Special Issue on Mobile Big Data Management and Innovative Applications

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With the rapid growth in popularity of smart phone and the development of wireless technology, mobile applications in the world are continuously expanding, and the proliferation of mobile devices and their enhanced onboard sensing capabilities are playing increasingly important role in the explosion of mobile data. Furthermore, advances in social networking and cyber-physical systems are making mobile data "big", and consequently, bring challenges for management and processing. All these factors contribute to a possible new service paradigm: mobile big data driven service computing. Aspects of big data driven service computing include mobile big data collection and sensing, novel technologies for mobile big data transmissions (such as software-defined data transmissions and processing), and mobile big data mining (such as mobility and demographic tracing based data mining). Under the new service paradigm, mobile big data management techniques and innovative applications need to be extensively investigated in order to uncover the potential of mobile big data.

This special issue aims to present high-quality contributions and innovations in this interdisciplinary area of mobile big data technologies, systems, and services, especially mobile big data management and innovative applications. In response to the Call for Papers, we were pleased to receive 23 submissions from the United States, Canada, Italy, Korea, China, Hong Kong, India, Saudi Arabia, and Taiwan. After a careful review process, this special issue presents four outstanding papers on interesting topics. These papers exhibit novelties to encourage readers to continue research on mobile big data management and innovative applications.

The volume opens with a paper, "GroRec: A Group-centric Intelligent Recommender System Integrating Social, Mobile and Big Data Technologies," co-authored by Y. Zhang. It proposes a group-centric recommender system integrating social, mobile and big data technologies to provide effective, objective and accurate recommendation services in Cyber-Physical-Social Systems (CPSSs). To improve the sufficiency, objectivity and accuracy, the proposed recommender systems consist of activity-oriented group discovery, rating data revision, and group preference modeling, which supports sufficient context mining from multiple sources. Various experiments verify that the proposed recommender systems provide a strong foundation for personalized computing in the CPSS paradigm.

Understanding and forecasting mobile traffic is extremely valuable as it allows service provides to control and manage explosive mobile data. To achieve this, the paper "Big Data Driven Mobile Traffic Understanding and Forecasting: A Time Series Approach," by F. Xu, Y. Lin, J. Huang, D. Wu, H. Shi, J. Song and Y. Li, extracts and models traffic patterns of 9,000 cellular towers deployed in a metropolitan area. It designs, implements and evaluates a time series analysis approach that is able to decompose large scale mobile traffic into regularity and randomness components. Specially, time series prediction is utilized to forecast the traffic patterns based on the regularity components, and reveal that high predictability of the regularity component can be achieved. It further verifies the effectiveness of the utilized time series decomposition method, and it shows the geographical distribution of the regularity and randomness component.

With the increasing demand of mobile big data, a big-data oriented service composition technique is required to find the optimum set of services from a huge number of choices. The third paper, "Big Data-Driven Service Composition Using Parallel Clustered Particle Swarm Optimization in Mobile Environment," co-authored by MS Hossain, M. Moniruzzaman, G. Muahammad, A. Ghoneim and A. Alamri, proposes a Big Data-Oriented Service Composition approach for mobile environment, where Parallel Clustered Particle Swarm Optimization (PCPSO) approach is used.

The last paper, "On Improving Constrained Operator Placement Using Evictions in Big Data Environments," by N. Tziritas, T. Loukopoulos, S. Khan, C. Xu and A. Zomaya, presents distributed algorithms that require minimum knowledge from nodes, provably converge and exchange relatively few control messages to tackle the problem. Furthermore, the authors prove that the operator migration problem is NP-complete in the case of resource-constrained nodes, and provide a control message silence mechanism to stop message exchange once placement stabilizes.

In closing, we would like to thank all the authors who submitted their research results to this special issue. We would also like to acknowledge the contributions of many experts in the field who have participated in the review process and have provided constructive suggestions to the authors to improve the contents and presentations of their papers. We would in particular like to thank Professor Ling Liu, Editor-in-Chief, and Dr. Rong N. Chang, Associate Editior-in-Chief, for their support and helpful comments and suggestions during the final stages of this special issue.

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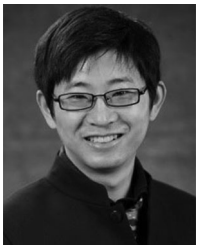

Min Chen is a professor of computer science and technology with Huazhong University of Science and Technology, where he serves as the director of Embedded and Pervasive Computing (EPIC) Lab. He has chaired the IEEE Computer Society Special Technical Communities on Big Data. He was on the faculty of the School of Computer Science and Engineering, Seoul National University, from 2009 to 2012. Prior to that, he has worked as a postdoctoral fellow in the Department of Electrical and Computer Engineering, University of British Columbia for three years. He received Best Paper Award from IEEE ICC 2012. He is a guest editor of the *IEEE Network*, the *IEEE Wireless Communications Magazine*, etc. He has published 260 papers including more than 120 SCI-indexed papers. He has more than 10 ISI highly cited papers. He has published the book: *OPNET IoT Simulation* (2015) with HUST Press, and another book on Big Data Related Technologies (2014) in the Springer Series in *Computer Science*. As of August 2016, Google Scholars has cited his published work more than 6,900 times with an h-index of 41. His top paper was cited 784 times. His research focuses on the Internet of Things, mobile cloud, body area networks, emotion-aware computing, healthcare big data, cyber physical systems, and robotics. He is a senior member of the IEEE since 2009.

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