Mobile Big Data

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Big data is an established field, pertaining to the science of analyzing and retrieving large and/or highly heterogeneous data sets. However, the mobile aspect is rather new, but becomes more pertinent with the rapid development of the mobile Internet and the Internet of Things (IoT). In addition, mobile network operators can also explore massive volumes of mobile data to improve the network's operational efficiency.

However, the nature of mobile big data presents vast challenges, not only in the huge volumes of data but also in the non-homogenous and temporarily volatile structure that is often related to incomplete and ambiguous information. New technologies are thus required to handle mobile big data in a highly scalable, cost-effective, and fault-tolerant fashion.

The objective of this Special Issue is to promote a progressive understanding of mobile big data to all readers of this magazine. In response to the Call for Papers, the submissions received for this Special Issue included articles on theoretical, practical, and experimental studies, from both academia and industry. The large number of submissions also reflects the importance of this emerging research field. Finally, four articles have been accepted in this Special Issue.

The issue opens with the article "Mobile Cellular Big Data: Linking Cyberspace and the Physical World with Social Ecology." In this article, the authors link cyberspace and the physical world with social ecology through the big data collected from large-scale mobile cellular networks in the urban environment. They characterize and link the features of human behaviors in the physical world, cyberspace, and social ecology. The proposed big data processing and modeling methodology, combined with the empirical analysis, paving the way toward a deep understanding of the human behaviors in large-scale metropolitan areas.

In the second article, "Mobile Big-Data-Driven Rating Framework: Measuring the Relationship between Human Mobility and App Usage Behavior," a rating framework is proposed to study the relationship between human mobility and application usage behaviors. It processes traffic traces, selects the significant features of human mobility, and forecasts app usage behavior. Their study reveals that a close relationship exists between mobility and app usage behavior. The proposed framework can also be applied to predict the application usage behavior of users.

In the third article, "Mobile Big Data Analytics Using Deep Learning and Apache Spark," the authors focus on deep learning in mobile big data analytics. After giving a brief overview on deep learning, they propose a scalable learning framework based on Apache Spark. This framework is validated by using a large-scale activity recognition system with a real-world dataset.

The fourth article, "Big Video Data for Light-Field-Based 3D Telemedicine," proposes an innovative light field (LF)-based 3D telemedicine system. LF technology is an emerging immersive 3D imaging technique. The appealing characteristics of the proposed LF-based 3D telemedicine system include the delivery of a lifelike tele-consultation experience promising a quality of experience far beyond conventional 2D telemedicine systems. In addition, the embedded 3D data in the LF video (LFV) format facilitate a higher level of big data analysis, which is referred to as big LF video data analysis in this article. To this end, an LF big data analytical framework is proposed to achieve improved classification, statistics gathering, and prediction and cognitive analysis for healthcare.

As Guest Editors, we would like to thank all the authors for their submissions to this Special Issue. The interest and quality of submissions were outstanding. We are also grateful to the reviewers for their timely responses and valuable comments to improve the quality of the articles. We appreciate the support from both Prof. Sherman Shen, former Editor-in-Chief, and Prof. Nei Kato, current Editor-in-Chief, for their constructive suggestions and timely guidance during the life cycle of this Special Issue. We also appreciate the help of Peggy Kang, Joseph Milizzo, and Jennifer Porcello throughout the publication process. Finally, our hope is that

the readers of *IEEE Network* enjoy the articles in this Special Issue, and explore further the promising research fields related to Mobile Big Data.

Biographies

JUN GUO is a full professor and a vice president of Beijing University of Posts and Telecommunications (BUPT). He received B.E. and M.E. degrees from BUPT, China in 1982 and 1985, respectively, and a Ph.D. degree from Tohuku-Gakuin University, Japan, in 1993. His research interests include pattern recognition theory and application, information retrieval, content based information security, and bioinformatics. He has published more than 200 papers in journals and conferences, including *Science, Nature Scientific Reports, IEEE Transactions on PAMI, Pattern Recognition*, AAAI, CVPR, ICCV, SIGIR, etc. His book *Network Management* was awarded by the government of Beijing city as a finest textbook for higher education in 2004. He has served on numerous TPCs for networking and theoretical computer science conferences, e.g. the first and second IEEE International Conference on Network Infrastructure and Digital Content, respectively.

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