

OPPORTUNISTIC SENSING AND ITS IMPLICATIONS

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The commercial availability of sensor-rich mobile hardware has greatly stimulated research about techniques that analyze, explain, and predict human mobility and activity patterns with consequences in a multitude of domains - accurate content dissemination, novel recommendation services, network optimization, resource planning for urban development, etc., to name a few. The current generation of smartphones is capable to continuously run data collection and aggregation software, providing researchers and businesses with a faithful and thorough description of a user's trajectory and mobility patterns. GPS coordinates, WiFi access points and cell association data, Bluetooth proximity information, accelerometer readings can all be collected and pieced together to gain an increasingly detailed picture of user habits, trajectories, and interactions. Although accurate, these efforts require much finer granularity of data and demand high energy consumption due to frequent update. An alternative and opportunistic approach is to leverage the power of network (mobile-residential-social) activity traces left behind by the individuals through their active usage of applications. To this end, in this talk I will discuss how residential and social network traces can be used to form rigorous understanding of an individual's activity dynamics. In particular, the talk will cover three novel techniques on modeling and predicting human activities with differential network analysis. Our approach call attention to the developers of future consumer-faced technology with implications to both end user service design and residential network optimization. With a better awareness of human activity dynamics, application developers can reach their intended customers with promotional offers and recommendation services in a timely fashion. Network operators can design personalised dynamic pricing package tailored to individual's need. Furthermore, elastic network resources can be better managed with an informed understanding of network usage, which eventually can minimize operational cost for the network operators.

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