



The 7th International Conference on Information and  
Communication Technologies for Disaster Management

3-5 Dec. 2021, Hangzhou, China (Hybrid)

# ICT-DM 2021

The 7th International Conference on Information and  
Communication Technologies for Disaster Management

<http://ict-dm.org>

<http://ictdm.cn>

Hangzhou, China  
December 3 – 5, 2021

浙江傳媒學院  
COMMUNICATION  
UNIVERSITY  
OF ZHEJIANG



# Program-at-a-glance

All in Beijing Time (CST+8)

| Day 1 - Dec. 3       |  | Day 2 - Dec. 4       |   | Day 3 - Dec. 5       |  |
|----------------------|--|----------------------|---|----------------------|--|
| 9:00<br>--<br>10:00  | <b>Opening</b>   | 9:00<br>--<br>10:40  | <b>Session 2</b><br>AI in disaster management   | 9:00<br>--<br>10:20  | <b>Session 5</b><br>Communication infrastructures, technologies and services |
| 10:00<br>--<br>11:00 | <b>Keynote 1</b><br>Characteristics of COVID-19 by Temporal-spatial Data<br><i>Prof. Jiming Chen</i> | 11:00<br>--<br>12:00 | <b>Keynote 3</b><br>On Deep Learning-based Indoor Fingerprinting<br><i>Prof. Shiwen Mao</i> | 11:00<br>--<br>12:00 | <b>Session 6</b><br>Human-system interactive information extraction          |
| 11:00<br>--<br>12:00 | <b>Keynote 2</b><br>TinyML Systems for Edge Intelligence in Smart City<br><i>Prof. Song Guo</i>      |                      |   |                      |  |

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|----------------------|--|----------------------|---|----------------------|---------------------------------|
| 14:00<br>--<br>16:40 | <b>Session 1</b><br>Mobile and wireless communication networks | 14:00<br>--<br>16:40 | <b>Session 3</b><br>Big data analytics in disaster management | 14:00<br>--<br>16:40 | <b>Session 7</b><br>Data mining |
|----------------------|--|----------------------|---|----------------------|---------------------------------|

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| 18:00<br>--<br>19:40 | <b>Session 4</b><br>Crowd sourcing & Collective Intelligence |
|----------------------|--|

## Welcome Letter from ICT-DM 2021 General Co-Chairs



Celimuge Wu

The University of Electro-Communications  
Japan



Jiefang Zhang

Communication University of Zhejiang  
China



Rajendra Akerkar

Western Norway Research Institute  
Norway

The 7th International Conference on Information and Communication Technologies for Disaster Management (ICT-DM 2021) will be held in Hangzhou, China, in December 2021. The conference is hosted by Communication University of Zhejiang, in cooperation with committees and supporting organizations. Considering the current situation of COVID-19 Pandemic, technical presentations will be conducted using an online approach.

ICT-DM 2021 aims to bring together academics and practitioners who are involved in emergency services, ad hoc planning, disaster recovery, etc., to learn about the latest research developments, share experiences and information about this area, and develop recommendations. The ICT-DM 2021 conference program will be split into 7 technical sessions along with 3 keynote speeches. We invite you to join the Conference.

The ICT-DM 2021 community is very grateful to the IEEE and the IEEE Communication Society for their technical sponsorship. ICT-DM 2021 is also grateful to Communication University of Zhejiang for the financial support and for the dedication of the event team. Finally, we wish you will find the ICT-DM 2021 an exciting, joyful and fruitful experience.

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## Organizing Committee

### General co-chairs

- Celimuge Wu, The University of Electro-Communications, Japan
- Jiefang Zhang, Communication University of Zhejiang, China
- Rajendra Akerkar, Western Norway Research Institute, Norway

### TPC co-chairs

- Osamu Uchida, Tokai University, Japan
- Rongpeng Li, Zhejiang University, China
- Zhi Liu, The University of Electro-Communications, Japan

### TPC Track co-chairs

#### Track 1: The use of ICT in the management of epidemics or pandemics

- Luca Chiaraviglio, University of Rome Tor Vergata, Italy

#### Track 2: AI, Big data, ontologies and analytics for crisis management

- Xinzhou Cheng, China Unicom, China
- Lexi Xu, China Unicom, China

#### Track 3: Risk assessment, cyber security and real-time systems

- Changyang She, The University of Sydney, Australia
- Chengchao Liang, Chongqing University of Posts and Telecommunications, China

#### Track 4: Crowdsourcing and social media for disaster & crisis management

- Sha Zhao, Zhejiang University, China
- Yi Zhong, Huazhong University of Science and Technology, China

#### Track 5: Geographic Information Systems (GIS) for Disaster Management

- Yinan Qi, Zhejiang Lab, China
- Keisuke Utsu, Tokai University, Japan

#### Track 6: IoT and wireless communications for disaster management

- Keping Yu, Waseda University, Japan
- Qiyue Li, Hefei University of Technology, China

### Poster & Demo co-chairs

- Junbo Wang, Sun Yat-sen University, China
- Wei Zhao, Anhui University of Technology, China

### Publication chair

- Xun Shao, Kitami Institute of Technology, Japan

### Local co-chairs

- Dingguo Yu, Communication University of Zhejiang, China
- Lei Liu, Xidian University, China
- Siri Guleng, Hohhot Minzu College, China

### **Publicity co-chairs**

- Yangjie Cao, Zhengzhou University, China
- Xin Liu, Dalian University of Technology, China
- Jack Hodgkiss, Manchester Metropolitan University, UK
- Xianfu Chen, VTT Technical Research Centre of Finland, Finland
- Rui Yin, Zhejiang University City College, China
- Zhaoyang Du, The University of Electro-Communications, Japan

### **Web chair**

- Xiaoyu Miao, Communication University of Zhejiang, China

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## **Steering Committee**

### **Steering committee co-chairs**

- Nadia Nouali-Taboudjemat, CERIST, Algeria
- Yassine Hadjadj-Aoul, University of Rennes 1, France
- Aris M. Ouksel, University of Illinois at Chicago, USA
- Celimuge Wu, University of Electro-Communications, Japan

### **Steering committee members**

- Ahcène Bendjoudi, EXFO, Canada
- Said Yahiaoui, CERIST, Algeria
- Soufiène Djahel, Manchester Metropolitan University, UK

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## **TPC Members**

Rifaat Abdalla, Sultan Qaboos University

Nassima Bouadem, University of BEJAIA

Kamel Boukhalifa, USTHB

Elena Cinque, Radiolabs Consortium

Antonio De Nicola,

Gladys Diaz, Sorbonne Paris Nord University

Duy Tan Do, Ho Chi Minh City University of Technology and Education

Surya Durbha, I. I. T. Bombay

Anna Förster, ComNets, University of Bremen

University

Pascal Lorenz, University of Haute Alsace

Pantelis Frangoudis, TU Wien

Frank Fuchs-Kittowski, Hochschule für Technik und Wirtschaft Berlin & Fraunhofer FOKUS

Martin Gutierrez, Universidad Diego Portales

Masafumi Hashimoto, Cyber University

Intesab Hussain, Nawabchah University

Satoru Izumi, National Institute of Technology, Sendai College

Chaker Abdelaziz Kerrache, University of Laghouat

Muhammad Khalid, Northumbria

Pietro Manzoni, Universitat Politècnica de València

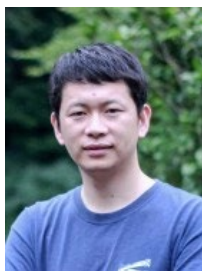
Francisco Martinez, University of

Zaragoza  
Hamid Mcheick, University of Quebec  
at Chicoutimi  
Nadia Nouali-Taboudjemat, CERIST  
Al-Sakib Khan Pathan, Independent  
University  
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Erika Rosas, Universidad Tecnica

Federico Santa Maria  
Sudip Roy, IIT Roorkee  
Kazuhiko Shibuya, Tokyo  
Metropolitan University  
Kamal Singh, Telecom Saint Etienne  
/ University Jean Monnet  
Chakkaphong Suthaputchakun,  
Bangkok University  
Hiroaki Tobita, AIIT

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## Keynotes



### **Analysis on Characteristics of COVID-19 by Temporal-spatial Data**

10am-11am, Beijing Time, 3 Dec. 2021

Prof. Jiming Chen  
Zhejiang University, Hangzhou, China

Jiming Chen (IEEE M'08-SM'11-F'19) received the Ph.D. degree in Control Science and Engineering from Zhejiang University in 2005. He is a Changjiang Scholars Chair Professor with the Department of Control Science and Engineering, the vice Dean of the Faculty of Information Technology, Zhejiang University. He serves on the multiple editorial boards of IEEE Transactions, and the General Co-chairs for IEEE RTCSA'19, IEEE Datacom'19, etc. His research interests include IoT, bigdata and networking, networked control, cyber security. He is an IEEE VTS Distinguished Lecturer and a Fellow of IEEE.

### **TinyML Systems for Edge Intelligence in Smart City**



11am-12am, Beijing Time, 3 Dec. 2021

Prof. Song Guo  
The Hong Kong Polytechnic University

Song Guo is a Full Professor in the Department of Computing at The Hong Kong Polytechnic University. He also holds a Changjiang Chair Professorship awarded by the Ministry of Education of China. His research interests are mainly in the areas of edge AI, big data and machine learning, mobile computing, and distributed systems. He is the recipient of over a dozen Best Paper Awards from IEEE/ACM conferences, journals and technical committees. He is the Editor-in-Chief of IEEE Open Journal of the Computer Society (CS), a member of CS Fellow Evaluation Committee, and the Chair of IEEE Communications Society (ComSoc) Space and Satellite Communications Technical Committee. He was an IEEE ComSoc Distinguished Lecturer and a member of IEEE ComSoc Board of Governors. He has also served as chairs of organizing and technical committees of many IEEE/ACM conferences, workshops and symposia. Prof. Guo is an IEEE Fellow, a Highly Cited Researcher (Web of Science), and an ACM Distinguished Member.

### **On Deep Learning-based Indoor Fingerprinting**



11am-12am, Beijing Time, 4 Dec. 2021

Prof. Shiwen Mao  
Auburn University

Shiwen Mao received his Ph.D. in electrical engineering from Polytechnic University, Brooklyn, NY in 2004. He is a professor and Earle C. Williams Eminent Scholar Chair, and Director of the Wireless Engineering Research and Education Center at Auburn University. His research interest includes wireless networks, multimedia communications, and smart grid. He is on the editorial board of several IEEE and ACM journals. He is a Distinguished Lecturer of IEEE Communications Society and IEEE Council of RFID. He received the IEEE ComSoc TC-CSR Distinguished Technical Achievement Award in 2019, the Auburn University Creative Research & Scholarship Award in 2018, and NSF CAREER Award in 2010. He is a co-recipient of the 2021 IEEE Communications Society Outstanding Paper Award, the IEEE Vehicular Technology Society 2020 Jack Neubauer Memorial Award, the 2004 IEEE Communications Society Leonard G. Abraham Prize in the Field of Communications Systems, and several IEEE conference best paper/demo awards. He is a Fellow of the IEEE.

**Abstract:**

With the fast growing demand of location-based services in indoor environments, indoor positioning based on fingerprinting has attracted considerable interest due to its high accuracy. In this talk, we present our recent work on applying deep learning for fingerprinting based indoor localization where Channel State Information (CSI), such as amplitude and phase difference information, are exploited for location estimation. Specifically, we present the design of ResLoc, which employs bi-modal CSI tensor data to train a deep residual sharing learning network. We then present DeepMap, a deep Gaussian process based approach for indoor radio map construction and location estimation, aiming to greatly reduce the training burden. Experimental results are presented to confirm that with deep learning and CSI, the proposed system can effectively reduce location error compared with existing methods in representative indoor environments.



## Programs

### Friday, Dec. 3

#### **Friday, Dec. 3 14:00 – 15:40**

Session 1: Mobile and wireless communication networks

S1.1 Capacity Prediction for Wireless Networks Based on Convolutional Neural Network

*Ping Hu, Yi Zhong and Yuchen Lai (Huazhong University of Science and Technology, China)*

S1.2 Deep Reinforcement Learning Based Mode Selection for Coexistence of D2D-U and Wi-Fi

*Ganggui Wang and Celimuge Wu (The University of Electro-Communications, Japan); Tsutomu Yoshinaga (University of Electro-Communications, Japan); Wugedele Bao (Hohhot Minzu College, China); Rui Yin (Zhejiang University City College, China & KwaZulu-Natal University, South Africa)*

S1.3 Communication resource allocation in platooning management based on C-V2X with spectrum sensing

*Wei Gao (BUPT, China); Celimuge Wu (The University of Electro-Communications, Japan); Baozhu Li (University of Jinan, China); Siri Guleng (Hohhot Minzu College, China)*

S1.4 A Grid and Vehicle Density Prediction-Based Communication Scheme in Large-scale Urban

*Bingyi Liu and Yang Sheng (Wuhan University of Technology, China); Xun Shao (Kitami Institute of Technology, Japan); Yusheng Ji (National Institute of Informatics, Japan)*

S1.5 A Reinforcement Learning based Edge Cloud Collaboration

*Hiroki Kobari and Zhaoyang Du (University of Electro-Communications, Japan); Celimuge Wu and Tsutomu Yoshinaga (The University of Electro-Communications, Japan); Wugedele Bao (Hohhot Minzu College, China)*

## Saturday, Dec. 4

### **Saturday, Dec. 4 9:00 – 10:40**

Session 2: AI in disaster management

S2.1 Resource Management in MEC based Multi-Robot Cooperation Systems  
*Yineng Shen (Zhejiang University, China); Rui Yin (Zhejiang University City Colle, China & KwaZulu-Natal University, South Africa); Huawei Zhu (Zhejiang University City Colle, China); Xianfu Chen (VTT Technical Research Centre of Finland, Finland); Celimuge Wu (The University of Electro-Communications, Japan)*

S2.2 Satellite Data Transmission Method for Deep Learning-Based AutoEncoders  
*Yile Fan, Yuanpeng Li, Naiyang Xue and Dan Ding (Aerospace Engineering University, China)*

S2.3 Mobile Network User Perception Prediction based on Random Forest Algorithm  
*Jinjian Qiao (China Unicom Research Institute); Jiajia Zhu and Xinzhou Cheng (China Unicom Network Technology Research Institute, China); Lexi Xu (China Unicom Research Institute & Queen Mary University of London, China); Feibi Lyu (Research Institute, China United Network Communications Corporation, China); Liang Liu (China Unicom Network Technology Research Institute, China); Zhaoning Wang (Beijing University of Posts and Telecommunications, China); Zixiang Di (China Unicom, China)*

S2.4 In-Network Aggregation for Privacy-Preserving Federated Learning  
*Fahao Chen, Peng Li and Toshiaki Miyazaki (The University of Aizu, Japan)*

S2.5 Revisit Gaussian Embedding: an Effective Method for Scalable Knowledge  
*Wei He (Yunnan Open University, China); Qiao Li (Anhui University of Technology, China); Wei Zhao (Anhui University of Technology (Xiushan) & School-Teacher, China)*

### **Saturday, Dec. 4 14:00 – 15:40**

Session 3: Big data analytics in disaster management

S3.1 Big Data assisted Strategy for Resuming of Work and Production during COVID-19

*Jie Gao (China Unicom Network Technology Research Institute, China); Zhendong Han (China United Network Communications Corporation, China); Xinzhou Cheng and Tao Zhang (China Unicom Network Technology Research Institute, China); Lexi Xu (China Unicom Research Institute & Queen Mary University of London, China); Chen Cheng (China Unicom Network Technology Research Institute, China); Yunyun Wang and Xin He (China United Network Communications Corporation, China); Yang Wu (Research Institute, China United Network Communications Corporation, China)*

### S3.2 Distributed Systems Anomaly Detection Based on Log

*Fenggang Lai, Ruiying Cheng and Pan Zhang (State Grid Information and Telecommunication Co., Ltd., China); Peng Xu (Beijing University of Posts and Telecommunications, China)*

### S3.3 5GC Network and MEC UPF Data Acquisition Scheme Research

*JingHui Li (China Unicom Research Institute, China); Xiaodong Cao (China Unicom Network Technology Research Institute, China); ShengLi Guo (Network Intelligent Operations Research Center, China); RunSha Dong (China Unicom, China); Chuntao Song (Network Technology Research Institute, China); TianYi Wang and ZeLin Wang (China Unicom, China)*

### S3.4 Research on Coverage Ability Assessment of High and Low Frequency based on Machine Learning

*Tian Xiao and Guanghai Liu (China Unicom Research Institute, China); Guoping Xu (China Unicom, China); Yi Li (China Unicom Research Institute, China); Xinzhou Cheng (China Unicom Network Technology Research Institute, China); Lexi Xu (China Unicom Research Institute & Queen Mary University of London, China); Chen Cheng (China Unicom Network Technology Research Institute, China); Shiyu Zhou (China Unicom Research Institute, China)*

### S3.5 Cell Load and Resource-aware Flow Shifting Scheme based on Heterogeneous Mobile Networks Data

*Lexi Xu (China Unicom Research Institute & Queen Mary University of*

*London, China); Gaofeng Cui (Beijing University of Posts and Telecommunications, China); Chaowei Wang (Beijing University of Posts and Telecommunications & School of Electronics Engineering, China); Xin Hu (Beijing University of Posts and Telecommunications, China); Huanlai Xing (Southwest Jiaotong University, China); Chen Cheng, Xinzhou Cheng, Tao Zhang and Jie Gao (China Unicom Network Technology Research Institute, China); Xin He (China United Network Communications Corporation, China); Kun Chao (China Unicom Network Technology Research Institute, China)*

## **Saturday, Dec. 4 18:00 – 19:40**

### Session 4: Crowd sourcing & Collective Intelligence

#### S4.1 Capturing and labelling the experiences of survivors of disasters triggered by natural hazards

*Ricardo Gacitua (Universidad de La Frontera, Chile); Michael Klafft (Jade Hochschule, Germany); Agnieszka Dudzinska-Jarmolinska (University of Warsaw, Poland); Solhanlle E. Bonilla-Duarte, Sra (INTEC, Dominican Republic); Ivana Harari (Universidad Nacional de La Plata, Argentina)*

#### S4.2 Advancing the Austrian Armed Forces' CBRN Incident Management with Project ABC-MAUS

*Kathrin Baumann-Stanzer, Ulrike Mitterbauer, Christian Maurer and Alexander Hieden (ZAMG, Austria); Harald Lernbeiss and Bernhard Jandl-Scherf (JOANNEUM RESEARCH Forschungsgesellschaft mbH,*

*Austria); Lukas Crepaz (GIHMM GmbH, Austria); Peter Mohr (Österreichisches Bundesheer, Austria)*

*Jay Lohokare (Stony Brook University, USA); Reshul Dani (University of California San Diego, USA)*

S4.3 Dynamic Evacuation System for the Intelligent Building Based on Beacons and Handheld Devices

*Tim Wächter, Jan Rexilius, Matthias König and Martin Hoffmann (Bielefeld University of Applied Sciences, Germany)*

S4.4 An Intelligent cloud ecosystem for disaster response and management leveraging opportunistic IoT mesh networks

S4.5 Optimizing FANET deployment for mobile sensor tracking in disaster management scenario

*Igor Dias da Silva (Université Côte d'Azur, France); Christelle Caillouet (Université Côte d'Azur, CNRS, Inria, I3S, France); David Coudert (Université Côte d'Azur, Inria, CNRS, I3S, France)*

## Sunday, Dec. 5

### **Sunday, Dec. 5 9:00 – 10:20**

Session 5: Communication infrastructures, technologies and services

S5.1 Information Delivery and Collection System Based on Locally Accessible System

*Babatunde Ojetunde (Advanced Telecommunications Research Institute International (ATR), Japan); Toshikazu Sakano (Advanced Telecommunications Research Institute International, Japan); Yoshinori Suzuki (ATR, Japan)*

S5.2 Ledger-based Points Transfer System in LPWAN: From Disaster Management Aspect

*Xin Qi (Global Information and Telecommunication Institute, Waseda University, Japan); Keping Yu and Toshio Sato (Waseda University, Japan); Kouichi Shibata (Skeed Co., Ltd., Japan); Eric Brigham, Takanori Tokutake, Rikiya Eguchi, Yusuke Maruyama, Zheng Wen and Kazuhiko Tamesue (Waseda University, Japan); Yutaka Katsuyama (Global Information and Telecommunication Institute Waseda University, Japan); Kazue Sako and Takuro Sato (Waseda University, Japan)*

S5.3 Research on VANET Network Coding Strategy in Expressway Scene  
*Hua Zhang (Mongolia University, China); Lei Yao (Inner Mongolia University, China); Xiangyu Bai (Inner Mongolia University & Institute of*

*Computing Technology, Chinese Academy of Sciences, China)*

S5.4 Resource Management for Blockchain-enabled Internet of Vehicles  
*Liming Gao (The University of Electro-Communications, Japan); Chunrong Peng (Inner Mongolia University of Finance and Economics, China); Qitu Hu (Inner Mongolia Academy of Social Sciences, China); Celimuge Wu and Tsutomu Yoshinaga (The University of Electro-Communications, Japan); Wugedele Bao and Siri Guleng (Hohhot Minzu College, China)*

### **Friday, Dec. 3 11:00 – 12:00**

Session 6: Human-system interactive information extraction

S6.1 Proposal of Information Hub Models for Effective Disaster Support Activities

*Dai Sato (Tohoku Medical and Pharmaceutical University, Japan); Hideaki Sone (Tohoku University, Japan)*

S6.2 Enhancing Detection of SSVEPs through Spatial Filtering: An Inter-Trial Distance Minimization Perspective

*Zhenyu Wang (ShanghaiTech University & Shanghai Advanced Research Institute, Chinese Academy of Sciences, China); Xianfu Chen (VTT Technical Research Centre of Finland, Finland); Ruxue Li and Honglin Hu (Shanghai Advanced Research*

*Institute, China); Ting Zhou (Shanghai Advanced Research Institute, Chinese Academy of Sciences, China)*

### S6.3 Automation Test Tool for the Page Loading Time of Mobile Applications

*Xiangyu Bai (Inner Mongolia University & Institute of Computing Technology, Chinese Academy of Sciences, China); Wentao Zeng (Inner Mongolia University, China)*

## **Sunday, Dec. 5 14:00 – 15:40**

### Session 7: Data mining

S7.1 Research on Mobile and Broadband Integration User Identification based on Big Data Analysis  
*Tao Zhang, Xinzhou Cheng and Jie Gao (China Unicom Network Technology Research Institute, China); Lexi Xu (China Unicom Research Institute & Queen Mary University of London, China); Chen Cheng (China Unicom Network Technology Research Institute, China); Qingqing Zhang and Yi Zhang (China United Network Communications Corporation, China)*

### S7.2 Research on Distance based Data Records Matching Method for Mobile Network CDR

*ShengLi Guo (Network Intelligent Operations Research Center, China); JingHui Li (China Unicom Research Institute, China); Xiaodong Cao (China Unicom Network Technology Research Institute, China); ZeLin Wang (China Unicom, China); Chuntao Song (Network Technology Research Institute, China); RunSha Dong (China Unicom, China); Lexi Xu (China Unicom*

*Research Institute & Queen Mary University of London, China)*

### S7.3 Exploration and Discussion on Operation Management System of Telecom Operators

*RunSha Dong (China Unicom, China); Xiaodong Cao (China Unicom Network Technology Research Institute, China); JingHui Li (China Unicom Research Institute, China); TianYi Wang (China Unicom, China); Chuntao Song (Network Technology Research Institute, China); ShengLi Guo (Network Intelligent Operations Research Center, China); Lexi Xu (China Unicom Research Institute & Queen Mary University of London, China); XiaoMeng Zhu (China Unicom, China); Chen Cheng (China Unicom Network Technology Research Institute, China)*

### S7.4 Telecom Big Data assisted Identification Algorithm for Poverty Stricken Students in Colleges

*Chen Cheng and Xinzhou Cheng (China Unicom Research Institute); Xin Zhao (China United Network Communications Group Corporation); Yuhui Han, Tao Zhang and Jie Gao (China Unicom Research Institute); Tian Xiao (China Unicom Research Institute, China); Lexi Xu (China Unicom Research Institute & Queen Mary University of London, China); RunSha Dong (China Unicom Research Institute); Feibi Lyu (Research Institute, China United Network Communications Corporation, China); Chuntao Song (China United Research Institute)*

S7.5 Coverage Estimation of Mobile Network Using Supervised Learning model on Artificial Estimation Dataset  
*Feibi Lyu (Research Institute, China United Network Communications Corporation, China); Chen Cheng, Jiajia Zhu and Xinzhou Cheng (China Unicom Network Technology Research Institute, China); Lexi Xu (China Unicom*

*Research Institute & Queen Mary University of London, China); Zhaoning Wang (Beijing University of Posts and Telecommunications, China); Liang Liu (China Unicom Network Technology Research Institute, China); Jinjian Qiao (China Unicom Research Institute, China); Zixiang Di (China Unicom, China)*

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