Mobile Cloud Tutorial 2017

Sunday, April 9th, 3-6 pm (Room PENN II)

From Participatory to Opportunistic Mobile Crowd Sensing: Techniques and Research Challenges

1. Abstract

Mobile Crowd Sensing (MCS) enables collective data harvesting actions by coordinating citizens willing to contribute data collected via their sensor-rich smartphones that represent sources of valuable sensing information in urban environments nowadays. One of the biggest challenges in a real long-running MCS system lies in the capacity not only to attract new volunteers, but also, and most importantly, to leverage existing social ties between volunteers to keep them involved to build long-lasting MCS communities.

The goal of this tutorial session is to introduce the audience to MCS techniques with a holistic approach. The first part of the tutorial will cover some key-concepts of MCS, while the second part will focus on two of the predominant MCS paradigms, namely participatory and opportunistic approaches.

The tutorial will finally conclude with some of the most challenging barriers to MCS campaigns as well as some research challenges.

2. Outline

Part I: Key-concepts of Mobile Crowd Sensing (speaker Luca Foschini, 1h 10mins)

1. Introduction to Mobile Crowd Sensing (MCS)
2. Common application scenarios
    a. Gathering environmental data
    b. Gathering user-centric contents
3. A reference architecture for a MCS platform
    a. Core elements: Users, backend , frontend
    b. The ParticipAct MCS platform: A case study
        i. Outline of ParticipAct
        ii. Examples of successful MCS campaigns
        iii. Summary of the results obtained
4. Potentialities and barriers for MCS campaigns
    a. Benefits
    b. Barriers (privacy, drop out, recruiting volunteers)

Break (20 minutes)

Part II: Participatory vs Opportunistic Mobile Crowd Sensing (speaker Michele Girolami, 1h 10mins)

1. Amplifying users in MCS Platforms
    a. The participatory model

    b. The opportunistic model
2. Mobility and sociality in MCS
    a. Key elements of the human mobility
    b. The social dimension of MCS users (ties, community and other stories)
3. MCS datasets
    a. Introduction to some popular MCS datasets
    b. Studying the mobility and the sociality with some MCS datasets
    c. The social amplification factor: preliminary results and obtainable performance improvements

Part III: Conclusions and Research Challenges (speakers: Luca Foschini and Michele Girolami, 20 mins)

1. Summary of the tutorial
2. Challenges
    a. User recruitment
    b. Privacy and anonymization of data
    c. Collecting data with mobile application

3. Intended Audience

The tutorial is intended to benefit researchers as well as practitioners from industry and academia, who are interested in research areas related to and crowd sourcing, sensing and more generally to mobile social computing. Not only, but also we aimed at attracting the attention of public and private administrations interested in gathering data from citizens by using sensing technologies.

4. Speaker's Biographies

This tutorial will be lead by two speakers, namely Dr. Luca Foschini and Dr. Michele Girolami.

LUCA FOSCHINI (luca.foschini@unibo.it) graduated from the University of Bologna, Italy, where he received a Ph.D. degree in computer engineering in 2007. He is now an assistant professor of computer engineering at the University of Bologna. His interests include distributed systems and solutions for system and service management, management of cloud computing, context data distribution platforms for smart city scenarios, context-aware session control and adaptive mobile services, and mobile crowd sensing and crowdsourcing.

MICHELE GIROLAMI (michele.girolami@isti.cnr.it) graduated from the University of Pisa, where he received a Ph.D. degree in computer science in 2015. Currently, he is a member of research staff at CNR-ISTI with the Wireless Network Laboratory. His research interests include data forwarding and service discovery in mobile social networks, crowd sensing techniques, and context-aware middleware for smart environments.