatly improved. Without pre-training weight initialization, the convergence speed of the model is approximately doubled.
D2105 15:15-15:30	Dual Context Based Network for Clothing Parsing Shaoping Ye, Shaoyu Wang, Jingyi Fan, An Xu, Xiao Ma, Xiujin Shi Presenter: Shaoping Ye, Donghua University, China Abstract: As a branch of semantic segmentation, clothing parsing is of great research value and can be applied in many practical aspects. In this paper, we propose a novel clothing parsing network, which aggregates dual context information to augment pixel representation. Specifically, we extend the FCN with Attention Class Feature Module (ACFM) and Pixel Correlation Module (PCM) to capture class-level context and global context respectively. ACFM is used to capture class-level context through a coarse-to-fine segmentation structure, which describes the average features of each class on the image. The attention mechanism is utilized in ACFM so that the network only needs to focus on the categories which

	present in the image, and obtains attention class feature which aggregates class-level context. Furthermore, we use PCM to refine attention class feature and obtain an augmented pixel representation that aggregates dual context information by computing pixel correlation matrix which describes the similarity of any two pixels and contains rich global context information. The experiments on the CFPD dataset show that our method achieves 93.03% of PA and 50.95% of mIoU which is a promising result compared with other state-of-the-art methods.
D2109 15:30-15:45	Application of Machine Learning Algorithms in Network Intrusion Detection Shuchang Zhang, Yanling Li, Yu Shi, Man Hua Presenter: Shuchang Zhang, Civil Aviation Flight University of China, China Abstract: With the rapid development of computer network technology, cyberspace security has received more and more attention. As an important means of ensuring cyberspace security, intrusion detection technology has also developed rapidly in recent years. Machine learning is improving the efficiency of the intrusion detection and reducing the false positive. This paper is mainly divided into three parts. The first part briefly introduces the application process and common data sets of machine learning methods in the field of intrusion detection, and conducts an in-depth analysis of the application of traditional machine learning algorithms in intrusion detection. The second part expounds the specific application of deep learning as a subfield of machine learning in intrusion detection. In this part, according to the classification of generative model, recognition models and hybrid models, it is found that the intrusion detection system based on deep learning generally has a higher detection rate, which can make up for the defects of machine learning algorithm. The third part summarizes the full text and makes an outlook on the future development direction of intrusion detection technology.
D2112 15:45-16:00	Micro-defect detection based on multi-scale feature backtracking structure Haotian Song, Tao Hong, Zhiqiang He, Teng Ma, Hong Wu, Tian Xia Presenter: Haotian Song, University of Electronic Science and Technology of China, China Abstract: Target detection has a wide application prospect in many scenarios, but the current surface defect detection generally has some problems such as low precision of small target detection or excessive resource cost. In this paper, aiming at the characteristics of industrial micro-defects and the idea that the most important component of Feature Pyramid Networks (FPN) is divide and conquer based on different situation, we propose a feature backtracking network structure. In this structure, negative weight based on background judgment and base judgment are introduced to enhance feature sensibility field and achieve an accurate target location prediction. The feature backtracking network structure ensures the accuracy of detection effectively by optimizing multi-scale feature fusion in FPN and using first-level feature to detect multi-layer feature processing. Surface pictures of mobile phones on a production line of XX factory were collected for labeling, and PSDD data set was

	made. The algorithm was tested and compared with the public data set VOC2012 to verify that the performance and speed of this method can meet the requirements.
D1A05 16:00-16:15	Intelligent Sorting System Yanghong Mao, Chuixin Chen, Zhengjun Pan Presenter: Yanghong Mao, Guangzhou Institute of Science and Technology, China Abstract: In order to achieve the goal that the manipulator can automatically obtain any position within its working range, and can adjust the end actuator for grasping, a machine vision sorting system is designed. The system passes through image processing, target recognition and positioning, and finally realizes the sorting effect through trajectory planning. Aiming at the problem that the deep learning algorithm takes a long time, The traditional image processing algorithm and deep learning target detection algorithm are organically combined to reduce the use delay of image processing in the system. Because the training of deep learning model requires a large number of data sets, but the amount of data in manufacturing factories is small, and data labeling is time-consuming and laborious, YOLO v3 algorithm is used to improve the efficiency of training model under a small number of labeled data sets, SIFT algorithm is used to extract image features, and K-D tree algorithm is used to match image features. In the algorithm of position, the centroid is extracted as the positioning reference coordinate, the kinematics model of the manipulator is established. trajectory planning, straight-line and arc interpolation algorithms are used. The experimental results show that the system meets the design requirements.
D0A69 16:15-16:30	Relationship Between Enterprise Green Technology Innovation, the Quality of Information Disclosure and Financing Constraints Qilin Cao, Yinjie Yang Presenter: Yinjie Yang, Sichuan University, China Abstract: In recent years, enterprise green innovation has become a hot topic in society and academia, but there is less discussion on the relationship between green innovation and financing constraints. Taking A-share listed companies from 2015 to 2019 as research samples, this paper discusses the relationship between green technology innovation, quality of information disclosure and financing constraints. The results of regression analysis show that enterprise green technology innovation can significantly inhibit the level of financing constraints of A-share listed companies. In addition, this paper also finds that information disclosure significantly strengthens the moderating effect of green technology innovation on enterprise financing constraints. This study contributes to the literature on green innovation and enterprise financing, and puts forward some suggestions for enterprises to solve the financing dilemma and realize sustainable development.

D0A10 16:30-16:45	Development of Digital Inclusive Finance and its Influencing Factors in China Xu Ren Presenter: Xu Ren, Lyceum of the Philippines University, Philippines Abstract: The development of digital inclusive finance is an effective measure to eliminate financial exclusion, improve the efficiency of financial resource allocation and spread financial risks. Using the panel data of 31 provinces in China from 2011 to 2020, this paper empirically analyzes the development and influencing factors of digital inclusive finance in various provinces of China. The results show that, economic development, traditional finance and the previous digital inclusive financial foundation can all promote the development of digital inclusive finance in the current period all over the country. The influences of economic development on digital inclusive finance in the east, midland and west are almost unaffected, inhibited and greatly promoted respectively. Therefore, all provinces should formulate suitable digital inclusive financial goals, take the midland and west as the construction emphasis, radiate the outstanding experience of the eastern region to the whole country, finally promote the optimal allocation of financial resources and achieve financial inclusive development.
D0A09 16:45-17:00	Small and Medium-sized Enterprises' Internet Precision Marketing Influencing Factors Analysis based on the Analytic Hierarchy Process Jing Jiao Presenter: Jing Jiao, Qinghai Minzu University, China; Philippine Christian University Center for International Education, Manila, Philippines Abstract: Small and medium-sized enterprises (SMEs) have become an important part of China's national economy. However, due to comprehensive limitations on scale, capital, and technology, it is more difficult for SMEs to survive compared to large enterprises. With the continuous development and application of big data, internet precision marketing has demonstrated its capacity to efficiently improve marketing capabilities. Therefore, this paper adopts SMEs in China as targets and build a model of SMEs' internet precision marketing based on the analytic hierarchy process, which is a method combines qualitative analysis and quantitative analysis to have good application value in modeling. The results show that the factors influencing SMEs' internet precision marketing include demand identification, effective communication, online word of mouth, organizational structure, products and services, marketing strategy, human resources, information collection, information mining and information storage. All CRs for the structural model are smaller than 0.1, which means the structure model is acceptable. The results show in the process of internet precision marketing, enterprises should not only make full use of data technology to mine customers' information, but also strengthen customer-oriented thinking. At the same time, enterprises can provide personalized products and services to improve the efficiency of internet precision marketing continuously. This paper can provide the theoretical basis for SMEs to carry out precision marketing.

Parelle Sessions

Session 4- Computer Modeling and Computation
April 24, 2022 | 10:00-11:45 | Zoom Link: https://us02web.zoom.us/j/85700076636 (Password:042224)
Session Chair: Rasha, Southwest Jiaotong University, China
D0A105, D1101, D0A77, D0A84, D0A51, D0A46, D0A18

D0A105 10:00-10:15	Groundwater simulation of some farm nitrate pollution along the Yellow River Xiaohui Lu, Shuaipeng Yang, Hao He Presenter: Shuaipeng Yang, Hohai University, China Abstract: The quality of groundwater directly or indirectly affects the living environment and health of human beings. Some farm in Zhengzhou city along the yellow area as the research object, investigated the regional hydrogeological conditions, by using Modflow in GMS and MT3D two modules model of groundwater flow and solute transport model, selection of nitrate as to simulate the pollution factors of groundwater pollutant migration law predict, simulate the nitrate pollution factor initial concentration of 25 mg/L, The migration rule, pollution range and concentration distribution of 1000 days, 5 years, 10 years and 15 years were selected in the simulation period. Finally, according to the prediction results, the pollution status of nitrate to groundwater environment is obtained.
D1101 10:15-10:30	A PCA-LSTM Model for Stock Index Forecasting: A Case Study in Shanghai Composite Index Yankai Sheng, Kui Fu, Liangliang Wang Presenter: Yankai Sheng, Wuhan University of Technology, China Abstract: Financial data prediction is greatly facilitated by the advanced machine learning techniques. Thus, financial index prediction based on supervised learning is attracting increasing attention with the surge of quantitative trading. In view of the hysteresis nature of the traditional financial index prediction, this paper proposes a novel PCA-LSTM approach for real-time stock index forecasting, which is both accurate and efficient. Specifically, a large dataset is first built up by analyzing the trading indicators and calculating the technical indicators of the Shanghai composite index in the last 10 years. PCA is then employed for data feature extraction, via redundancy removing and dimensionality reducing. In particular, we further formulate a 4-layer LSTM neural network to model the extracted temporal features, by considering the current states of trading indicators and the information of previous technical indicators. A number of comparative experiments are conducted on the new established dataset, which verify the effectiveness of our method.

D0A77 10:30-10:45	Log Anomaly Detection method based on BERT model optimization Yangyi Shao, Wenbin Zhang, Peishun Liu, Ren Huyue, Ruichun Tang, Qilin Yin, Qi Li Presenter: Yangyi Shao, Ocean University of China, China Abstract: In the field of computer system anomaly detection, log anomaly detection is a very important project. In order to detect system faults from log text data accurately and quickly, this paper proposes a log anomaly detection method, namely Prog-BERT-LSTM, which uses the network based on the BERT model as the text vectorization module, and designs the sequence feature learning module based on LSTM to avoid the loss of sequence features caused by the disappearance of gradient in the calculation process, and further obtain the semantics and features of the input log sequence text. The progressive masking strategy is used to aggregate the text semantic vector and sequence feature vector. We compare the Prog-BERT-LSTM model with the BERT-based model (LogBERT) on three public log datasets. The test results show that the Prog-BERT-LSTM model has better performance than the standard BERT-based model (LogBERT).
D0A84 10:45-11:00	Reservoir Porosity Prediction Model based on Improved Shuffled Frog Leaping Algorithm and BP Neural Network Miaomiao Liu, Dan Yao, Jingfeng Guo, Jing Chen Presenter: Dan Yao, Northeast Petroleum University, China Abstract: A reservoir porosity prediction model based on an improved shuffled frog leaping algorithm (SFLA) and BP neural network (BPNN) is proposed. Aiming at the problem that the BPNN is sensitive to the initial weight and easy to fall into local optimum, an algorithm called SFLA_RGC is proposed. Firstly, the roulette selection mechanism is introduced in the process of dividing subgroups to improve the selection probability of elite individuals; secondly, genetic coding is carried out by making full use of the effective information such as the global and local optimum of the population. Then, the SFLA_RGC algorithm is verified on 8 benchmark functions and compared with 3 optimization algorithms, and experimental results show its good performance. Finally, the SFLA_RGC algorithm is applied to the optimization of the initial weights and thresholds of the BPNN, and a new model (SFLA_RGC_BP) is proposed. The porosity prediction performance of the model was compared with five methods and results show the SFLA_RGC_BP model has higher training accuracy, stability and faster convergence speed.
D0A51 11:00-11:15	Anomaly detection and prediction of base station KPI Qingyi Li, Jingyi Zhu, Yongjia Yu, Wen Shi Presenter: Qingyi Li, Central South University, China Abstract: This paper uses the periodic time series analysis method to study the short-term prediction of time series business data in specific operation and

	maintenance scenarios, identify and correct abnormal values of historical data series of the performance index of the operator's base station KPI, and realize the short-term multi-step prediction with high accuracy. This study innovates the detection method of outliers using the Nonhomogeneous Poisson Process (NHPP) and multilayer perceptron (MLP), and completes the multi-step time series prediction utilizing three periodic prediction methods, AUTO-ARIMA, Prophet and Trendy and Seasonal Linear Model (TSLM), based on the correction of outliers. The competitive side of the National University Big Data Challenge acknowledged the forecast result, and it was awarded the fifth place of the first prize in the competition. In intelligent operation and maintenance settings, this prediction model can serve as a guide for index prediction.
D0A46 11:15-11:30	Emotion analysis model based on Multi-head Attention and Tree_LSTM Zhengjun Pan, Lianfen Zhao, Yanghong Mao Presenter: Zhengjun Pan, Software Engineering Institute of Guangzhou, China Abstract: Most of the emotion analysis models based on attention mechanism and neural network adopt single-layer attention mechanism, and the feature expression is relatively single, which can not be applied to various types of sentences. Based on the existing attention mechanism and neural network model, this paper proposes a method to fuse emotional information and combine multi head attention mechanism and Tree_ LSTM's emotion analysis model ,aims to enable the model to obtain more levels of information about sentences in different representation spaces, dynamically adjust the feature weight through the multi head self-attention mechanism, and introduce emotional information on the basis of existing network input to further obtain more text syntax information and improve the feature expression ability of the model,Finally, the emotion category is obtained by softmax classifier. The experimental results of coae2014 microblog data set show that compared with Bi_LSTM, CNN_LSTM, Self-attention_ BILSTM, Self_attention_ Tree_ BiLSTM model, which further improves the performance of emotion classification.
D0A18 11:30-11:45	Scenario Simulation Scheme of Intelligent Distribution Terminal Based on Factor Graph Model Jianan Yuan, Libin Zheng, Chao Huo, Anqin Luo Presenter: Jianan Yuan, Beijing SmartChip Microelectronics Company Limited Abstract: For the new intelligent distribution terminal, China is in the leading position of concept at present, and the enterprise level technical standard of equipment products has been formed in China. However, in terms of quality detection, there is still a lack of operation scenario simulation and standardized detection technology to adapt to the new business format of the terminal, so it is urgent to establish a matching quality detection environment. According to the practical application needs of distribution terminal detection, this paper establishes a distribution terminal resource allocation model based on factor graph model. Under the condition of this resource allocation scheme, this paper proposes an operation scenario simulation method and system for distribution terminal detection. This method defines the functions of analog circuit breaker module, high-precision output module, high-precision acquisition

	module and information access module, Build an intelligent distribution terminal operation scene simulation system in the station area, which can connect the detected intelligent distribution terminal equipment to the simulation system for various tests, reflect the functional performance of the detected equipment, and realize the simulation of the operation scene and working condition of the intelligent distribution terminal.

Parelle Sessions

Session 5- Big Data Analysis and Methods
April 24, 2022 | 10:00-11:45 | Zoom Link: https://us02web.zoom.us/j/82792835100 (Password:042224)
Session Chair: Taha, Southwest Jiaotong University, China
D0A100, D0A101, D0A104, D0A66, D0A25, D0A33, D0A40

D0A100 10:00-10:15	Portfolio Management with Return Forecasting Based on Bigdata Analysis Yuyan Li Presenter: Yuyan Li, Case Western Reserve University, USA Abstract: The international diversification of assets allocation has proven to be beneficial ascribed to its lower risks and higher extra returns. In this paper, the portfolio construction with various international underlying assets is investigated in terms of return prediction based on random forest models. To synthesize data from markets around the world both at the individual country level and across much broader regional areas, this paper selects major world indices to construct portfolio as they reflect countries' markets. Besides, the corresponding exchange rates to U.S. dollars are considered to add currency effect into consideration. For each index, one random forest model is employed in forecasting expected returns and calculates volatility based on those. In this research, machine learning models are applied first for index preselection. Then, this paper uses predicted return and volatility in mean-variance portfolio formation. According to the analysis, random forest models outperform the conventional linear models and the currency exchange rate shows significant impacts in return prediction. These results shed light on portfolio management with return prediction in international investment.
D0A101 10:15-10:30	Research on Comprehensive Analysis Platform of Big Data of Supplies Jianxiang Li, Chenggong Zhai, Shanbo Zhou, Qingping Xu, Rangming Wu, Liyong Zhou Presenter: Chenggong Zhai, Army Logistics Academy Of PLA, Chongqing Abstract: Supply big data comprehensive analysis platform refers to a data engineering that uses big data, cloud computing and other information technologies to collect, store, process, analyze and mine the supply support situation. It plays an important role in deepening the supply support reform and strengthening the scientific management of supply. Based on the in-depth analysis of the problems existing in the construction of big data, this paper intends to absorb the relevant theories and practices of big data information systems at home and abroad, and put forward the overall architecture, technical architecture and supporting measures for the construction of comprehensive analysis platform of big data based supplies.

D0A104 10:30-10:45	An Empirical Analysis Based on CFPS Panel Data: Impacts of China's Housing Price Rising on Household Entrepreneurship Zijing Liu, Chunlu Wang, Shengqiang Han Presenter: Zijing Liu, Shandong Normal University, China Abstract: China's housing prices have been on the rise since the 1990s. At the same time, China's urban residents' housing rate had reached 96% by 2020. Based on the above-mentioned realistic background, the rise and fall of housing prices will inevitably affect a series of behaviors such as investment, consumption and entrepreneurship of Chinese households. According to the data from China Family Panel Studies (CFPS) from 2014 to 2018, this article analyzes the net value of housing and whether the ownership of housing property rights has an impact on family entrepreneurship based on the comprehensive effects of housing prices on entrepreneurship of "wealth effect", "collateral effect" and "substitution effect". The study results show that the increase in house prices generally promotes family entrepreneurial decision-making, and the promotion effect is more significant for families with housing property rights. Still, for families without housing property rights, the increase in housing prices has an opposite inhibitory effect on family entrepreneurship. Based on the above conclusions, this article puts forward some suggestions on related policies.
D0A66 10:45-11:00	Big Data and Data Mining in Education: A Bibliometrics Study from 2010 to 2022 Chengliang Wang, Jian Dai, Liujie Xu Presenter: Chengliang Wang, Zhejiang University of Technology, China Abstract: To understand the development status of the field of educational big data and educational data mining in recent years, this paper uses VOSviewer and CiteSpace to quantitatively analyze and visualize the relevant literature in the Web of Science (WoS) from 2010 to 2022. Using methods such as co-occurrence analysis and co-citation analysis, the research hotspots, evolutionary paths and development trends in the field of educational big data and educational data mining are introduced, and the highly cited and representative literature of different time periods are analyzed in depth to summarize the mainstream research hotspots in the field and grasp the development pulse of the field. The research found that: (1) A collaborative network of authors in this field has been largely formed; (2) The journals in the field belong to the field of educational technology and computer education, and open access journals have played a role in promoting the development of the field; (3) The depth and breadth of research in the field have expanded rapidly in the last decade.

D0A25 11:00-11:15	An Efficient Reference-Point based k Neighbors Algorithm for Imbalanced Data Junkuan Wang, Yanmin Wu, Jinli Qi, Zizhong Chen Presenter: Junkuan Wang, Chongqing University of Posts and Telecommunications, China Abstract: The kNNs are very simple, effective and online multicategory learning algorithms, which makes them widely applicable to various fields. However, almost all kNNs have the problem of low accuracy in imbalanced data. In this paper, an interesting point is observed that the nearest neighbors might not always be the best samples for prediction, and a reference-point based k Neighbors algorithm (RPkN) is proposed. The proposed algorithm uses some reference-points to measure the distance between two data points rather than directly computing the distance. This makes it able to find better neighbors than their nearest ones, and the problem of low accuracy in imbalanced data sets could be solved. Therefore, the proposed method can achieve higher average accuracy than the existing exact kNNs. In addition, it avoids the direct computation of distances between each pair of data points without using any tree structure, and this makes the RPkN decrease the time complexity to O(nlogn). The time complexity to classify a new data point is O(logn). The time complexity is lower than almost all the existing exact kNNs. The low time complexity and not relying on tree structures makes it very suitable to be paralleled for large-scale data processing when compared with other fast exact kNNs using tree structure.
D0A33 11:15-11:30	Recommendation algorithm and application via big data mining Wenwu Deng, Yongmei Ding, Yongxiang Wei Presenter: Wenwu Deng, Wuhan University of Science and Technology, China Abstract: Nowadays, the amount of data is increasing second by second, which implies huge commercial value in the developing economy. How to mine effective information from the data ocean has become a hot topic in various fields. Here we chose the ml-latest-small data from MovieLens data set to realize the efficient recommendation to the consumers. The K-means clustering algorithm in machine learning technique and the user-based collaborative filtering algorithm are reconstructed, and the cluster-based collaborative filtering recommendation system is implemented. Empirical analysis shows that, the model training time is shortened from one minute to 10s after switching the data storage method and clustering to 5 categories, which greatly improves the efficiency of the entire recommendation system.

D0A40 11:30-11:45	Data Distritubion Service based on Symbol Bloom Filter for Large-scale Distributed Computing Zhexu Liu, Zhen Zhao Presenter: Zhexu Liu, Civil Aviation University of China, China Abstract: Data distribution service (DDS) has been widely used for the data communication of distributed computing system. But the existing DDS is based on the Simple Discovery Protocol (SDP). Its high network data transmission cannot meet the real-time requirement of the large-scale distributed computing. For this problem, this paper proposes a lightweight automatic discovery algorithm for DDS. In this algorithm, a new Bloom Filter with symbol is presented to compress the information transmitted between the distributed computing nodes, which is called Symbol Bloom Filter (SBF). Then it is combined with the SDP to reduce the consumption of the automatic discovery process in DDS. Experiments show that the proposed SDP_SBF can present a lower fault positive ratio while reducing data transmission, and therefore improves the real-time performance of DDS in the large-scale distributed computing.

Parelle Sessions

Session 6- Blockchain and Data Security
April 24, 2022 | 10:00-12:00 | Zoom Link: https://us02web.zoom.us/j/81646883912 (Password:042224)
Session Chair: Prof. Yoshifumi Manabe, Kogakuin University, Japan
D0A37, D0A74, D0A47, D0A71, D0A19, D0A21, D0A38, D101

D0A37 10:00-10:15	A Blockchain-based and Privacy-Protected Method for Sharing of BIM Big Data Hongwei Wang, Xiaohan Hao, Lian Yin, Peisong Gong, Feng Xiong, Wei Ren Presenter: Wei Ren, School of Computer Science, China University of Geosciences, China Abstract: Currently, cloud computing and big data are largely applied in smart construction, or so-called industrial Internet of Things 4.0. Building Information Model (BIM) performs as an elemental information and data unit, which is extensively employed in entire construction processes (lifespan) and interacted with various entities including investors, employers, design institutes, construction companies, and monitors. They thus can achieve quantitative computing, measurement, and managements by sharing BIM data. The accumulation of BIM data will finally approach to a big data for construction intelligence. However, sharing BIM big data may be subtle in terms of privacy leakage, since BIM data may enclose the critical infrastructure information, homeland security data, structure parameters, and design intellectual property. It thus is of urgent importance to protect privacy in the BIM data sharing. In this paper, we propose a blockchain based method to protect data privacy in BIM data sharing, which can be applied for guaranteeing the information security in next generation industrial Internet of Things for smart construction.
D0A74 10:15-10:30	Time Labeled Visibility Graph for Privacy-Preserved Physiological Time Series Classification Yuxuan Xiu, Xinyue Ren, Ting Zhang, Yanyu Chen, Li Jiang, Duo Li, Xingjun Wang, Liang Zhao, Wai Kin (Victor) Chan Presenter: Yuxuan Xiu, Tsinghua University, China Abstract: With the development of artificial intelligence (AI) and the continuous improvement of medical informatization, health assessment and auxiliary diagnosis based on physiological time series has become a hot research topic. However, the direct use of raw time series data is inappropriate due to privacy protection regulations in medial scenarios. Therefore, we designed a privacy-preserved framework based on Visibility Graph (VG) transformation and Graph Neural Network (GNN) for physiological data multi-classification. In particular, we proposed a Time Labeled Visibility Graph (TLVG), which uses the idea of VG to protect privacy while retaining more information that is useful for classification. Experiments are conducted based on the ECG5000 electrocardiogram dataset of the UCR time series classification archive. The comparison with existing classic and transformation-based classifiers shows

	the effectiveness and stable performance of our proposed method, providing an alternative and reasonable way for diseases diagnosis decision supports. Furthermore, from this research, it is discovered that the time sequence of each node in VG is an important feature in time series classification tasks.
D0A47 10:30-10:45	Application of Blockchain Technology in the Supply Chain Finance Wenchuan SUN Presenter: Wenchuan SUN, Xiamen University, China Abstract: The emergence and development of blockchain technology has injected vigorous vitality into innovations in the fields of digital finance and supply chain finance. Supply chain finance connects the transaction process between core enterprises and upstream and downstream enterprises, providing flexible financial products and services for finance. Since the demand side of funds is mostly enterprises, financial institutions face challenges in credit identification, transaction supervision, risk control and other business aspects of supply chain finance. The application innovation of blockchain technology in the field of supply chain finance will help solve the information asymmetry and credit crisis in the financial transaction chain. After introducing the basic theory of blockchain technology, this paper analyzes and researches the application of blockchain technology in supply chain finance, which not only provides a process-oriented reference for better integration of blockchain technology and finance field, but also provides inspiration for subsequent in-depth practical application in this field.
D0A71 10:45-11:00	Blockchain-based Conditional Privacy-Preserving Authentication Protocol with Implicit Certificates for Vehicular Edge Computing Jianing Yang, Jing Liu, Hengxian Song, Jialu Liu, Xinyu Lei Presenter: Jianing Yang, Yunnan University, China Abstract: With the gradual commercialization of the Internet of Vehicles (IoV), conventional cloud-based vehicular networks often fall short of keeping pace with real-world demands for low latency and high mobility. To fully exploit the growth potential of the IoV and overcome the challenges of effective communication, the concept of mobile edge computing has been applied to the IoV field, namely, vehicular edge computing (VEC). Nonetheless, a series of security issues have appeared due to the explosive growth of various vehicular service data in the VEC. As a result, the security and conditional privacy of the VEC have become an urgent research hotspot. While several authentication schemes have been proposed to address secure communication in the VEC, most of them typically suffer from key escrow issues and lack conditional traceability, a decentralized datacenter, and a dynamic join-and-exit mechanism. Thus, a blockchain-based conditional privacy-preserving authentication protocol with implicit certificates for vehicular edge computing is proposed in this paper. Furthermore, we provided formal security analysis using the formal security verification tool and informal security analysis to demonstrate that our designed protocol is secure and resilient against several security attacks. The performance evaluation results show that our protocol can meet security requirements while reducing computing and communication overheads compared with the existing protocols.

D0A19 11:00-11:15	ID-based Data Integrity Auditing Scheme from RSA with Forward Security Wenyong Yuan, Lixian Wei, Zhengge Yi, Ruifeng Li, Xiaoyuan Yang Presenter: Wenyong Yuan, Engineering University of the PAP, China Abstract: Cloud data integrity verification was an important means to ensure data security. We used public key infrastructure（PKI） to manage user keys in Traditional way, but there were problems of certificate verification and high cost of key management. In this paper, RSA signature was used to construct a new identity-based cloud audit protocol, which solved the previous problems caused by PKI and supported forward security, and reduced the loss caused by key exposure. Through security analysis, the design scheme could effectively resist forgery attack and support forward security.
D0A21 11:15-11:30	Research on multi service collaboration mode of University Smart Library Based on blockchain Feng Li, Kai Liao Presenter: Li feng, Huazhong Agricultural University, China Abstract: The application of blockchain technology in this scenario can effectively improve the collaborative efficiency of multiple service agents participating in smart services. Based on the technology and principle of blockchain, combined with the characteristics of university library services, this paper constructs five different scene structure service blockchain, and integrates the five structures into the multi service collaborative blockchain network of University Smart Library.
D0A38 11:30-11:45	CPAS: A Copyright-Protected Autonomous Sharing Scheme by Blockchain and Smart Contract for BIM Data Peng Guo, Ruoting Xiong, Gang Yu, Peisong Gong, Feng Xiong, Wei Ren Presenter: Wei Ren, School of Computer Science, China University of Geosciences, China Abstract: Building Information Model (BIM) has been envisioned as one of the most promising technologies for smart construction industry, e.g., industry 4.0 or industry digitalization. BIM data is of the most importance in the smart construction since the data can cover the whole life cycle of the building, which is somewhat also called digital twins. BIM data usually stored in cloud servers and finally BIM big data is formed. The BIM data is always required to be shared among a large number of contributors, and re-use of those data will greatly decrease the development delay. As BIM data usually encloses the intellectual property of contributors, the sharing of BIM data may be unwilling and thus difficult, especially in open data sharing over specific platforms or markets. To promote the re-use and replication of BIM data yet protect the intellectual property, we propose a blockchain and smart contract-based scheme in this paper. The blockchain technology can encourage the sharing by awarding of tokens and

	trace the sharing behaviors. Smart contract can implement autonomous sharing with copyright registration, authentication, and verification. The experiment results justified that our proposed scheme is practical.
D101 11:45-12:00	The spread of artificial intelligence technology challenges the bottom line of privacy protection Ying Wu Presenter: Ying Wu, Shanghai university of political Science and law, China Abstract: Artificial intelligence is prone to or has caused devastating damage through technical means to access data. But massive amounts of personal information data underpin AI applications; data is the foundation of AI, and it is the use of big data, increased computing power, and algorithmic breakthroughs that have allowed AI to develop rapidly and be widely used. The complexity of the data environment, algorithms and models behind the development and operation of AI systems, and the deliberate secrecy of governments and private actors are some of the factors that undermine the public's understanding of how AI systems can impact on human rights and society. Can they co-exist and how?

Parelle Sessions

Session 7- Cloud Computing and High Performance Computing
April 24, 2022 | 13:30-15:30 | Zoom Link: https://us02web.zoom.us/j/85700076636 (Password:042224)
Session Chair: Yang Li, Southwest Jiaotong University, China
D0A85, D0A86, D0A98, D0A68, D0A59, D0A52, D0A26, D0A32

D0A85 13:30-13:45	DESIGN AND IMPLEMENTATION OF NON-FIXED CLIENT CLOUD DESKTOP PLATFORM BASED ON SOFTWARE-DEFINED ARCHITECTURE Fan Zhonglei, Bi Qiang, Wang Jiazhu, Guo Shaosong Presenter: Zhonglei Fan, ChangAn University, China Abstract: Aiming at the shortcomings in traditional cloud desktop access methods caused by the high coupling of hardware and software resources, this paper presents a non-fixed client cloud desktop access method that does not depend on the endpoint device and its operating system and application software. This method bases on customized network startup service and cloud desktop resource service with software-defined architecture. By booting the client system to the endpoint device, a cloud desktop platform is implemented, which separates the control path and data path and combines the endpoint device, unified manager, startup server, and cloud desktop resource server together organically. The result of partial renovation and testing of the school computer room shows that the platform has the advantages of low cost, good portability, good scalability, easy upgrade and maintenance, etc., and can effectively cope with the shortcomings of the current cloud desktop system.
D0A86 13:45-14:00	A Parallelism-Based Earliest Finish Time (PBEFT) Algorithm for Workflow Scheduling in Clouds Xiaojun Wu, Sijia Cheng, Sheng Yuan, Ziyi Wang Presenter: Sijia Cheng, XI'an Jiaotong University, China Abstract: For those public-cloud-based application providers, workflow scheduling in clouds must not only meet traditional performance optimization goals, but also minimize financial costs. This paper focuses on budget-constrained workflow scheduling issue on heterogeneous cloud resources, and tries to minimize the end-to-end delay of the workflow while meeting the given budget. A heuristic algorithm is proposed, which introduces a resource leasing mechanism to maximize the usage of the budget. This paper also defines a scheduling factor parameter consisting of two factors (parallelism and urgency) to determine the scheduled tasks. A scheduling algorithm based on task duplication is designed, which reduces the finish time of workflow

	tasks by using the idle time slots in existing servers. Finally, compared with contrast algorithms, the experimental results show that the proposed algorithm is superior in both meeting budget constraints and minimizing end-to-end delay.
D0A98 14:00-14:15	Chlorophyll-a Analysis Based on Hilbert Huang Transformation and Convolutional Neural Network Zijing Liu Presenter: Zijing Liu, Shandong Normal University, China Abstract: The ocean and climate system are non-linear and non-stationary system for the earth. It is inadvisable to consider the linear and stable changing process, because it cannot greatly reflect the inherent non-linear characteristics of the system itself. On the other hand, there is big data of the system. Traditional methods cannot characterize them well. Therefore, this paper focuses on using Hilbert-Huang Transformation (HHT) and Convolutional Neural Network (CNN) to analyze the chlorophyll-a content of ocean and climate by satellite remote sensing observations, and discusses the nonlinear characteristics and seasonal changing trend in ocean and climate data. The trend which changes characteristics of chlorophyll-a in the Pacific Ocean is analyzed. The results show that the spatial mode of chlorophyll-a mainly depends on the distribution of phytoplankton, which is determined by the degree of light and nutrient supply. Chlorophyll-a presents a significant upward trend in the western Pacific warm pool area. In the equatorial Pacific divergence zone, chlorophyll-a shows a significant downward trend. However, the relationship between sea surface temperature and the changing trend of chlorophyll-a still needs to be further confirmed, and the long-term effects of global warming caused by human activities on the global ocean chlorophyll-a need to be explored in depth.
D0A68 14:15-14:30	Fast Non-Uniform Quantization of Neural Networks Yuan Gao, Qiyue Wang, Chen Zhao and Yong Yuan Presenter: Yong Yuan, Sina Weibo Inc, China Abstract: Neural Networks (NNs) have achieved state-of-the-art performance in a number of domains but suffer intensive complexity. Network quantization can effectively reduce computation and memory costs without modifying network structures, facilitating the deployment of NNs on cloud and edge devices. However, the low-bit quantization without time-consuming training or access to the full datasets is still a challenging problem. Inspired by the traditional companding technique in the signal processing area, we propose a novel method to achieve fast non-uniform quantization of NNs with few unlabeled samples. Extensive experiments on ImageNet2012 demonstrate that the proposed method can guarantee efficiency and accuracy simultaneously. We further show that the proposed method can extend to other computer vision tasks such as object detection and semantic segmentation.
D0A59 14:30-14:45	Actor-Critic with Transformer for Cloud Computing Resource Three Stage Job Scheduling Yanbo Xu, Jiakun Zhao*

	Presenter: Yanbo Xu, Xi'an Jiaotong University, China Abstract: Cloud computing is widely used in academia and industry. Users can provide jobs to cloud service providers that provide pay-as-you-go methods by cloud for calculation and obtaining results. Cloud service providers make reasonable scheduling for different jobs of users and in the case of successful operation, the cost of energy consumption becomes a key factor. Prior works proposed various algorithms based on reinforcement learning on job scheduling. However, due to the lack of online training mode and refined container decision-making, this paper makes some improvements and extensions. This paper presents the algorithm ACT4JS, an actor-critic with transformer for three stage job scheduling algorithm, that finely manages data centers, server nodes, and application containers. The job scheduling algorithm is designed to select the best long-term decision by learning from cloud computing resource model that accepts single-task multi-instance jobs and directed acyclic graph jobs with dependencies. To learn key features and loss optimization, use the transformer network structure and the proximal policy optimization method. To minimize energy consumption costs for large scale job scheduling and running, designs a reward function to reflect optimized energy consumption targets and independent simulation experiments. To achieve low energy consumption cost and low task reject rate, use training methods such as experience replay and advantage estimate. Compared with the mainstream baseline algorithm, the results show that the ACT4JS algorithm is better than the baseline in the online training model. In addition, the effect of ACT4JS is more effective in the long-term experimental.
D0A52 14:45-15:00	CHS-Scheduler: A Hybrid Scheduler for QoS Task Scheduling in Cloud Human Service Scenarios Renyu Zhang, Zongwei Zhu Presenter: Renyu Zhang, University of Science and Technology of China, China Abstract: With the rapid advancement of crowdsourcing and services technology, human service ecosystem is evolving rapidly and scenarios within it are diversifying. Represented by consulting service platforms on the cloud, task scheduling in such cloud human service scenarios has more key features than traditional QoS cloud scheduling scenarios, such as dynamic human processing capability and statistical property in task flows. Rule based scheduling heuristics usually produces poor scheduling results in multi-target scenarios and have limited adaptability as using local scheduling information. Scheduling algorithms based on meta-heuristics is time-consuming and tend to fall into local optima prematurely when facing large-scale task flows. More importantly, these scheduling methods pay little attention to optimizing those key features mentioned above. Thus,an efficient task scheduling approach is urgently needed as a key to future computing systems for these scenarios. In this paper, we propose CHS-Scheduler, a hybrid scheduler for QoS task scheduling in cloud human service scenarios. Firstly, a scheduling model focusing on statistical property in task flows and dynamic human processing capability is constructed. Secondly, a two-stage scheduling methodology is given. Stage one is a task scheduling algorithm

	based on static & dynamic hybrid dimensionality reduction mechanism. Stage two is a solution domain mapping mechanism based on incremental learning. Experiments show that CHS-Scheduler exhibits state-of-the-art performance in both batch scheduling and online scheduling.
D0A26 15:00-15:15	Attribute Reduction Method Based on Improved Granular Ball Neighborhood Rough Set Han Xia, Yanmin Wu, Jinli Qi, Zizhong Chen Presenter: Han Xia, Chongqing University of Posts and Telecommunications, China Abstract: Feature reduction is an important aspect of big data analytics today, and neighborhood rough set is a classic attribute reduction method. The traditional neighborhood rough set finds out the radius suitable for problem solving by specifying the radius of the neighborhood or using a grid search method. There are a lot of overlapping calculations in the neighborhood calculation, and the calculation complexity is high. The granular ball neighbor-hood rough set can adaptively generate different neighborhood radius, and obtains better algorithm efficiency and learning effect than the traditional neighborhood rough set. However, due to the overlap problem in the process of granular ball generation, the granular ball neighborhood rough set still exists the overlap calculation of neighborhoods. For this reason, this paper solves the problem of granular ball overlap by detecting heterogeneous ball overlap and splitting, and thus designs an improved granular ball neighbor-hood rough set attribute reduction method. Experiments show that the improved granular ball neighborhood rough set has higher classification accuracy on the public benchmark dataset than the classic neighborhood rough set and the standard granular ball neighborhood rough set.
D0A32 15:15-15:30	Trend Prediction of Stock Index Based on Convolutional Neural Network Zhiqi An, Yongmei Ding, Qianqian Wu Presenter: Zhiqi An, Wuhan University of Science and Technology, China Abstract: The emergence of the COVID-19 has a huge impact on the Chinese and American economies, including the fluctuations of stock price in the financial market. It's significantly valuable to search out the rules of index variability under this post-epidemic era. In this paper, we create an improved Convolutional Neural Network to search out the future trend of Shanghai Composite Index and Nasdaq composite index by using the daily data from January 1, 2011 to April 23, 2021, and find out the characteristics through nonlinear test and random lasso algorithm. The empirical results show that the prediction correction determination coefficients of Shanghai Composite Index and Nasdaq composite index reach 0.87 and 0.97 respectively, which shows that it is feasible and effective to use convolutional neural network to predict the stock index.

Parelle Sessions

Session 8- Data Theory and Engineering
April 24, 2022 | 13:30-15:30 | Zoom Link: https://us02web.zoom.us/j/82792835100 (Password:042224)
Session Chair: Ghufran, Southwest Jiaotong University, China
D0A73, D1A04, D0A50, D0A30, D0A24, D0A02, D0A27, D1A03

D0A73 13:30-13:45	Software module clustering using the hierarchical clustering combination method Hong Xia, Yongkang Zhang, Yanping Chen, Hengshan Zhang, Zhongmin Wang, Fengwei Wang Presenter: Yongkang Zhang, Xi'an University of Posts & Telecommunications, China Abstract: The scale of software applications has increased dramatically. Hierarchical clustering is a good method for modular recovery of software architecture. Because the different evaluation criteria of software types and clustering results, a single hierarchical clustering algorithm cannot integrate the number of clusters, arbitrary decision-making, recovery quality and other indicators on different evaluation standards, there is no comprehensive clustering algorithm selection method. We propose a hierarchical clustering combination algorithm and use principal component analysis to combine the results of multiple hierarchical clusters, the combined result retain the basic information of each clustering algorithm as much as possible. The experimental results show that compared with the single software hierarchical clustering method and other combined methods, the result of our method is closer to expert decomposition, and it has good performance on a variety of indicators.
D1A04 13:45-14:00	Initial clustering center optimization algorithm based on weighted dissimilarity Li Pengfei, Liu Jiaxin, Wu Jianhong Presenter: Liu Jiaxin, Xi'an University of Posts & Telecommunications, China Abstract: The traditional k-means algorithm has randomness in the selection of the initial clustering center, which is easy to fall into local optimum. In order to select the appropriate initial clustering center to obtain the optimal clustering effect, an optimized initial clustering center algorithm based on density and dimension weighting is proposed. Euclidean distance after dimension weighting was used to construct dissimilarity matrix, and mean dissimilarity and overall dissimilarity were calculated. Introducing Gaussian kernel function to determine initial cluster centers. Through the test on UCI dataset, compared with the classical k-means algorithm,k-means++ algorithm and related improved algorithms, the clustering indexes are optimized and improved, with high feasibility. High time consumption occurs in high dimensional data computation. The proposed algorithm has less iterations and better clustering performance on high-dimensional datasets.

D0A50 14:00-14:15	Fast Clustering for Redundancy Removal In Auditory Anomaly Detection Renhang HONG, Yang ZHOU, Shenghe SHI, Bo ZHANG Presenter: Renhang HONG, Nankai University, Tianjin, China Abstract: The objective of this work is to detect anomalies of a group of hydro-turbines and electric generators of a power plant based on their audio signals when they are running. Autoencoders are utilized for this task. In this approach, neural networks learn the time-frequency distribution of normal audio signals, and they are then used to predict the normal components of testing signals. If spectral features are used, the residuals produced by subtracting the predictions from the inputs can be regarded as estimations of anomaly signals in the inputs, and their energies can be used as the basis to make the normal/abnormal decision. When the approach was used in our project, we encountered a problem of large but imbalance training data. The training data has quite large a size (about 12,890 hours) but is highly redundant (caused by the fact that at most time devices run in stationary states). To make the training feasible, we propose a new clustering algorithm which is specially designed to quickly remove redundant data in the large database. The algorithm is significantly faster than the conventional k-means algorithm or its improved variants. The redundant data of the training database was removed by the algorithm. Autoencoders trained on the shrinked database can detect all the real anomalies recorded in the past months. When tested on a database of simulated anomalies, the average precision for the ten devices is 96.9 percent, showing the effectiveness of the algorithm.
D0A30 14:15-14:30	Probabilistic Fuzzy Frequent Item Sets Mining (PPFIM) Fayuan Li, Zeyuan Zhang, Bo Cheng, Peng Zhang Presenter: Peng Zhang、Northwestern Polytechnical University、China Abstract: The double superposition of fuzziness and randomness makes the mining of uncertain fuzzy item sets more complex. Based on the calculation of item set fuzziness, this paper integrates the randomness of possible world model to solve the problem of mining fuzzy frequent item sets based on probability threshold. Fuzzy theory and uncertainty are based on linguistic information and are extended to deal with partial truth concepts. In the fuzzy probabilistic context, an itemset $\boldsymbol{X}$ is called fuzzy frequent if the fuzzy probability that $\boldsymbol{X}$ occurs in at least minSup transactions is above a given threshold $\boldsymbol{\tau}$. We designed a dynamic programming-based algorithm to compute the frequent fuzzy probability. Experiments were conducted to evaluate the performance of the proposed approach.
D0A24 14:30-14:45	Multimodal Learning Approach for Multi-topic Twitter Summariation Yangyang Cao, YanMin Wu, JinLi Qi, Zizhong Chen Presenter: Yangyang Cao, Chongqing Key Laboratory of Computational Intelligence Chongqing University of Posts and Telecommunications Chongqing 400065, China

	Abstract: Twitter summary is designed to filter out the content summary from lots of noisy tweets, which can be used for Twitter search, public opinion analysis, hot topic discovery, etc. But the existing Twitter summary methods mostly focus on individual topics or hot events, and there are few studies on Twitter summary with multi-topic posts. For the sake of resolve this problem, we propose a Twitter summary method based on social network information and manifold learning, which can extract tweets covering multiple topics, and better integrates the topic information and structural information of the tweets. First, the multi-modal manifold learning method is improved, and the social network information is integrated. Second, in order to test the relevance of the tweet summary and the topic, a test method of topic membership is designed. What's more, due to the lack of evaluation data sets, the author built a manual evaluation dataset. Our experiments on large-scale real tweets demonstrate the effectiveness of our framework.
D0A02 14:45-15:00	Research on the Visualization and Prediction of the Temporal and Spatial Distribution of Offense ——A Case Study of Boston, USA Zhou Xu, Lin Li Presenter: Zhou Xu, Chinese People's Public Security University, China Abstract: It is based on the data of various offense from June 2015 to September 2018 in Boston, USA, using statistics, variance test and other methods to analyze the time, space, and location of the offense involved and conduct linkage analysis and interactive display, present the temporal and spatial distribution of the city's high incidence of offense, and detect the temporal and spatial hot spots of offense. Finally, the article uses Tableau 2021.2 software to construct a linear regression model to predict the occurrence of offense.
D0A27 15:00-15:15	Generalized Undersampling of Center Points Based on Granular Ball Hao Bai, YanMin Wu, JinLi Qi, YanYi Chen Presenter: Hao Bai, Chongqing University of Posts and Telecommunications, China Abstract: In this paper, we propose a new generic sampling classification method based on granular Ball sampling because of good robust noise immunity and possessing properties that can be classified as an undersampling method, called Granular Ball Center-based Common Under-sampling. The method uses adaptively generated Ball to cover the data space, and the sampled data are supported by the centroid properties of the Ball. Unlike the boundary sampling of granular ball sampling, this method mainly uses the center points to smooth out the noise, which not only can clearly represent the attributes, but also can reduce some computational effort, and in most of the time, it can obtain almost the same accuracy as the original model, or even can perform better. Compared with undersampling, it can be better adapted to the task of unbalanced classification as well as non-unbalanced classification. The above can show that the method is able to be generalized without the restriction of specific classifiers and also has a strong adaptability to the dataset.

	The method can also be effectively used as an undersampling method for unbalanced classification because it is supported by the centroid property, and the method has a speedup effect for most classifiers. These advantages form a strong advantage of the method in improving classifier performance.
D1A03 15:15-15:30	A Two-layer Sketch for Entropy Estimation in Data Plane Jie Lu, Hongchang Chen, Zhen Zhang Presenter: Jie Lu, PLA Information Engineering University, China Abstract: Entropy-based approaches have been shown to aid a wide variety of network measurement applications such as load balancing, anomaly detection, traffic classification. Existing entropy estimation methods require frequent interaction between forwarding and control planes which increases the burden on the network and causes unnecessary delay. In this paper, we present Filter-Sketch, a two-layer sketch that supports frequency estimation with small and static memory allocation. Based on Filter-Sketch, we propose a new generation of mechanisms to calculate entropy at a line rate which completely executes in programmable data plane. The trace-driven evaluation shows that Filter-Sketch achieves higher accuracy than the existing data plane algorithm in entropy estimation where the relative error decreases 0.65 in average.

Parelle Sessions

Session 9- Computer Vision and Virtual Technology
April 24, 2022 | 13:30-15:30 | Zoom Link: https://us02web.zoom.us/j/81646883912 (Password:042224)
Session Chair: Ma Mingbo, Southwest Jiaotong University, China
D0A99, D0A22, D0A48, D0A94, D0A34, D0A08, D2107, D2101

D0A99 13:30-13:45	Research on the Application of Virtual Reality Technology in Agriculture under the Background of Rural Revitalization under the Background of Big Data Yuli Zhang, Jia Li, Rihui Chen, Ziquan Wang Presenter: Yuli Zhang, Southwest Petroleum University NanChong, China Abstract: Virtual reality technology is regarded as one of the most innovative technologies in the 21st century. Under the background of rural revitalization, how to combine virtual reality technology with agriculture and play a powerful role in virtual crops, agricultural production automation and agricultural production management to the maximum extent is the subject of this paper.
D0A22 13:45-14:00	Design of wireless site-specific spraying system based on machine vision technology Haiyun Wu, Yanan Zeng, Yong Wei, Renjie Yang, Yongheng Wang, Huiyong Shan Presenter: Haiyun Wu, Tianjin Agricultural University, China Abstract: A control system for site-specific spraying which delivers pesticide spray selectively with respect to the characteristics of the targets based on machine vision technology was designed. In this system, the modbus protocol was used for the communication between the receiving terminal and the site-specific spraying terminal via GT-38 wireless module. The graphical user interface (GUI) was used to design the interface of Human-machine included modes setting and image acquisition instructions sending. The prototype was tested in laboratory. The experimental results show that target recognition accuracy was 100%. The spraying uniformity in the target area was greater than 70%. The acquisition time of a single test was 2s, and the image information transformed into the action time interval of nozzle solenoid valve was less than 100 ms, which realized real-time detection and spraying.
D0A48 14:00-14:15	SL-CycleGAN: Blind Motion Deblurring in Cycles using Sparse Learning Ali Syed Saqlain, Li Yun Wang, Zhiyong Liu Presenter: Ali Syed Saqlain, NCEPU, Beijing, China

	Abstract: In this paper, we introduce an end-to-end generative adversarial network (GAN) based on sparse learning for single image motion deblurring, which we called SL-CycleGAN. For the first time in image motion deblurring, we propose a sparse ResNet-block as a combination of sparse convolution layers and a trainable spatial pooler k-winner based on HTM (Hierarchical Temporal Memory) to replace non-linearity such as ReLU in the ResNet-block of SL-CycleGAN generators. Furthermore, we take our inspiration from the domain-to-domain translation ability of the CycleGAN, and we show that image deblurring can be cycle-consistent while achieving the best qualitative results. Finally, we perform extensive experiments on popular image benchmarks both qualitatively and quantitatively and achieve the highest PSNR of 38.087 dB on GoPro dataset, which is 5.377 dB better than the most recent deblurring method.
D0A94 14:15-14:30	Video Content Classification Using Time-Sync Comments and Titles Zeyu Hu, Jintao Cui, Binhui Wang, Wei-Hua Wang, Feng Lu Presenter: Zeyu Hu, Nankai University, China Abstract: The Time-Sync Comment (TSC) is a novel comment used by online video websites and has been gradually recognized by Internet users. Attracted by the active viewer-creator interaction, numerous content creators upload their videos to online TSC video websites. Facing the increasing number of videos, it is difficult to efficiently classify video in traditional manual review methods. Given the close comment-video correlation, achievements of natural language processing can be applied to the TSC video classification task, processing texts instead of images. In this paper, a new method of video classification based on TSCs and titles is proposed. It combines the BERT (Bidirectional Encoder Representation from Transformers) model with the machine learning classifier, and obtains classification results via analyzing TSCs and titles. In particular, this method can work with few TSCs and bypass the limit of the BERT for the input sequence length. The experimental results on the real-world dataset show that BERT-SVM can achieve a better performance than the baseline methods, and the maximum accuracy is up to 0.9396. This research can help online video websites to manage TSC videos more efficiently and intelligently, and provide novel ideas for researchers to study classical tasks.
D0A34 14:30-14:45	cMobiDesk: A Lightweight Solution for Android Desktop Virtualization Peiyu Liu, Yi Chen, Lirong Fu, Mingyuan Yan, Zonghui Wang Presenter: Peiyu Liu, Zhejiang University, China Abstract: Mobile devices have become an important aspect of people's daily lives and increased the popularity of Bring Your Own Device (BYOD). However, there exist many problems in BYOD. First, it is complex and expensive for companies to make the applications and tools general across all platforms. Second, a large amount of companies' computing resources is wasted. Thus, researchers proposed Virtual Mobile Infrastructure (VMI).

	However, existing VMI solutions still have the following limitations: 1) They run server instances in virtual machines, leading to high overhead. 2) They need to modify the source code of the mobile OS running on the server, introducing maintainability and compatibility concerns. To address the above problems, we propose a new lightweight VMI solution named cMobiDesk. cMobiDesk employs Linux Container (LXC) to build multiple Android containers with low overhead on a single physical machine. Then, we design and implement a prototype system of cMobiDesk without modifying the source code of the mobile OS by leveraging a non-invasive method. The experiments show that the cMobiDesk has higher performance and lower overhead than the state-of-the-art.
D0A08 14:45-15:00	Painting Influence Evaluation Network Based on Time Series Yuehang Si, Jincai Huang, Huien Cui, Qing Cheng Presenter: Yuehang Si, National University of Defense Technology, China Abstract: Paintings fill people's lives. In order to explore the influence of painters on each other, major changes in the development of painting, and changes in the painting with social change, we analyze the compositions to reduce the dimension of the data. Based on the correlation of data, we establish a measurement model of painting similarity. Distances between vectors representing painters/paintings are applied to measure their similarity and use support vector machines to build classification models. We explore the evolution of painting by building a time series model for experiments. Finally, we analyze the cultural influence of paintings and identified the influence of social, political, or technological changes in the network in combination with time-series models.
D2107 15:00-15:15	Machine Vision Analysis of Welding Region and its Application to Seam Tracking in Arc Welding Xiaoyang Fei, Cheng Tan, Zijun Yuan Presenter: Cheng Tan, Tianjin University, China Abstract: In the process of the rapid development of artificial intelligence, machine vision makes full use of image recognition technology. The application of image recognition technology in machine vision has become a very common technology and has been widely used. In the welding industry, machine vision is widely used in weld tracking, weld pool parameters and visual inspection of welding quality. It can improve the productivity of the industry and maximize the use value of this technology. The purpose of this study is to use machine vision method to analyze various welding processes, so as to know how much machine vision technology will improve the efficiency of the welding industry.
D2101 15:15-15:30	A Binocular Vision-guided Puncture Needle Automatic Positioning Method Haoran Gu, Zhuang Fu, Zeyu Fu, Chenzhuo Lu, Jian Fei, Yisheng Guan Presenter: Haoran Gu, Shanghai Jiao Tong University, China

Abstract: In the traditional Magnetic Resonance Imaging (MRI)-guided breast puncture surgery, doctors perform puncture surgery manually based on the MRI images and experience. The puncture needle may not be able to reach the location of the lesion accurately due to the inexperience or fatigue of the doctor. In this paper, a binocular vision-guided automatic positioning method for breast puncture needles is proposed. First, the combined image processing algorithm and the three-frame difference method are used to detect the needle tip; then, the puncture needle is guided to the target position by position-based visual servoing. The experimental results show that the average error of feature point detection is within 3 pixels, and the final positioning error is within 2.5mm. Compared with the traditional manual positioning method, the positioning accuracy of this method is higher, and the puncture process is also more stable, which improves the efficiency of surgery.

Parelle Sessions

Session 10- Modern Information and Communication Technology
April 24, 2022 | 16:00-18:00 | Zoom Link: https://us02web.zoom.us/j/85700076636 (Password:042224)
Session Chair: Assoc. Prof. SK. Saidhbi, Semara University, Ethiopia
D2108, D2110, D1A06, D0A53, D0A60, D0A61, D0A57, D0A23

D2108 16:00-16:15	Spiking Spatio-Temporal Channle Yan Mo, Yuanlei Yang, Shukai Duan, Lidan Wang Presenter: Yan Mo, Southwest University, China Abstract: Spiking neural network is known as the third-generation artificial neural network because of its rich temporal and spatial dynamic characteristics and reasonable bionic properties. It has great prospects in the fields of artificial intelligence and brain like neural computing. However, at present, the accuracy of Spiking neural network in text classification and image recognition is not satisfactory. Researchers hope to improve the performance of spiking networks from all aspects. Although the previous SNNS tried their best to mine the characteristic information of time and space, they focused on the encoding and expression of information. In this paper, a novel concept of Spiking Spatio-Temporal Channel is proposed. The time dimension is introduced in the direction of information transmission, which means the connection between neurons is expanded. Combined with the popular surrogate gradient method, a concise and beautiful spiking neural network training algorithm is deduced. Finally, it is verified that without adding additional neuron overhead and affecting the training and inference speed, after introducing the Spiking Spatio-Temporal Channel, the trainable parameters of the new spiking neural network are increased, the convergence speed is improved, and the recognition accuracy get better performance.
D2110 16:15-16:30	Power Line Communication Based on Adaptive SCMA Algorithm Xiang Wang, Haimin Hong, Shuming Xu, Gang Xie, Yumiao Shang, Xincheng Zhou Presenter: Xincheng Zhou, Beijing University of Posts and Telecommunications, China Abstract: Power Line Communication (PLC) covers a wide range of functions and has low cost. With the development of smart grid, new requirements of high-frequency spectral efficiency and large access capacity are put forward for power line communication. This paper studies the power line communication technology based on adaptive SCMA. Through adaptive modulation, SCMA technology can better adapt to the characteristics of strong signal attenuation, background noise and impulse noise in power line channel, and improve the spectral efficiency and user capacity in power line communication.

D1A06 16:30-16:45	Research on the Relationship between Governance Optimization and Performance of Communication Enterprises Based on Pearson Test Rui HUANG, Yuanqin ZHU, Xia OUYANG Presenter: Rui HUANG, Xiangnan University, China Abstract: This research takes 55 listed enterprises in China A-share communication industry from 2014 to 2018 as samples, takes frequency of board meetings, whether a director concurrently serve as a general manager, the proportion of independent directors in the board of directors, the number of board members and the salary level of board members as explanatory variables, takes asset liability ratio and net operating interest rate as control variables and return on assets (ROA) as explained variables to establish multiple linear regression equations and carry out descriptive statistics, Pearson correlation test and linear correlation test. And the relationship between characteristic variables of enterprise governance and enterprise performance is empirically tested. The result shows that the proportion of independent directors, the number of board meetings per year and director salary incentive are positively related to the enterprise performance, which can promote the improvement of enterprise performance. The number of board members, the duality of general manager and director are not significantly related to the enterprise performance, and the impact on enterprise performance is uncertain. Combined with the empirical results, this paper puts forward the optimization strategy of enterprise governance system to improve the enterprise business performance.
D0A53 16:45-17:00	Using Smart Wearable Technology Acceptance Model for Health Monitoring Technology Chai Wei Yang, Angela Lee Siew Hoong Presenter: Chai Wei Yang, Sunway University, Malaysia Abstract: The increasing of aging population has caused the rising need for healthcare and assistance through smart wearables health monitoring systems in order to attend impairments in cognitive psychosocial functioning of the elderly, as well as their ability and mobility. To facilitate and encourage the use of smart wearable systems among older adults, this study investigated the factors that may have contributed to the acceptance of such systems, and smart wearables acceptance model for elderly people will be developed by using structural equation modeling. The model will be validated with 250 samples. Validation and reliability of the constructs in the model will be tested through Partial Least Square method. The results will indicate what are the factors that have significant positive effect on the intention of the elderly people in using smart wearable systems.
D0A60 17:00-17:15	Research on CCL Signal Recognition Method for Coupling Based on SVM Algorithm Yuting Zeng Presenter: Yuting Zeng, Southwest Petroleum University, China

	Abstract: At present, unconventional oil and gas resources are being developed on a large scale in major domestic oil and gas fields, and oil and gas well coupling location identification has become a research hotspot in the field of petroleum technology. The study uses data mining and machine learning tools to study CCL signals in a novel way. Sliding window feature selection and signal feature-based feature construction methods are used for data pre-processing. SVM, Random Forest, AdaBoost, and XGBoost were used to compare four independent models. Following the studies, the SVM model outperformed the other models in terms of performance evaluation metrics such as accuracy, recall, F1 score, and AUC score. In addition, the model results were improved by comparing the correctness of CCL signal measurements.
D0A61 17:15-17:30	Layered Bit-Flipping Algorithms for Decoding LDPC Codes Fangxia Luo, Xuan He, Jiongyue Xing, Xiaohu Tang Presenter: Fangxia Luo, Southwest Jiaotong University, China Abstract: At present, various communication and storage systems have put forward high requirements on both the complexity and performance of low-density parity-check (LDPC) decoders. Bit flipping decoders are a good candidate for these applications. This letter proposes to utilize the column layered scheduling to speed up the convergence and improve the error correcting performance of existing bit flipping algorithms. As the information storage bit flipping (ISBF) algorithm generally performs the best, we investigate the layered ISBF (LISBF) algorithm in detail, including developing two efficient techniques for optimizing the computation of flipping thresholds: forward-backward computation and two-max computation. Simulation results on a (3, 6) LDPC code show that, compared to the ISBF algorithm, the LISBF algorithm can reduce the frame error rate by up to an order and reduce the average number of iterations by around 40%.
D0A57 17:30-17:45	Combined Influence of Commenting and Forwarding on Information Propagation on the Chinese Sina Microblog Jinxia Wang, Tongyu Liang, Qinghua Kuang, Xinyi Tang, Rui Ma, Fulian Yin Presenter: Jinxia Wang, Communication University of China, China Abstract: After the outbreak of the COVID-19 pandemic, social media platforms offer an essential channel for the public to obtain and discuss the latest development of the epidemic situation and vaccine research. On the Chinese Sina Microblog, which is one of the most popular social platforms in China, two unique interaction mechanisms promote the change of the intensity and breadth of online information propagation, namely “commenting” and “forwarding”. Based on that, we propose a Susceptible-Commenting-Forwarding-Immune (SCFI) dynamic model and use the actual public opinion event on the Chinese Sina Microblog to adopt a data-model dual-drive research approach. We focus on the differences between the influence of “commenting community” and “forwarding community” on the promotion of information propagation, which is conducive to grasping the law of public opinion propagation. Our experimental results show that the multiple interactive mechanisms can particularly affect public opinion propagation. Our conclusions

	can contribute to designing effective communication strategies for governments and related agencies to guide public opinion in response to public health emergencies.
D0A23 17:45-18:00	Research on extended CVRP problem based on Memory Pointer Network Yue Cai, Enliang Wang, Zhixin Sun Presenter: Yue Cai, Nanjing University of Posts and Telecommunications, China Abstract: The traditional CVRP model is often too simple compared to the problems in actual production and life. CVRP problems with strict feasible solutions are difficult to appear in actual production life. For example, in some shopping festivals, user demand will exceed the transportation capacity of all vehicles. Therefore, it is more practical to study a broader, a little slack, super-large-scale CVRP problem. First, this paper proposes an extended CVRP model for the above problems. The model takes minimizing the driving distance of all vehicles and maximizing the number of users served as the optimization goal, and the vehicle carrying capacity is the constraint condition. The above CVRP problem is generalized to make it closer to actual production and life. Then this paper proposes a Memory Pointer Network (MemPtrN) for how to solve the super-large-scale CVRP problem. The network expresses the matching strategy between the vehicle and the user, so as to solve the CVRP problem. The solution method has good versatility. The Memory Pointer Network can be trained on small-scale problems and then used directly on large-scale problems, and good solution results can still be obtained. Compared with OR-Tools, Google's operations research solver, the quality of solutions on small-scale problems is the same, and the quality of solutions on large-scale problems is better than this solver.

Parelle Sessions

Session 11- Object Recognition and Detection
April 24, 2022 | 16:00-18:15 | Zoom Link: https://us02web.zoom.us/j/82792835100 (Password:042224)
Session Chair: Dr. Muharrem Tuncay GENÇOĞLU, Fırat University, Turkey
D2111, D1A08, D0A87, D0A45, D0A63, D0A36, D1A02, D0A67, D2102

D2111 16:00-16:15	An identification method of Apple leaf disease based on transfer learning Jinsheng Su, Mingjun Zhang, Wenjing Yu Presenter: Jinsheng Su, Software Engineering Institute of Guangzhou, China Abstract: In order to solve the identification problem of apple disease detection, a method based on light network structure MobileNetV2 was designed to detect apple leaf pathology, which was widely affected and severely damaged by spotted leaf litter disease, brown spot disease, Mosaic disease, gray spot disease and rust. In this method, data enhancement method is used to amplify the number of original factors, and the application of convolutional neural network in crop pathological identification is explored by transfer learning method. A deep learning model suitable for mobile devices such as mobile phones is designed to realize the detection of apple leaf diseases. The experimental results show that the performance of deep separable convolutional neural network in this task can meet the actual demand of production.
D1A08 16:15-16:30	Fire Object Detection Algorithm Based on Improved YOLOv3-tiny Yongquan Li, Leilei Rong, Runqing Li, Yan Xu, Presenter: Yongquan Li, Shandong University of Science and Technology, China Abstract: In view of the poor performance of the commonly used network models on the self-made fire dataset and the real-time requirements for the fire detection, we propose an improved fire object detection model based on the yolov3-tiny lightweight network. The specific measures are as follows: Replace the first four pooling layers in the backbone network with the 3×3 convolutional layers with a step size of 2, increasing network nonlinearity while reducing the information loss caused by the pooling layer; On the basis of the original network detection layer, a new detection layer of 52×52 size is added to improve the detection effect of small object fire; In order to reduce the detection errors caused by the complex background of the dataset, the SE channel attention module is added after the fusion of different detection layers to strengthen the attention to important features. According to the experimental results, the improved YOLOv3-tiny network has a mean average precision rate of 80.8%, which is 5.9% higher than the original network, which fully proves the effectiveness of the model.

D0A87 16:30-16:45	Recognition of Disaster images Based on Self-supervised Learning Linyong Wang, Ruiqi Wu, Cen Li, Zhiqiang Zou Presenter: Linyong Wang, Nanjing University of Posts and Telecommunications, China Abstract: Existing supervised deep learning model requires large amounts of labeled training data to learn new tasks. This is a limitation for many practical applications in disaster areas as well as in many other fields such as medical domain, where numerous labour and time are required to label datasets. According to our literature survey, there is few self-supervised learning model with high accuracy for image recognition about natural disasters. This paper proposed a self-supervised learning model for disaster image recognition based on MoCo model, called MoCo-Q, including image preprocessing, model training and transfer learning after fine-tuning. After being trained by learning a couple of features of disaster images without artificial labels, the trained neural network is applied to downstream tasks, which achieves the recognition of a large number of disaster images at a high accuracy without the manual intervention and labeling. With the implement of the MoCo-Q, images of natural disasters can be quickly recognized without manual labeling. The work can provide scientific decision-making support for the government and it is of great significance for natural disaster assessment and disaster relief. Finally, experiments on real-world natural disaster datasets, CrisisMMD and ASONAM17, are performed, and we compared with the state-of-the-art supervised method (ResNet50) that uses same datasets. The result presents that the accuracy of the MoCo-Q (91.56%) is 5.71% higher than that of the supervised learning model (85.85%).
D0A45 16:45-17:00	An Improved AKAZE Algorithm for Feature Matching of Moving Objects Lin Yongsheng, Fan Wenqiang, Zhao Yuan Presenter: Lin Yongsheng, Yantai University, China Abstract: Aiming at the problems of fast feature extraction and low matching accuracy of moving target detection features for moving targets in the existing image processing feature matching, an improved method is proposed based on the AKAZE algorithm. Using the nonlinear method of the AKAZE algorithm to construct the calculated feature points in the scale space, obtain the displacement of the same feature point between adjacent frames, and filter out the unsuitable feature points according to the rules of the improved algorithm. The experimental results show that although the improved algorithm has the disadvantage of increasing the matching time, by reducing the number of mismatched point pairs, the accuracy of feature matching can be improved relatively, and it is suitable for the capture of accurate objects in a small range.
D0A63 17:00-17:15	Research on Face Recognition Based on Deep Learning Technology in Intelligent Construction Site Qinglin Wu, Caiyun ssXu Presenter: Qinglin Wu School of Information Engineering Wuhan Business University

	Abstract: It is an urgent problem for construction enterprises to supervise site personnel and reduce potential safety hazards. In order to improve the safety supervision ability of the construction site, combined with the management requirements of the current smart construction site monitoring platform, and based on the analysis of the architecture and functions of the smart construction site monitoring platform, and conducive to the deep learning technology, a smart construction site face recognition system based on convolutional neural network is designed. Recognize the faces of site personnel through convolution neural network, manage and control the site personnel, realize the identification of suspicious targets, realize the intellectualization of video monitoring on the construction site, provide good safety guarantee for site construction, and improve the construction level and management ability of intelligent site production engineering.
D0A36 17:15-17:30	Facial Expression Recognition for OoD Generation Using Risk Extrapolation HUANG Ke-xin, HE Ren-jie, YAO Feng, ZHANG Zhong-shan, WANG Tao, SHEN Da-yong, LIU Zan-wei Presenter: HUANG Ke-xin, College of Systems Engineering National University of Defense Technology, Changsha Abstract: Humans express emotions through facial expressions. It's easy for humans to recognize these emotions, but it's a very challenging task for computers. Every face image will be different because of the differences in brightness, contrast, resolution, angle, etc. when taking an image. which is why Out-of-distribution (OoD) Generalizing for facial recognition expression is very difficult. In pursuit of strong OoD generalization, we introduce the principle of Risk Extrapolation (REx) into the field of face recognition. The robustness of affine combination of training environments is enhanced by making each training risk equal. In this paper, we identified seven basic facial expressions and improve their adaptability based on risk extrapolation from multiple datasets.
D1A02 17:30-17:45	Wheat Heads Detection via Yolov5 with Weighted Coordinate Attention Feixiang Han, Jie Li Presenter: Feixiang Han, Wuhan University of Technology, China Abstract: Wheat is one of the three crops globally. Accurately detecting and counting wheat heads is essential for crop yield assessment and breeding. The traditional method involves manually counting the number of wheat heads, which is timeconsuming and inefficient. Although researchers have studied several algorithms to measure the wheat head automatically, the generalizability limits the application of these algorithms. Our research aims to develop a method with high accuracy and generalizability for wheat head detection in the field. The proposed method employed YOLOv5, WCA (Weighted Coordinate Attention), and image-processing techniques to detect the wheat head. WCA uses the weighted average to aggregate the feature information along with the x and y directions, capturing the long-range dependencies among the feature maps. Via WCA, the Yolov5 could extract comprehensive

	feature information of the wheat head in complex environments, improving the detection performance of the model. Benchmarking Yolov5-WCA on 6500 labeled images of the wheat head, we achieved the average precision, recall, accuracy of wheat head detection of 93.7%, 91.6%, 86.2%, outperforms Yolov5 by 0.7% on precision, 1.9% on recall, and 2.2% on accuracy. The proposed method can extract comprehensive feature information among complex environments, improve the model's accuracy and generalizability, and provide technical support for other detection tasks.
D0A67 17:45-18:00	TD-Sampler: Learning a Training Difficulty based Sampling Strategy for Few-Shot Object Detection Chunpeng Wu, Bo Wang, Siyan Liu, Xin Liu, Peng Wu Presenter: Chunpeng Wu, Artificial Intelligence on Electric Power System State Grid Corporation Joint Laboratory, China Abstract: Success of deep learning on image applications heavily relies on tremendous data. Since collecting sufficient data is difficult for certain applications, e.g., medical image processing, few-shot learning has recently become a more attractive research field in deep learning community. For few-shot object detection, previous methods popularly finetunes a pretrained detector for data-scarce novel classes using a small number of data-abundant base class data. To effectively adopt all base class data in the finetuning stage while overcoming incurred imbalanced learning, we propose a training difficulty (TD) criterion for training data in this paper. Training data with a bigger TD more probably changes a detector's activation pattern significantly, compared to data with a smaller TD. Since the TD criterion requires time-consuming backpropagation information, we learn a TD predictor with the detector in the pretraining stage to accelerate TD computation. Based on the TD predictor, we propose a sampling strategy which prefers a batch of training data with more novel class data and lower probability of incurring significant changes on the detector's activation pattern. Experimental results on two popular datasets Pascal VOC and MSCOCO show that for novel class data, our proposed method, TD-Sampler, achieves state-of-the-art on Pascal VOC, and improves mAP averagely by 22.9% on MSCOCO compared to the previous best method. Ablation study further shows that averaged accuracy drop of ours without TD based sampling is 21.3% compared to ours. Therefore, the TD based sampling is a crucial component of our proposed method.
D2102 18:00-18:15	The Fusion of Feature for Person Re-identification based on Siamese Network Tianwen Du, Yifeng Zhang Presenter: Tianwen Du, Southeast University, China Abstract: This paper proposes Fusion-based Siamese Network (FSN), a new deep learning architecture that targets at learning global and local features convergently for person re-identification (re-ID). This paper demonstrates the advantages of combining global and local features, which is embodied in indicators such as rank-1 and mAP. At the same time, it is noteworthy that FSN is based on siamese network, which leads innovation in image retrieving.

	Siamese network consists of two identical sub-networks. In the training process, a pair of images are input into the sub-networks at the same time. Through training, FSN updates the weights according to the triplet loss. FSN can solve the problem of retrieving pictures under different posture, size and light conditions correctly. On three benchmark datasets, Market-1501, DukeMTMC-reID, and CUHK03, the proposed FSN achieves 94.9%, 89.1%, 67.7% in rank-1 and 90.1%, 86.3%, 65.7% in mAP respectively, surpassing most of state-of-the-art methods by a large margin.