Tutorial T-4: Mobile Crowdsourcing: Incentives, Trust, and Privacy

Presenters
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Tutorial Overview

The booming smartphone industry has recently spurred a new wave of mobile crowdsourcing, which offers a cost-effective approach to distributed problem solving and data collection (a.k.a. crowdsensing). Not only do we see a large spike of publications in major conferences such as INFOCOM, MobiCom, MobiHoc, UbiComp, AAMAS and AAAI, but industry has also shown enormous interest as indicated by many emerging crowdsourcing companies such as Waze (Google), Quora and Kickstarter, as well as crowdsourcing platforms such as mTurk, CrowdFlower and TaskRabbit. In addition, AppStore and Google Play also see a large number of crowdsourcing apps being uploaded on a daily basis.

This calls for a good understanding of what mobile crowdsourcing really is, what benefit it has to offer, what challenges it faces, and what solutions have been proposed, with respect to feasibility and performance. This tutorial aims to fulfil this need, and in particular, will cover three most important issues, namely incentive, trust, and privacy.

Incentive refers to how to encourage public users (the "crowd") to participate in crowdsourcing activities and exert high effort (for quantity), trust refers to how to induce "nice" user behaviors and trustworthy user contributions (for quality), and privacy refers to protecting sensitive personal information from being divulged. We will explain relevant concepts, review the state of the art, present representative solutions, and discuss open challenges.

This tutorial will provide a comprehensive overview of this exciting new computing and sensing paradigm, and aid the ICC attendees to gain a better understanding of this field of research.

The tutorial outline is as follows:

I.   Introduction
        a. The rise of mobile crowdsourcing
        b. Real-world applications
        c. Research issues: incentive, trust, and privacy

II.   Incentives
        a. Overview
        b. Mechanism design
        c. Algorithmic mechanism design
        d. Incentive mechanisms for mobile crowdsourcing
                • Auctions
                • Tullock contests
                • Tit-for-tat

III.   Trust
        a. Overview
        b. Trust and reputation systems in other contexts
        c. Trust and reputation systems for mobile crowdsourcing
        d. Social-network based trust systems

IV.   Privacy
    a. Overview
    b. Privacy preservation techniques
    c. Privacy preservation for mobile crowdsourcing

V.   Conclusion
    a. Summary
    b. Opportunities and challenges

Presenter Biographies

Dr. Salil Kanhere received his M.S. and Ph.D. degrees, both in Electrical Engineering from Drexel University, Philadelphia in 2001 and 2003, respectively. He is currently an Associate Professor in the School of Computer Science and Engineering at the University of New South Wales in Sydney, Australia. His current research interests include pervasive computing, crowdsourcing, embedded sensor networks, mobile networking, privacy and security. He has published over 140 peer-reviewed articles and delivered over 15 tutorials and keynote talks on these research topics. He is a contributing research staff at National ICT Australia and a faculty associate at Institute for Infocomm Research, Singapore. Salil regularly serves on the organising committee of a number of IEEE and ACM international conferences (e.g, IEEE PerCom, ACM MobiSys, ACM SenSys, ACM CoNext, IEEE WoWMoM, IEEE LCN, ACM MSWiM, IEEE DCOSS, IEEE SenseApp, ICDCN, ISSNIP). He currently serves as the Area Editor for Pervasive and Mobile Computing, Computer Communications, International Journal of Ad Hoc and Ubiquitous Computing and Mobile Information Systems. Salil is a Senior Member of both the IEEE and the ACM. He is a recipient of the Humboldt Research Fellowship in 2014.

Dr. Tony T. Luo received his PhD degree in electrical and computer engineering from the National University of Singapore. He is a scientist at the Institute for Infocomm Research (I2R), A*STAR, Singapore. His research interests include mobile crowdsourcing and social sensing, Internet of things, and cyber-physical systems. He serves/served as the TPC co-chair of IEEE PerCom 2016 CASPer workshop, ICDCN 2016 ComNet-IoT workshop, and IEEE ISSNIP 2014 PSC symposium. He also served on the organizing committee of IEEE ISSNIP 2014 and 2015. He is a guest editor for the Mobile Information Systems journal and the Journal of Sensor and Actuator Networks. He received the Best Paper Award at ICTC 2012, and was a nominee of the Best Paper Award of IEEE INFOCOM 2015.