01 Jun 2016

Big Data Management and Analytics for Mobile Crowd Sensing

Tingting Chen

Fan Wu

Tony Tie Luo
Missouri University of Science and Technology, tluo@mst.edu

Mea Wang

et. al. For a complete list of authors, see https://scholarsmine.mst.edu/comsci_facwork/902

Recommended Citation

T. Chen et al., "Big Data Management and Analytics for Mobile Crowd Sensing," *Mobile Information Systems*, Hindawi Limited, Jun 2016.
The definitive version is available at https://doi.org/10.1155/2016/8731802

Hindawi Publishing Corporation
Mobile Information Systems
Volume 2016, Article ID 8731802, 2 pages
http://dx.doi.org/10.1155/2016/8731802

Editorial

Big Data Management and Analytics for Mobile Crowd Sensing

Tingting Chen,[1] Fan Wu,[2] Tony T. Luo,[3] Mea Wang,[4] and Qirong Ho[3]

[1]*California State Polytechnic University, Pomona, CA 91768, USA*
[2]*Shanghai Jiao Tong University, Shanghai 200240, China*
[3]*Institute for Infocomm Research, A* STAR, Singapore*
[4]*University of Calgary, Calgary, AB, Canada T2N 1N4*

Correspondence should be addressed to Tingting Chen; tingtingchen@cpp.edu

Received 23 June 2016; Accepted 26 June 2016

With the fast increasing popularity of mobile smart devices, mobile crowd sensing has become a new paradigm of applications that enables the ubiquitous mobile devices with enhanced sensing capabilities, such as smartphones and wearable devices, to collect and to share local information towards a common goal. Most of the smart devices are equipped with a rich set of cheap and powerful sensors, including accelerometer, digital compass, GPS, microphone, and camera. These sensors can be utilized to monitor mobile users' surrounding environment and infer human activities and contexts. In recent years, a wide variety of applications have been developed to realize the potential of crowd sensing throughout everyday life, such as environmental, noise pollution assessment, road and traffic condition monitoring, road-side parking statistics, and indoor localization. The data acquired through mobile crowd sensing exhibits a number of important characteristics, such as being large in scale (volume), being fast generated (velocity), being different in forms (variety), and being uncertain in quality (veracity). The 4 Vs of crowd sensing data make it extremely interesting and challenging in designing participatory and opportunistic sensing technologies, human centric data management and analytics models, and novel visualization tools.

This special issue is composed of seven original research papers, carefully selected based on their merit contents. These works cover a variety of topics, including data sharing, compressed sensing protocols, privacy protection, cooperation issues, and application studies.

The paper "Share the Crowdsensing Data with Local Crowd by V2V Communications" by C. Song et al. investigates the communication and sharing of crowd sensing data by vehicles near the events. In a local crowd formed by vehicles, vehicles can transmit the data to each other by vehicle-to-vehicle (V2V) communication. This approach based on the vehicle-to-vehicle communications has a lower delay than the offloading-based approach.

Also on the topic of data sharing, the paper "ODMBP: Behavior Forwarding for Multiple Property Destinations in Mobile Social Networks" focuses on making the information sharing more effective among people with similar interests, by profiling the users' behavior in the mobile social network.

The paper "A Perturbed Compressed Sensing Protocol for Crowd Sensing" by Z. Zhang et al. proposes a data collection protocol for compressed sensing in wireless sensor networks. The protocol can protect the data confidentiality and is also time-efficient.

We have two excellent papers addressing the privacy issues. In the paper "How Dangerous Are Your Smartphones? App Usage Recommendation with Privacy Preserving," the authors K. Zhu et al. work on evaluating the mobile App privacy violation of mobile users by computing the danger coefficient. To help users reduce the privacy leakage, both the user preference to mobile Apps and the privacy risk are used in combination. The paper presents a mobile App usage recommendation method called AppURank to recommend secure Apps with the same function.

On the other hand, the paper "Privacy Leakage in Mobile Sensing: Your Unlock Passwords Can Be Leaked Through Wireless Hotspot Functionality" explores the snooping attack on smartphones leveraging the wireless hotspot functionality. The attacker leverages the impacts of finger motions on the wireless signals during the unlocking period to analyze the passwords/patterns.

In the aspect of cooperation, the paper "Cooperation Dynamics on Mobile Crowd Networks of Device-To-Device Communications" has contributions in exploring the cooperation dynamics in mobile crowd networks by considering the elemental characteristics of crowd population, individual's mobility, and reciprocity policy. In particular, the authors model the cooperative behaviors in a mobile crowd into an evolutionary prison dilemma game and investigate the relationships between cooperation rate and some main influence factors.

Last but not least, the paper "Outdoor Air Quality Level Inference via Surveillance cameras" by Z. Zhang et al. presents an interesting application work of a novel air quality level inference approach based on outdoor images utilizing surveillance cameras. The proposed approach first extracts features from images and adopts multikernel learning to learn an adaptive classifier for air quality level inference. The contributions also include an Outdoor Air Quality Image Set (OAQIS) dataset, which contains high quality registered and calibrated images with rich labels.

We believe that the original works presented in this special issue would significantly contribute to the literature and the authors' innovative insights can influence the future work of people from academia and industry who are interested in the covered areas.

Acknowledgments

We would like to thank the authors for their valuable works. We are grateful to all the anonymous reviewers who carefully reviewed the assigned papers and provided valuable comments to further improve the paper quality.

Tingting Chen
Fan Wu
Tony T. Luo
Mea Wang
Qirong Ho