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Special Issue on Mobile Crowd Sensing for IoT

The ubiquitous sensor-rich mobile devices (e.g., smartphones, wearable devices, and smart vehicles) have been playing an increasing important role in the evolution of the Internet of Things (IoTs), which bridges the digital space and physical space at a societal scale. Their powerful computing/communication capacities, huge population, and inherent mobility makes mobile-device networks a much more flexible and cost-effective IoT solution than static sensor networks. This promotes the emergence of a fast-growing citizen-centric sensing paradigm, the Mobile Crowd Sensing (MCS). As an evolution of participatory sensing, MCS has two unique features: (1) it involves both implicit and explicit human participation; (2) MCS collects data from two user-participant data sources: mobile social networks and mobile sensing. Various categories of knowledge (e.g. location, personal and social context, user feelings/opinions, traffic conditions, and pollution status) reported by smart device users, are shared within the social sphere, practitioners, health care providers, and utility providers, enabling a broad range of applications and services such as urban dynamics mining [2], public safety [3], and environment monitoring [4]. Numerous research challenges arise from the MCS paradigm including optimal task assignment, incentive mechanism design, transient and hybrid networking, data quality maintenance, privacy protection, and cross-space data mining [1].

This special issue provides the opportunity for researchers, practitioners, and application developers to review and discuss the state-of-the-art and trends of MCS techniques and applications or propose new solutions. Over the numerous submissions, we have finally chosen four papers, the topic of them ranges from task assignment, incentives, to privacy protection.

The first article “Research on Crowdsourcing Assignment Model based on Mobile Crowd Sensing in Internet of Things” by An et al., focuses on how to achieve credible crowdsensing task assignment. A novel credible crowdsourcing assignment model is proposed based on previous studies on social network analysis and community detection. It uses the service quality factor, link reliability factor, and region heat factor to assess user crowdsourcing preferences. Experiments based on simulations prove the effectiveness of their model.

The second article “A Survey of Incentive Techniques for Mobile Crowd Sensing” by Jaimes et al., reviews a variety of incentive mechanisms that motivate people to contribute to MCS tasks. It first studies a set of design constraints for MCS incentive mechanisms. These constrains are then used as metrics to evaluate existing MCS incentive mechanisms and determine their advantages and disadvantages. They also contribute a taxonomy of MCS incentive mechanisms and show how current systems fit this taxonomy. Finally, the authors discusses several challenges to be investigated in the future.

The third article “Anonymity-based Privacy-preserving Data Reporting for Participatory Sensing” by Yao et al., proposes an anonymous data reporting protocol for crowd sensing. The protocol consists of two stages: slot reservation and message submission. The aim is to break the link between the data and participants to protect user privacy. Both theoretical analysis and experiments are conducted to validate the efficiency and usefulness of the protocol.

The fourth article “Profiling Wireless Resource Usage for Mobile Apps via Crowdsourcing-based Network Analytics” by Ye et al., presents AppWiR, a crowdsourcing system that collects application behavior information from smartphones and mines varied indicators in different network layers. A two-layer causal relationship among application behaviors, network traffics, and network resources is built, based on which a prediction model for network resource usage is proposed. Experiments over real world collected data prove the usefulness of their system.

In concluding this overview, we would like to address our special thanks to Dr. Chonggang Wang, the Editor-in-Chief of IEEE Internet of Things for his great support and effort throughout the whole publication process of this special issue. We are also grateful to all the authors for submitting their papers and the reviewers for their professional and timely work in making it possible to publish this special issue.

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