

# **The 5<sup>th</sup> International Conference on Data Mining, Communications and Information Technology**

## **DMCIT 2021 In Conjunction with CSMO 2021**

### **Conference Program**

<https://www.dmcit.net/>

<https://www.csmo2021.org/>

**Conference Organized by**  
Asia Pacific Institute of Science and Engineering (APISE)  
**Media Supported by**  
MDPI-Mathematics

Apr. 16-18, 2021 • Hangzhou, China

# CONTENTS

|   |           |
|---|-----------|
| <b>WELCOME MESSAGE .....</b>                                  | <b>1</b>  |
| <b>CONFERENCE SPEAKERS.....</b>                               | <b>2</b>  |
| KEYNOTE SPEAKER .....   | 2         |
| <b>PROGRAMME OVERVIEW.....</b>                                | <b>6</b>  |
| <b>INSTRUCTIONS TO PRESENTATIONS .....</b>                    | <b>7</b>  |
| <b>ONLINE VIDEO CONFERENCE OPERATION GUIDE VIA VOOV .....</b> | <b>8</b>  |
| <b>TECHNICAL SESSION.....</b>                                 | <b>10</b> |
| <b>ABSTRACT INDEX .....</b>                                   | <b>15</b> |
| <b>CONFERENCE COMMITTEE.....</b>                              | <b>22</b> |
| <b>CONFERENCE VENUE.....</b>                                  | <b>24</b> |
| <b>NOTE .....</b>   | <b>25</b> |

## WELCOME MESSAGE

Dear Participants,

Due to the outbreak of COVID-19, the whole world is struggling against the impact from all aspects. Unfortunately, each of us is affected, either overtly or covertly. Our conference, the 5<sup>th</sup> International Conference on Data Mining, Communications and Information Technology (DMCIT 2021), in conjunction with the 5<sup>th</sup> International Conference on Simulation, Modeling and Optimization (CSMO 2021) is not an exception. To actively respond to the call of the government, to strengthen the protection work, to effectively reduce people gathering and prevent coronavirus transmission, DMCIT 2021, which should be held in Hangzhou, China during Apr. 16-18, 2021 as planned, considering that some participants could not attend in person, the conference is now adjusted as a combination of the on-line and off-line conference.

However, the change of conference form will not influence on papers' publication and index. All the registered and presented papers will be published in the volume of Journal of Physics: Conference Series (JPCS) (ISSN: 1742-6596), which will be submitted to Engineering Village, Scopus, Thomson Reuters (WoS) and other databases for review and indexing.

Also, the change of conference form will not influence on our conference's aim and pursuit. DMCIT 2021 aims to present the latest research and results of scientists related to Data Mining, Communications and Information Technology and other topics. By on-line and offline oral presentations and poster presentation, this conference provides opportunities for the delegates to exchange new ideas, to establish business or research relations as well as to find global partners for future collaborations. We hope that the conference results will lead to significant contributions to the knowledge in these up-to-date scientific fields.

We would like to thank our outstanding Keynote Speakers: Prof. Yulin Wang, Wuhan University, China; Prof. Yucong Duan, Hainan University, China; Prof. Kaizhu Huang, Xi'an Jiaotong-Liverpool University, China; Prof. Ce Zhu, University of Electronic Science and Technology of China, China for sharing their deep insights on future challenges and trends.

Thanks to all the committees for their great support on organizing the conference. We also would like to thank all the reviewers for their great effort on reviewing the papers submitted to DMCIT 2021. Special thanks to all the researchers and students who with their work and participate in the conference.

We hope all is well with everyone, with families and friends.

A handwritten signature in black ink, appearing to read 'Yucong Duan'.

Prof. Yucong Duan, Hainan University, China  
Conference Committee Chair

## CONFERENCE SPEAKERS

### Keynote Speakers



**Prof. Yulin Wang**  
Wuhan University, China

**Biography:** Prof. Yulin Wang is a full professor and PhD supervisor in the School of Computer Science, Wuhan University, China. He got PhD degree in 2005 in University of London, UK. Before that, he has worked in high-tech industry for more than ten years. He led or participated in many important research programs, and achieved several ministry level awards.

He got his master and bachelor degree in 1990 and 1987 respectively from Xi-Dian University, and Huazhong University of Science and Technology (HUST), both in China. His research interests include digital rights management, multimedia and network security, signal processing, and Artificial Intelligence. In recently 10 years, Prof. Wang has published as first author 3 books, 40 conference papers and 45 journal papers, including in IEEE Transactions and ACM proceedings and Elsevier Journals. He hold 8 patents.

Prof. Wang served as editor-in-chief for International Journal of Advances in Multimedia in 2010. He served as reviewer for many journals, including IEEE Transactions on Image Processing, IEEE Signal Processing Letters, Elsevier Journal of Information Sciences. He served as reviewer for many research funds, including National High Technology Research and Development Program of China ('863' project). Prof. Wang was the external PhD adviser of Dublin City University, Ireland during 2008-2010. He was the keynote speakers in many international conferences. He has been listed in Marcus 'who's who in the world' since 2008.

#### **Keynote Lecture: Intelligent Multimedia Data Hiding: Techniques and Applications**

Digital music, podcasts, live and recorded webinars, video calls, and streaming video have changed the way in which we communicate, and have become ubiquitous in virtually every organization. We employ these methods to convey ideas, train our employees, engage our customers, and of course entertain.

The question is, does digital multimedia pose a threat? Could these channels be used to communicate information covertly, ex-filtrate intellectual property, share insider information, be used to convey command and control information, or provide the needed enabling technology for advanced persistent threats? Additionally, since the size of multimedia files are typically much larger than a single digital photo, does this mean that larger payloads of hidden information could be exchanged or leaked by exploiting weaknesses inherent in multimedia carriers? Or, on the contrary, is the human auditory system sensitive to even small changes in multimedia information such that we could detect anomalies caused by embedding hidden information in such streams?

In this talk, we present the intelligent multimedia data hiding techniques and their possible application. We will cover some of the earliest and simplest forms of data hiding in digital multimedia and then move to some of the latest innovations in order to provide insight into these questions. Some of the research branches, called reversible data hiding, is also depicted.



**Prof. Yucong Duan**  
Hainan University, China

**Biography:** Yucong Duan is currently a full professor in college of science and information technology, Hainan University, P.R.China. He received a PhD in software engineering from Institute of Software, Chinese Academy of Sciences, China in 2006. He was Post-doc fellow in School of Software, Tsinghua University, China from 2006-2007. He was a Post-doc fellow in the Software Engineering Laboratory at Pohang University of Science and Technology (POSTECH), South Korea, from 2007-2008. He was a lecturer of Biomedical Engineering Institute, Capital University of Medical Sciences, Beijing, China, from 2008 to 2009. He was a Post-doc fellow in Le2i, CNRS, University of Bourgogne, France, from 2009-2010. He was a postdoc in DISCO, University of Milano Bicocca, Milano, Italy, from 2011 to 2012. He visited Missouri State University from 2017-2017. He is a senior member of CCF and a senior member of IEEE. He has published more than 100 international journal or conference papers and applied more than 80 Chinese patents. His research interests include: Artificial Intelligence, Cyberspace Security, Knowledge Management, etc.

**Keynote Lecture: Why we need Crossing “Data, Information, Knowledge and Wisdom (DIKW) modals” towards Strong Artificial Intelligence?**

Currently most AI methodologies and systems are built on hypothesis and assumptions of learning data distribution probabilities, information completeness, or logical consistency of knowledge systems, separately. However learning data distribution is hard to be guaranteed to be properly “Big” as Big Data. Static data distribution is even more difficulty in terms of modeling dynamics of data sets. Information completeness will rely on not only various objective presentations of information but also the subjective purpose side inside human minds. Experience, commonsense and knowledge need coordination to keep conforming to value of wisdom.

The more hypothesis and assumptions on the current usages of Data, Information, Knowledge and Wisdom resources, they can be used effectively and efficiently. These hypothesis and assumptions will also means higher cost to collect, accumulate and processing relative resources.

Towards a more general AI landscape, which maps to the real situations that we only have small or insufficient data, partial information and diversified knowledge under a vague value strategy, with enriched processing capability, we propose to integrate the power or value of Data, Information, Knowledge and Wisdom resources to fit more general AI application scenarios with less cost as well as improve effectiveness and efficiency through conversions among Data, Information, Knowledge and Wisdom.

Availability and Cost of DIKW resources per unit is only the First Half of this story. Another Half of the story is more theoretical and technically subversive or revolutionary: in daily reality, we expect more intuitive results in the proper forms, e. g. proper imprecision, proper correctness, proper uncertainty, of data, information, knowledge and wisdom, instead of over qualified precision, correctness, and certainty, at unwanted consumption of energy of reasoning and computation, and waiting time. In transformations among DIKW elements and DIKW Graphs (Data Graph, Information Graph, Knowledge Graph and Wisdom Graph), we find the integrated solution covering both objective and subjective semantics.

Research group website: <http://www.yucongduan.org>

DIKW conference: <https://dikwra.org/>



**Prof. Kaizhu Huang**

Xi'an Jiaotong-Liverpool University, China

**Biography:** Kaizhu Huang is currently a Professor at the Department of Intelligent Science, Xi'an Jiaotong-Liverpool University, China. He acts as associate dean of research in School of Advanced Technology, XJTLU and is also the founding director of Suzhou Municipal Key Laboratory of Cognitive Computation and Applied Technology. Prof. Huang obtained his PhD degree from Chinese University of Hong Kong (CUHK) in 2004. He worked in Fujitsu Research Centre, CUHK, University of Bristol, National Laboratory of Pattern Recognition, Chinese Academy of Sciences from 2004 to 2012. Prof. Huang has been working in machine learning, neural information processing, and pattern recognition. He was the recipient of 2011 Asia Pacific Neural Network Society Young Researcher Award. He received the best paper or book award six times. So far, he has published 9 books and over 200 international research papers (80+ international journals) e.g., in journals (JMLR, Neural Computation, IEEE T-PAMI, IEEE T-NNLS, IEEE T-BME, IEEE T-Cybernetics, Cognitive Computation) and conferences (NeurIPS, IJCAI, SIGIR, UAI, CIKM, ICDM, ICML, ECML, CVPR). He serves as associated editors/advisory board members in a number of journals and book series. He was invited as keynote speaker in more than 30 international conferences or workshops.

**Keynote Lecture: Towards Robust and Safe Machine Learning with Adversarial Training**

Machine learning (ML), especially deep learning, has achieved great success in many applications. However, recent research investigations show that ML systems are vulnerable on small perturbations of input data, making ML less trustable to be applied in security-critical scenarios. In this talk, we present a unified perspective to build up a robust and safe AI and pattern recognition framework. In particular, we design a minmax adversarial training strategy that has been theoretically justified and empirically validated on many real data. Fundamentals, theories, and applications will be discussed in this talk with intuitive visualizations and numerical verifications. This talk will be mainly based on our research of adversarial training published at ICDM, CVPR, AAAI, ECCV, and ACM Multimedia.



**Prof. Ce Zhu**

University of Electronic Science and Technology of China, China

**Biography:** Ce Zhu is currently a Professor with the School of Information and Communication Engineering, University of Electronic Science and Technology of China, Chengdu, China. His research interests include image/video coding and communications, 3D video, visual analysis and understanding, visual perception and applications. He has served on the editorial boards of a few journals,

including as an Associate Editor of IEEE Transactions on Image Processing, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Transactions on Broadcasting, IEEE Signal Processing Letters, and IEEE Communications Surveys and Tutorials. He has also served as a Guest Editor of a few special issues in international journals, including as a Guest Editor in the IEEE Journal of Selected Topics in Signal Processing. He is a Fellow of the IEEE, and an IEEE CASS Distinguished Lecturer (2019-2020).

**Keynote Lecture: Substitute Training for Black-Box Adversarial Attacks: A GAN-based Approach without any Real Training Data**

Recent study shows machine learning models are readily vulnerable to adversarial attacks. Substitute attacks, typically black-box ones, employ pre-trained models to generate adversarial examples. It is generally accepted that substitute attacks need to acquire a large amount of real training data combined with model-stealing methods to obtain a substitute model. However, the real training data may be difficult (if not impossible) to be obtained for some practical tasks, e.g., in medical or financial sectors. As the first trial study, the talk will present our proposed model-stealing method that does not require any real training data. The method develops specially designed generative adversarial networks (GANs) for substitute training. The experimental results demonstrate that the substitute models produced by the proposed method without any real training data can achieve competitive performance against the baseline models trained by the same training set as in the attacked models.

## PRESENTATION PROGRAMME OVERVIEW

| DAY 1- April 16, 2021   Beijing Time, GMT+8 |   |   |
|---|---|---|
| 14:00-17:00                                 | Registration and Conference kits collection<br><i>Lobby of Mansion New Century Hotel, Binjiang Hangzhou China</i> |   |
| DAY 2- April 17, 2021   Beijing Time, GMT+8 |   |   |
| 8:30-8:40                                   | Opening Ceremony  | Garden Hall, 6 <sup>th</sup> floor<br>(6楼花园厅) /<br>Online Room ID: 943 858<br>431 |
| 8:40-9:20                                   | Keynote Speech 1<br>Yulin Wang  |   |
| 9:20-10:00                                  | Keynote Speech 2<br>Yucong Duan   |   |
| 10:00-10:20                                 | Coffee Break & Group Photo & Poster Session   |   |
| 10:20-11:00                                 | Keynote Speech 3<br>Kaizhu Huang  |   |
| 11:00-12:36                                 | Technical Session I   |   |
| 12:40-14:00                                 | Lunch   | Starlight Hall, 6 <sup>th</sup> floor<br>(6楼星光厅)                                  |
| 14:00-14:40                                 | Keynote Speech 4<br>Ce Zhu  | Garden Hall, 6 <sup>th</sup> floor<br>(6楼花园厅) /<br>Online Room ID: 943 858<br>431 |
| 14:40 -14:45                                | Break   |   |
| 14:45-16:33                                 | Technical Session II  |   |
| 16:33-16:40                                 | Break   |   |
| 16:40-17:00                                 | Poster Session  |   |
| 17:00-17:10                                 | Closing Ceremony  |   |
| 18:00-19:00                                 | Dinner  | Starlight Hall, 6 <sup>th</sup> floor<br>(6楼星光厅)                                  |
| DAY 3- April 18, 2021   Beijing Time, GMT+8 |   |   |
| 7:00-16:30                                  | One Day Tour in Hangzhou  | /   |

## INSTRUCTIONS TO PRESENTATIONS

### Materials Prepared and Provided by the Presenters:

Oral Presenter:

PowerPoint or PDF files

Duration of each Presentation (Tentatively 12 minutes)

Laptops (with MS-Office & Adobe Reader)

Poster Presenter:

Poster: color printing; Add Conference Name's Acronym on the top of poster (Such as "DMCIT 2021" and paper ID)

### Minutes of Q&A

Keynote Speech: 35 Minutes of Presentation and 5 minutes' Q&A

Oral Presenter: 10 Minutes of Presentation and 2 minutes' Q&A

### NOTICE:

- Certificate of Participation will be awarded after the conference finished via fast delivery.
- One best presentation will be selected from each session. The best one will be announced when each session ends, and will be awarded with a "Best Presentation" certificate.

## ONLINE VIDEO CONFERENCE OPERATION GUIDE VIA VOOV

### ● Conference Information:

| Time   | Theme                | Online Room ID | Link  |
|--|----------------------|----------------|---|
| <b>8:30 a.m.-17:10 p.m.</b><br>April 17, 2021<br>(GMT+8) | DMCIT & CSMO<br>2021 | 943 858 431    | <a href="https://meeting.tencent.com/s/COMFiAlbvsqy">https://meeting.tencent.com/s/COMFiAlbvsqy</a> |

### ● Testing:

All the participants can join the conference room during the testing time, the conference secretary will arrange the participants who will do the oral presentation to test one by one. (p.s. Conference ID keeps the same with testing ID)

| Testing Time  | Participate               | Testing Room ID | Link  |
|---|---------------------------|-----------------|---|
| <b>15:00 p.m.-17:00 p.m.</b><br>April 13, 2021<br>(GMT+8) | Oral & Poster<br>Speakers | 943 858 431     | <a href="https://meeting.tencent.com/s/COMFiAlbvsqy">https://meeting.tencent.com/s/COMFiAlbvsqy</a> |

### ● Operation Guide:

#### 1. Video meeting software: VooV

Download link :

A.) Chinese Version:

<https://meeting.tencent.com/download-mac.html?from=1001&fromSource=1> (Mac OS)

<https://meeting.tencent.com/download-win.html?from=1001&fromSource=1>

(Windows)

B.) International Version

<https://voovmeeting.com/download/darwin> (Mac OS)

<https://voovmeeting.com/download/windows> (Windows)

#### 2. Join the Conference:

**Method 1:** Click the Conference link, or click “Join the conference”, then input the Conference ID: 943 858 431. When you join the conference room, you need to fill in your phone number for authentication, then fill in your “Paper ID +Name” at the “Name” to join the conference.

\*Tip: Should you fail to “Join the Conference” as a visitor, we suggest you register an account by method 2, then log in and join the conference.

**Method 2:** You can register at the APP/ website (<https://www.voovmeeting.com/>), log in and join the conference by the link or tap the Conference ID.

● **Note:**

- The conference committee will **call the roll 5 minutes before** our conference, please join the conference in advance for at least 5 minutes. The conference secretaries will be waiting since 8:00.
- Please **wear headphones** during the meeting to block out the outside noise. Keeping the video on and keeping online are suggested.
- Please test the video meeting software in advance.
- During the poster session, we will upload all the poster files in the “meeting room”. For learning more about posters, you could download the files to read only. But please note that, all materials have not been published, please **respect the paper originality and copyright**.  

\*Note: Since International version does not support the function of file transmission, we recommend you to download Chinese version, then you can upload and download file smoothly. If Chinese version is not available in your country or region, you can download International version; as for e-posters, we could email you via email box once you requested.
- Please follow WeChat for Consultation (**APISE17358663189**) for more information. DMCIT & CSMO 2021 Wechat Group will update conference information in realtime.
- Should you have any further questions about this operation guide, please click <https://www.voovmeeting.com/> for help. You can also contact the conference secretary at +86-17723329879(China), +852-30506939 (Hong Kong).

## TECHNICAL SESSION

| <b>Keynote Speech Session</b><br><b>Session Chair: Prof. Yucong Duan</b> (Hainan University, China)<br><b>8:40-11:00, Apr. 17<sup>th</sup>, Saturday</b><br>Garden Hall, 6 <sup>th</sup> floor(6楼花园厅) & Online Room ID: 943 858 431 |  |   |      |
|---|--|---|------|
| Time  | No.  | Content   | Page |
| 8:40-9:20   | KN1  | Intelligent Multimedia Data Hiding: Techniques and Applications<br><i>Prof. Yulin Wang</i> , Wuhan University, China  | 2    |
| 9:20-10:00  | KN2  | Why we need Crossing “Data, Information, Knowledge and Wisdom (DIKW) modals” towards Strong Artificial Intelligence?<br><i>Prof. Yucong Duan</i> , Hainan University, China | 3    |
| 10:30-10:20   | <b>Coffee Break &amp; Group Photo &amp; Poster Session</b> |   |      |
| 10:20-11:00   | KN3  | Towards Robust and Safe Machine Learning with Adversarial Training<br><i>Prof. Kaizhu Huang</i> , Xi'an Jiaotong-Liverpool University, China                                | 4    |
| <b>Technical Session I</b><br><b>Session Chair: Prof. Yulin Wang</b> (Wuhan University, China)<br><b>11:00-12:36, Apr. 17<sup>th</sup>, Saturday</b><br>Garden Hall, 6 <sup>th</sup> floor(6楼花园厅) & Online Room ID: 943 858 431     |  |   |      |
| 11:00-11:12   | M1004  | Data augmentation using DCGAN for improved fault detection of high voltage shunt reactor<br><i>Zhu Ming</i> , Huazhong University of Science and Technology, China          | 15   |
| 11:12-11:24   | M1023  | Research on handover algorithm based on dynamic beamforming in HSR cutting scene<br><i>Zepeng Zhang</i> , Lanzhou Jiaotong University, China                                | 15   |
| 11:24-11:36   | M1024  | An opportunity downlink interference alignment algorithm based on Punch scheduling in cognitive heterogeneous networks<br><i>Na Li</i> , Lanzhou Jiaotong University, China | 16   |

|   |              |   |    |
|---|--------------|---|----|
| 11:36-11:48   | M1028        | An improved island algorithm and its application in model optimization of micro soft robot<br><i>SHAN Shi-Jiao</i> , Zhengzhou University of Light Industry, China                                  | 16 |
| 11:48-12:00   | M1029        | A Novel Channel Attention Mechanism for Human Action Recognition Based on Convolutional Kernel<br><i>Xu Teng</i> , Nanjing Institute of Technology, China   | 16 |
| 12:00-12:12   | M1033        | A Novel Channel Attention Mechanism for Human Action Recognition Based on Convolutional Kernel<br><i>Xin Shi</i> , North China University of Technology, China                                      | 17 |
| 12:12-12:24   | M2002        | Mathematical modelling of spatial position of 4-high mill housing<br><i>Li Yanglong</i> , Research Institute of Technology of Shougang Group Co., Ltd., China                                       | 17 |
| 12:24-12:36   | M2003        | Research on mathematical model of strip slip during speed increase of the bridel roll of SPM<br><i>Yong-qiang Wang</i> , Research Institute of Technology of Shougang Group Co., Ltd., China        | 17 |
| 12:40-14:00   | <b>Lunch</b> |   |    |
| <b>Keynote Session</b><br><b>Session Chair: Prof. Yucong Duan</b> (Hainan University, China)<br><b>14:00-14:40, Apr. 17<sup>th</sup>, Saturday</b><br>Garden Hall, 6 <sup>th</sup> floor(6楼花园厅) & Online Room ID: 943 858 431                       |              |   |    |
| 14:00-14:40   | KN4          | Substitute Training for Black-Box Adversarial Attacks: A GAN-based Approach without any Real Training Data<br><i>Prof. Ce Zhu</i> , University of Electronic Science and Technology of China, China | 5  |
| 14:40-14:45   | <b>Break</b> |   |    |
| <b>Technical Session II</b><br><b>Session Chair: Prof. Kwang Sik Chung</b> (Korea National Open University, Korea)<br><b>14:45-16:33, Apr. 17<sup>th</sup>, Saturday</b><br>Garden Hall, 6 <sup>th</sup> floor(6楼花园厅) & Online Room ID: 943 858 431 |              |   |    |

|             |                         |  |    |
|-------------|-------------------------|--|----|
| 14:45-14:57 | M1001                   | Comparative Analysis of Graph Databases for Git Data<br><i>Thiago Azevedo Falcão</i> , Sidia R&D Institute, Brasil   | 18 |
| 14:57-15:09 | M002                    | Design of Blockchain based e-Voting System for Vote Requirements<br><i>Seiwoong Choi</i> , Korea National Open University, Korea   | 18 |
| 15:09-15:21 | M008                    | Research on Super-Resolution Reconstruction Algorithm of Image Based on Generative Adversarial Network<br><i>Xiaohong Wang</i> , Liaoning Petrochemical University, China                | 19 |
| 15:21-15:33 | M015                    | An Auto-Contouring Method for Kidney based on SVM<br><i>Bo Li</i> , Jiangnan University, China   | 19 |
| 15:33-15:45 | M016                    | Anomaly detection algorithm based on semi-supervised collaborative strategy<br><i>Mingtian Shao</i> , University of Science and Technology of China                                      | 19 |
| 15:45-15:57 | M001                    | Studies Suspension Prevention System of Distance University using Analysis of Learning Activity and Learner's Big Data<br><i>Kwang Sik Chung</i> , Korea National Open University, Korea | 20 |
| 15:57-16:09 | M1002                   | Towards a Method to Predict the Evaluation Result in a Microlearning Context<br><i>Marta S. Tabares</i> , Universidad EAFIT, Colombia  | 21 |
| 16:09-16:21 | M1035                   | Research on the Mechanism of the Influence of E-WOM Dispersion on Consumers' Return Intention<br><i>Guangtao Long</i> , Hainan University, China   | 21 |
| 16:21-16:33 | M1036                   | The influence of electronic word-of-mouth dispersion on order Decision from the perspective of self-construal<br><i>Weili Wu</i> , Shangdong University, China                           | 21 |
| 16:33-16:40 | <b>Break</b>            |  |    |
| 16:40-17:00 | <b>Poster Session</b>   |  |    |
| 17:00-17:10 | <b>Closing Ceremony</b> |  |    |

**Poster Session**

**Session Chair: Prof. Yizhang Jiang** (Jiangnan University, China)

**16:40-17:00, Apr. 17<sup>th</sup>, Saturday**

Garden Hall, 6<sup>th</sup> floor(6楼花园厅) & Online Room ID: 943 858 431

|       |   |
|-------|---|
| M005  | Comprehensiveness, Preciseness and Interconnectedness: How to Evaluate International Public Opinion Based on Cross-media Data Mining on the Internet<br><i>Deng Tianqi</i> , Communication University of China, China |
| M010  | A Blind Recognition Algorithm of Scrambler after Convolutional Encoder<br><i>Zhongfang Wang</i> , Chinese Academy of Sciences, China / University of Chinese Academy of Sciences, China                               |
| M014  | A Novel Improved Brain Tumor Segmentation Method Using Deep Learning Network<br><i>Haoyuan Yan</i> , Jiangnan University, China   |
| M1005 | Research on pipeline defect classification based on SVM<br><i>Yunping Han</i> , Liaoning Petrochemical University, China  |
| M1007 | An Improved Gray Wolf Optimization Algorithm for Solving Disassembly Sequencing Problems<br><i>Laide Guo</i> , Liaoning Shihua University, China  |
| M1008 | Research on Analysis and Prediction of Elderly Medical Satisfaction Based on Convolutional Neural Network<br><i>Jing Gao</i> , Capital University of Economics and Business, China                                    |
| M1009 | Residual strength prediction of pipeline with single defect based on SVM algorithm<br><i>Yunping Han</i> , Liaoning Petrochemical University, China   |
| M1010 | The Design and Realization of Fire Evacuation and Rescue Applet<br><i>Zhang Yansu</i> , China People's Police University, China   |
| M1011 | Research on the application of DNA database in the investigation of combined cases<br><i>Zhao Feng</i> , Shandong University of Political Science and Law, China  |
| M1012 | Adaptive Probabilistic Broadcasting for Floating Content<br><i>X Y Shuai</i> , Taizhou University, China  |
| M1014 | Virtual Technology in New Media<br><i>Wu Qixiang</i> , Fuyang Normal University, China  |
| M1015 | Architecture design of an intelligent monitoring system for turbine filtration device<br><i>Jiangang Yi</i> , Jiangnan University, China  |
| M1016 | Construction of University Intelligent Manufacturing Learning Factory Laboratory for Emerging Engineering<br><i>Jiangang Yi</i> , Jiangnan University, China  |
| M1017 | Early identification of rice leaf blast based on hyperspectral imaging<br><i>Jianqing Yuan</i> , Harbin Finance University, China   |

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|-------|--|
| M1018 | Power monitoring system of laser welding equipment<br><i>Wen Bo</i> , Jiangnan University, China   |
| M1019 | Research on quantitative analysis method of readers' demands in University Library<br><i>Chuanjie Xu</i> , Library of Jiangnan University, China                     |
| M1021 | Design of the Fire Command Vehicle Simulation Operating Software<br><i>Zhang Yansu</i> , China People's Police University, China                                     |
| M1025 | Design of Face QR Code Recognition System based on PCA<br><i>Linglong Tan</i> , Anhui Xinhua University, China   |
| M1026 | Image compression and reconstruction based on PCA<br><i>Linglong Tan</i> , Anhui Xinhua University, China  |
| M1027 | Impact on property market from economic policy uncertainty and its spillover<br><i>Yunyi Zhang</i> , Harbin Institute of Technology (Shenzhen), China                |
| M1030 | Extraction of space domain entity and relation via word vector representation and clustering method<br><i>Zhanji Wei</i> , Space Engineering University, China       |
| M1031 | Solving manifold ambiguity by sliding the array in MIMO radar<br><i>Yucui Pang</i> , Chongqing University of Posts and Telecommunications, China                     |
| M1034 | Research on Vibration Characteristics of Zither Based on Modal Analysis<br><i>Hu Bing</i> , Xi'an University of Technology, China                                    |
| M302  | Designing and realization of VR simulation system on oilfield flooding<br><i>Ruijie Zhang</i> , Northeast Petroleum University, China                                |
| M303  | Research on Partial Pressure of Oilfield Water Injection Pipeline Network System Based on Fuzzy Logic<br><i>Ruijie Zhang</i> , Northeast Petroleum University, China |
| M304  | Study on simulation method of filtration for oily wastewater treatment in Oilfield<br><i>Baihan Cao</i> , Northeast Petroleum University, China                      |
| M2004 | Optimization analysis of suction probe for formation sampling while drilling<br><i>Chuanlong Jiang</i> , Beijing University of Chemical Technology, China            |
| M2005 | Finite element simulation and shape optimization of acoustic horn<br><i>Kaidong Wang</i> , Engineering University of PAP, China                                      |

## ABSTRACT

| Technical Session I |   |
|---------------------|---|
| Time                | Content   |
| 11:00-11:12         | <p><b>M1004:</b> Data augmentation using DCGAN for improved fault detection of high voltage shunt reactor</p> <p><b>Presenter:</b> <i>Zhu Ming</i>, Huazhong University of Science and Technology, China</p> <p><b>Abstract:</b> High voltage shunt reactor is an important equipment of power transmission systems. The accurate assessment of their operating status and the timely and correct diagnosis of faults and defects concern the operation safety of the entire grid. Health assessment of high voltage shunt reactors based on vibration signal, which can be used to characterize the hidden troubles of it, is a topic widely studied in deep learning and fault diagnosis. A large number of samples are needed to train the deep learning model, but it is not easy to acquire enough fault samples in the actual scene. In this paper, we utilize a Deep Convolutional Generative Adversarial Networks (DCGAN) to generate synthetic fault samples and enlarge the fault dataset to train the Convolution Neural Network (CNN) fault detection model. Results reveal that the performance through the CNN model can be improved by 3% with the synthetic samples generated by DCGAN, which is better than that of traditional Synthetic Minority Oversampling Technique (SMOTE) algorithm.</p> |
| 11:12-11:24         | <p><b>M1023:</b> Research on handover algorithm based on dynamic beamforming in HSR cutting scene</p> <p><b>Presenter:</b> <i>Zepeng Zhang</i>, Lanzhou Jiaotong University, China</p> <p><b>Abstract:</b> High-speed train passes through the cutting terrain, signal propagation is significantly affected by the steep sides, resulting in a high probability of handover interruption. To solve this problem, this paper proposes a location-assisted dynamic beamforming handoff algorithm. This solution uses the vehicle-mounted GPS and the arrival angle of the incoming wave to determine the location of the Mobile Relay Node (MRN) and ensure the stability of signal transmission during the operation of the train in the overlapping area. According to the path loss of the High-speed Railway (HSR) cutting scene, calculate the Handover Interruption Probability (HIP), the Handover Trigger Probability (HTP) and the Handover Success Probability (HSP). The simulation results have showed that the proposed algorithm has lower HIP and higher HSP, compared with the traditional handover solution. It ensures the stability of handover in complex scenes, and has better performance in improving the handover efficiency of HSR communication systems.</p>                            |

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| 11:24-11:36 | <p><b>M1024:</b> An opportunity downlink interference alignment algorithm based on Punch scheduling in cognitive heterogeneous networks</p> <p><b>Presenter:</b> <i>Na Li</i>, Lanzhou Jiaotong University, China</p> <p><b>Abstract:</b> For the hierarchical structure and frequency re-use of cognitive heterogeneous networks, it is inevitable to deal with interference effectively while gaining capacity gain. In this paper, we proposed the alignment of opportunity interference based on cognitive heterogeneous networks. First of all, we designed a pair of pre-coded and decoded matrices to eliminate the co-tier interference, and then the proposed user scheduling algorithm can get more interference-free size, but also in terms of fairness and system capacity and other performance improvements. Simulation results show that the proposed ODIA schemes outperform the existing interference management techniques in terms of interference, system capacity, and fairness of system resource allocation.</p>  |
| 11:36-11:48 | <p><b>M1028:</b> An improved island algorithm and its application in model optimization of micro soft robot</p> <p><b>Presenter:</b> <i>SHAN Shi-Jiao</i>, Zhengzhou University of Light Industry, China</p> <p><b>Abstract:</b> Aiming at the shortcomings of the original island algorithm (IA), which has a slow convergence speed and is prone to local optimality, the island algorithm with the characteristics of Levy flight (LevyIA) was proposed by introducing the Levy flight strategy, which replaced the position update method in the original algorithm and made use of the occasional long jump of Levy flight strategy to jump out of the local optimal solution. The simulation test of the improved algorithm is carried out with 6 test functions, and the experimental results show that the improved algorithm LevyIA can effectively solve the problems of slow convergence speed and local optimization of island algorithm. For the micro-soft robot model with multi-mode movement, IA and LevyIA algorithms were used to optimize the size of the robot and the appropriate magnetic field intensity needed to drive the robot to deform and move. Finally, the experimental data of swimming speed of the robot obtained by simulation shows that, among the three optimization results obtained by LevyIA algorithm and IA algorithm, LevyIA algorithm can make the robot swim faster when moving forward with minor perturbations.</p> |
| 11:48-12:00 | <p><b>M1029:</b> Modeling and analysis of millimeter wave 5G cellular networks based on 3-D spatial model</p> <p><b>Presenter:</b> <i>Xu Teng</i>, Nanjing Institute of Technology, China</p> <p><b>Abstract:</b> Wireless cellular networks are usually modeled and analysed in two-dimensional (2-D) space. The 2-D model is suitable for the analysis of cellular networks in suburb area but not for the dense millimeter cellular networks in the urban environments. In this work, a three-dimensional (3-D) model based on stochastic geometry is proposed, in which the distribution of base stations (BSs) are modelled as a 3-D Poisson point process (PPP), the blockage is modelled as line of sight (LOS) ball, the shadowing of wireless channel is modelled as Nakagami-m fading, and both the transmitters and receivers obtain maximum gain</p>  |

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|             | <p>of beamforming by a large array of antennas. Based on the model, the distribution of the distance between the target user and the nearest the BS is given, and then the average coverage probability and transmission rate of the networks are derived. We analyse the impact of parameters such as path loss, cell radius on average coverage and the relationship between BS density and average rate through Monte Carlo simulation. The simulation results show that in the dense urban environment, the performance of 3-D PPP model of the millimeter wave cellular network analysis is more precise.</p>   |
| 12:00-12:12 | <p><b>M1033:</b> A Novel Channel Attention Mechanism for Human Action Recognition Based on Convolutional Kernel</p> <p><b>Presenter:</b> <i>Xin Shi</i>, North China University of Technology, China</p> <p><b>Abstract:</b> With the improvements of computer performance, deep learning has gradually expanded from 2D image tasks to 3D video tasks. Human action recognition is a typical 3D video task, which can achieve category classification by capturing human action characteristics. However, most of the videos are processed by encoding and decoding technology at current, thus the motion details are blurry, which makes it difficult for human action recognition. To solve this problem, we utilize the attention mechanism to "ignore" the blurred feature caused by video coding and decoding technology. Therefore, we hope to embed the attention mechanism in 3D spatiotemporal CNN to overcome this problem. Compared with 3D CNN, the effectiveness of our method is verified on UCF101 and HMDB51 dataset.</p>  |
| 12:12-12:24 | <p><b>M2002:</b> Mathematical modelling of spatial position of 4-high mill housing</p> <p><b>Presenter:</b> <i>Li Yanglong</i>, Research Institute of Technology of Shougang Group Co., Ltd., China</p> <p><b>Abstract:</b> Nowadays with the rise of laser measure technique, the laser tracker is applied to measure and calibrate the spatial position of mill equipment in cold and hot rolling mills. How to analyze the spatial state of mill housing with the amount measured data via laser tracker is the key to the problem. However, there is still no effective model to study the spatial position of mill housing. In this paper, a comprehensive mathematical model of the spatial position of 4-high mill housing was established. The least square method was used to fit the liner plates. It can be used to calculate the spatial distance and inclination relationship of each liner plate. The model was validated by the measured data of the 4-high mill housing via laser tracker. The calculated results of the model were consistent with those of the spatial analysis software, and the relative deviation was less than 0.01%. The median and opening value and inclination state of the mill liner plates were further studied. The ability and efficiency of data analysis could be improved based on this model, which has good prospect in on-site application.</p> |
| 12:24-12:36 | <p><b>M2003:</b> Research on mathematical model of strip slip during speed increase of the bridel roll of SPM</p> <p><b>Presenter:</b> <i>Yong-qiang Wang</i>, Research Institute of Technology of Shougang Group Co., Ltd., China</p>   |

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|                                    | <p><b>Abstract:</b> For the sake of research the mechanism of relative slipping happens between the bridle roll and strip When the speed of the skin pass mill (SPM) is increased, a mathematic model for relative sliding between the strip steel and the bridle roll is built and at the same time, raising a quantitative parameter named “the strip slip risk ratio”. On the basis of this model, a lot of factors that affect the skid are analyzed, such as friction coefficient, front and rear tension, velocity, acceleration, coiling angle, etc. The results show that increasing friction coefficient, decreasing tension difference, decreasing velocity and acceleration will reduce the slip risk of sliding strip. According to the calculation results, the process parameters were optimized. After application of measures, the next few months Sliding problems are significantly reduced.</p>   |
| <p><b>Technical Session II</b></p> |  |
| <p>14:45-14:57</p>                 | <p><b>M1001:</b> Comparative Analysis of Graph Databases for Git Data<br/><b>Presenter:</b> <i>Thiago Azevedo Falcão</i>, Sidia R&amp;D Institute, Brasil</p> <p><b>Abstract:</b> In past decades, the requirements that database management systems (DBMSs) must achieve have become increasingly stringent (speed, data volume). This increase in complexity led to the development of a wide range of non-relational databases strategies, each one suited for specific scenarios. In this context, Graph Database Management Systems (GDBMSs) became popular to represent social networks and other domains that can be intuitively represented as graph-like structures. In this paper, we represent Version Control System data, specifically Git, from a large software project in a graph structure and compared three popular GDBMSs: Neo4j, JanusGraph and Dgraph. We evaluated read/write operations performance for common activities, such as inserting new commits into the graph and retrieving the complete commit history of a specific project. With this contribution, researches and engineers may choose, assertively, the better solution for their needs.</p>   |
| <p>14:57-15:09</p>                 | <p><b>M002:</b> Design of Blockchain based e-Voting System for Vote Requirements<br/><b>Presenter:</b> <i>Seiwoong Choi</i>, Korea National Open University, Korea</p> <p><b>Abstract:</b> Voting refers to the submission of an election or an opinion on a specific matter by expressing an intention on the ballot to a certain place. The existing voting method has the burden of counting time and cost. For this reason, research has been conducted to introduce an e-voting system. However, despite the advantages of e-voting, it is not widely used due to the risk of manipulation of voting results and various requirements. Recently, in order to reduce the risk of data manipulation, research is being conducted to apply the blockchain, a technology that guarantees data integrity, to e-voting. Blockchain guarantees the integrity of data, but has a weakness in secrecy. This paper applies the critical encryption technique to the blockchain and satisfies the requirements for voting such as verifiability, anonymity, fairness, non-reusability, competence, safety, transparency, and non-ticketing. We propose a system design and implementation method. The proposed blockchain-based e-voting system provides voter anonymity by issuing a voter certificate based on a</p> |

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|             | <p>blockchain address. The e-voting election monitoring committee generates a threshold group encryption key, and the proposed blockchain-based e-voting system guarantees confidentiality by a threshold group encryption algorithm during the voting process. The voting result is encrypted through a homomorphic encryption algorithm and stored in the blockchain. Thus, the released voting results ensure safety, confidentiality, transparency, and non-vote ticketing. In addition, the proposed blockchain-based e-voting system guarantees the unity and competence of voting through the blockchain's smart contract.</p>  |
| 15:09-15:21 | <p><b>M008:</b> Research on Super-Resolution Reconstruction Algorithm of Image Based on Generative Adversarial Network</p> <p><b>Presenter:</b> <i>Xiaohong Wang</i>, Liaoning Petrochemical University, China</p> <p><b>Abstract:</b> Image super-resolution is to use a series of algorithms to improve the original image resolution. The process of obtaining high-resolution image through some low-resolution images is image super-resolution reconstruction technology. There are two main research fields in super-resolution reconstruction, one is to restore the real details of the image, and the other is to not require too much detail, and only pay attention to the overall visual effect of the image. In this paper, an improved super-resolution reconstruction algorithm based on generative adversarial network is proposed. The network model and loss function are improved and optimized. The auxiliary VGG-19 network is used to extract the image features, and the extended convolution is used to expand the receptive field, which makes the image have a better reconstruction effect. Using DIV2k data set as training set and set5, set14, bsd100 data sets as test set, a series of experimental analysis is to prove the feasibility of the procedure method. Compared with the existing mainstream models, the perceptual effect of the image has been improved.</p> |
| 15:21-15:33 | <p><b>M015:</b> An Auto-Contouring Method for Kidney based on SVM</p> <p><b>Presenter:</b> <i>Bo Li</i>, Jiangnan University, China</p> <p><b>Abstract:</b> In adaptive radiotherapy planning, the contour map of the treatment target area is still the most difficult problem. Usually this work is done by a professional radiologist oncologist, which is very time-consuming and labor-intensive. In order to solve this problem, this paper proposes an automatic contour method based on support vector machine. Experiments were conducted on the lower abdomen MR data set of eight patients. In the experiment, the simulated data was only used to train the classifier, and the treatment day images were used to evaluate the performance of the classifier. DSI was used to compare the manual contour and automatic contour of the kidney. The experiment showed that, The automatic contour method based on support vector machine has better classification performance than most classification algorithms. Among the eight sets of results, the DSI value of the six sets of results is 1, and the smallest DSI value is also greater than 9.423.</p>   |
| 15:33-15:45 | <p><b>M016:</b> Anomaly detection algorithm based on semi-supervised collaborative strategy</p> <p><b>Presenter:</b> <i>Mingtian Shao</i>, University of Science and Technology of China</p>   |

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|                    | <p><b>Abstract:</b> This paper analyzes the existing credit card anomaly detection classification algorithms, summarizes the parts that can be improved, and proposes an outlier detection classification algorithm based on the unsupervised algorithm and active learning decision trees. Since the 1990s, machine learning technology has been widely used in the field of credit card fraud detection. Among them, the supervised learning expert system used for classification tends to perform better than the unsupervised learning model. The good performance of supervised learning methods requires high learning costs. The training process is usually serial or partially parallel. Therefore, the computing power, time, and manual labeling cost for learning need to be considered as algorithm selection factors. However, manual labeling usually involves the counter or ATM sending information to the back-end large-value transaction authorization department for manual review, and then the employee judges whether it is an abnormal transaction based on experience. This rigorous process will produce a very large time delay. Combining this feature, this article selects the appropriate unsupervised outlier detection method, selects part of the training data, and uses a small part of the more valuable data for annotation learning. Experiments show that this method can improve the accuracy while saving the time cost of training. Compared with the training time, the added time of classification is negligible.</p>   |
| <p>15:45-15:57</p> | <p><b>M001:</b> Studies Suspension Prevention System of Distance University using Analysis of Learning Activity and Learner's Big Data</p> <p><b>Presenter:</b> <i>Kwang Sik Chung</i>, Korea National Open University, Korea</p> <p><b>Abstract:</b> Due to the increase in withdrawals and temporary absences of students from changes in the external environment, distance learning universities are trying to establish various policies and increase the number of enrolled students, and at the same time, are trying to establish various policies and efforts to increase the enrollment. However, it is difficult to systematically diagnose the main cause of the interruption of students, and prior research efforts related to the problem of student suspension in distance learning universities have accumulated, since there are various reasons for the student suspensions.</p> <p>In the proposed distance university Studies Suspension Prevention System (SSPS), distance university students can use two types of learning analytics services. In order to analyze learning activities, we propose the asynchronous learning activity analysis module, and the synchronous learning activity analysis module. In the asynchronous analysis module and synchronous analysis module, quiz, LINE group chatting &amp; discussion forum communication, and online lecture has a learning state score according to the lecturer's directions. Learning activities in the learning management system have three kinds of learning states, passive activity state, negative activity state, and medium activity state. Learning activity states are used to predict the student learning state. In the proposed Student Support System, there are two types of learning support services connected to the smart learning portal server. One is the intelligent distance university chatbot service for personalized chatting and caring services. The other is push message services for alarm, warning, notices, and alerts, such as dashboard service.</p> |

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| 15:57-16:09 | <p><b>M1002:</b> Towards a Method to Predict the Evaluation Result in a Microlearning Context</p> <p><b>Presenter:</b> <i>Marta S. Tabares</i>, Universidad EAFIT, Colombia</p> <p><b>Abstract:</b> This paper presents a method for predicting the evaluation results of learners interacting with a context-aware microlearning system. We use ASUM-DM to guide different data analytics tasks, including applying a genetic algorithm that selects the prediction's highest weight features. Then, we apply Machine Learning models like Random Forest, Gradient Boosting Tree, Decision Tree, SVM, and Neural Networks to train data and evaluate the context's effects, either success or failure of the learner's evaluation. We are interested in finding the model of significant context-influence to the learner's evaluation results. The Random Forest model provided an accuracy of 94%, which was calculated with the cross-validation technique. Thus, it is possible to conclude that the model can accurately predict the evaluation result and relate it to the learner context. The model result is a useful insight for sending notifications to the learners to improve the learning process. We want to provide recommendations about learner behavior and context and adapt the microlearning content in the future.</p>                                       |
| 16:09-16:21 | <p><b>M1035:</b> Research on the mechanism of the influence of e-WOM dispersion on consumers return intention</p> <p><b>Presenter:</b> <i>Guangtao Long</i>, Hainan University, China</p> <p><b>Abstract:</b> Based on the attribution theory, this paper constructs a conceptual framework for the influence of the dispersion of electronic word of mouth on consumers' return intentions, focusing on the impact of the interaction between robot review and e-WOM dispersion on consumers' attribution selection, the study uses situational experiments to collect data and verify hypotheses. The study found that: (1) Consumers are more willing to return goods when faced with high-dispersion electronic word of mouth; (2) When facing high-dispersion electronic word of mouth, consumers tend to attribute it to existing reviewers; (3) The influence of word-of-mouth dispersion on attribution selection is regulated by robot reviews. For the word-of-mouth dispersion of robot reviews, the tendency of word-of-mouth dispersion to be attributed to product reasons becomes greater. The research has laid a theoretical foundation for further exploring the influence of e-WOM dispersion on consumers' return intentions, and also provides theoretical guidance and reference for enterprises to rationally use Internet robots and reduce return rates.</p> |
| 16:21-16:33 | <p><b>M1036:</b> The influence of electronic word-of-mouth dispersion on order Decision from the perspective of self-construal</p> <p><b>Presenter:</b> <i>Weili Wu</i>, Shangdong University</p> <p><b>Abstract:</b> Hotel managers pay particular attention to factors that influence consumer decision making when manage online orders. Therefore, based on attribution theory, this paper investigates the mechanism behind the influence of hotel electronic word-of-mouth dispersion on consumer order decision. Results show that (1) discrete electronic word-of-mouth negatively impact the order</p>   |

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| <p>decision of consumers; (2) attribution selection could mediate the effect of electronic word-of-mouth dispersion on order decision of consumers; (3) independent self-construal weakens the negative effect of electronic word-of-mouth dispersion on order decision of consumers; and (4) consumers with high endowment reduce the tendency of electronic word-of-mouth dispersion due to the presence of online supporter reviews. Findings from this study not only contribute to electronic word-of-mouth dispersion studies in the field of consumer behaviour, but also provide theoretical guidance and reference for hotel order management based on electronic word-of-mouth.</p> |
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**Hangzhou Xiaoshan International Airport—Mansion New Century Hotel, Binjiang Hangzhou China**

**A、地铁七号线→地铁六号线→地铁一号线(Metroline 7→Metroline 6→Metroline 1)**

萧山国际机场站（奥体中心方向）→奥体中心站（莲花西路方向，站内换乘 6 号线）→江陵路站（湘湖方向，站内换乘 1 号线）→滨河路站（B 口出）（约 1 小时 6 分钟）

**B、出租车 (Taxi)**

约 43 分钟，24.5 公里

About 43 minutes and 24.5 kilometres

#### 2、萧山西站——杭州滨江开元名庭酒店

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**A、公交车 315 路（直达）(Bus No.315)**

五七路口站→春波小区站（约 52 分钟）

**B、地铁二号线→地铁五号线→地铁一号线(Metroline 2→Metroline 5→Metroline 1)**

杭发厂站（良渚方向）→人民广场站（金星方向，站内换乘）→滨康路站（临平方向，站内换乘）→滨河路站（B 口出）（约 52 分钟）

**C、出租车 (Taxi)**

约 21 分钟，7.5 公里

About 21 minutes and 7.5 kilometres

#### 3、杭州东站——杭州滨江开元名庭酒店

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**A、地铁一号线 (Metroline 1)**

杭州东站（湘湖方向）→滨河路站（B 口出）（约 45 分钟）

**B、出租车 (Taxi)**

约 33 分钟，16.2 公里

About 33 minutes and 16.2 kilometres

