
Preface

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Biographical notes: Min Huang received her PhD from North China Electric Power University in 2005, and she has been teaching at South China University of Technology since 2005. She is currently the Deputy Dean of Software College of South China University of Technology. She is mainly engaged in the research of mobile computing, internet of things, data mining, web information analysis and processing, and process management. She (co-) authored nearly 50 research papers in core journals and international conferences in the field of computers, of which about 40 have been included in SCI/EI. She has served as an editor and a reviewer for a number of international and domestic academic conferences.

Guanqiu Qi received his PhD in Computer Science from Arizona State University in 2014. He is currently an Assistant Professor with the Computer Information Systems Department, Buffalo State College, Buffalo, NY, USA. His primary research interests include many aspects of software engineering, such as software-as-a-service (SaaS), testing-as-a-service (TaaS), big data testing, combinatorial testing, service-oriented computing, as well as machine learning and image processing. He has (co-) authored over 50 technical papers in these areas.

Yinong Chen received his PhD from the Karlsruhe Institute of Technology (KIT), Germany in 1993. He did Postdoctoral Research at KIT and at LAAS-CNRS – France in 1995 and 1996. From 1994 to 2000, he was a faculty member at Wits University at Johannesburg, South Africa. He joined Arizona State University in 2001 and is a Principal Lecturer and the Director of IoT/Robotics Education Lab. His primary research interests are in service-oriented computing, robots as a service, the internet of things, and computer science education. He has (co-) authored a dozen books and over 200 technical papers in these areas. He is an Associate Editor of the *International Journal of Simulation and Process Modelling (IJSPM)* since January 2004.

In 2010, IBM formally proposed a ‘Smart City’ vision, hoping to contribute its own strength to the development of cities in the world. According to IBM’s research, cities are based on six core systems, which are composed of different networks, infrastructures and environments related to key functions, such as population, business/government, transportation, communications, water and energy. These systems are not fragmented, but interconnected in a collaborative way. The city itself is a macro system composed of these systems. In the process of building and

developing smart cities, modelling and simulation (M&S) has unique advantages in terms of safety, energy saving and environmental protection.

In this special issue of the *International Journal of Simulation and Process Modelling*, we are pleased to select eight research papers to report on the latest research on transportation, energy, location, and image fusion in the development of the internet of things and smart cities. All eight papers have made significant extensions to the conference papers presented at the 2018 International

Symposium on Simulation and Process Modelling – ISSPM2018, Shenyang, China, 21–22 July 2018, including the latest results and scientific achievements. They have undergone a rigorous peer review and revision process to ensure high-quality scientific significance. The following paragraphs describe the content of the eight articles.

In the field of transportation, three papers are included. The paper titled ‘A two-level identification model for selecting the coordination strategy for the urban arterial road based on fuzzy logic’, by Haochen Sun, Feng Qiao, Zhaoyan Wang and Lingzhong Guo, proposes a new urban arterial road traffic state recognition model to improve the operational efficiency and safety of the urban arterial road system. This recognition mode uses a fuzzy analytic hierarchy process and fuzzy comprehensive evaluation method to identify the traffic conditions of the main road and generate appropriate coordination strategies. The comparison results show that the proposed model can well adapt to the actual traffic situation, and the proposed coordination strategy can provide better performance for traffic management.

The paper titled ‘An improved artificial fish swarm algorithm for traffic signal control’, by Bin Lu, Qiang Wang and Yang Wang, combines the artificial fishes swarm algorithm, chaos search and feedback strategy based on the optimisation theory of the signal timing problem to solve the problem of unreasonable scheme of traffic signal timing at road intersections problem. Through simulation experiments, they prove that the algorithm based on the artificial fish-swarm is feasible and effective compared with the Webster algorithm.

The paper titled ‘Modelling of traffic capacity under traffic accident’, by Ling Yu, Zhang Pan, Yitong Zhang, Siyu Jia, Baoyun Sun and Mingxia Huang, analyses the traffic characteristics of urban roads in traffic accidents from three aspects: the characteristics of traffic volume, the definition of accident sections, and the evolution characteristics of traffic capacity. On this basis, the theoretical analysis of road capacity under traffic accidents is carried out, and a capacity model was established. The simulation and the quantitative analysis experiment are carried out using the traffic capacity of urban roads as an example to verify the effectiveness of the model.

In the field of energy, two papers are included. The paper titled ‘Research on optimal collaborative method for microgrid environmental and economic dispatch in grid-connected mode’, by Juan Chen, Bin Lu and Lingling Hao, constructs the microgrid schematic diagram of energy flow, and presents a mathematical model for environmental and economical dispatch optimisation. They analyse the cooperative co-evolutionary genetic algorithm and apply it into a large number of cases. Compared with the traditional genetic algorithm, it has better optimisation performance and convergence speed. The experimental results show it may play a significance role in the optimal scheduling of distributed energy generations in grid-connected mode.

The paper titled ‘Simulation and analysis of user-side transaction technology for energy blockchain considering multi-chain structure’, by Guping Zheng, Jingya Hu and Gang Li, proposes a method based on blockchain extension technology, and carries out a case study combining multiple energy trading schemes in an energy local area network. The results showed that the proposed method significantly improves the efficiency of energy trading and reduces the complexity of trading information.

In the field of positioning, three papers are included. The paper titled ‘WLAN indoor positioning method based on gradient boosting and particle filtering’, by Libin Hu, Zhongtao Li, Xinghai Yang and Changzhi Wei, optimises the traditional WLAN indoor positioning method based on the location fingerprint database, tests the indoor signal simulation and vector similar matching and continuous positioning algorithms, and proposes filtering based on gradient boosting and particle-based WLAN indoor positioning methods. The paper finally obtains the indoor positioning result with an average error of 1.7 m. The research results in this paper verify the feasibility of WLAN indoor positioning and shows that the positioning accuracy will be improved with the further optimisation of the positioning method.

In terms of location-based services, the paper titled ‘iCampusGuide: a multi-purpose guide system in intelligent campus’, by Chunyan Yu, Hui Qi, Haibao Chen, Shenghui Zhao and Sheng Wang, proposes a flexible, low-cost campus guidance model called iCampusGuide. It summarises the problems of university campus guidance, including goals, constraints, systems, and algorithms. The proposed iCampusGuide provides tour bookings, route navigation, parking guides, and a broadcast introduction to the building during navigation. Technically, iCampusGuide uses iBeacon for accurate positioning and navigation, and provides parking suggestions by sending a real-time snapshot from the parking lot closest to the destination. In particular, iCampusGuide provides business modes, tour modes, driving modes, and walking modes for different purposes. Each mode uses a different route navigation algorithm. To verify the model, client-server software is developed and implemented on a real university campus. Experiments show that the model is effective.

Following the development of smart city, informative images play a more and more important role in recognition, detection, and perception. In terms of image fusion technology, the paper titled ‘A DT-CWT-based infrared-visible image fusion method for smart city’, by Guanqiu Qi, Mingyao Zheng, Zhiqin Zhu and Rongdi Yuan, overcomes the shortcomings of multi-scale transform (MST) and sparse representation (SR) fusion methods that are difficult to represent all the features of the source image, and traditional SR-based fusion methods that do not consider the morphological information of image features during dictionary learning. An infrared visible image fusion framework combines double tree complex wavelet

transform (DT-CWT) and SR. Experiments show that compared with five mainstream image fusion solutions, their fusion framework can achieve the latest performance of infrared visible fusion images.

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