

Human Activity Modeling from Mobile Phone Sensors

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Mobile phones have emerged as the ultimate sensor. Smartphones can constantly sense people's location via GPS or cell tower connectivity, motion through accelerometers, proximity via Bluetooth, and communication through call and SMS logs, and thus represent the most accurate and pervasive current means of tracing real-life human activities. All this information, as never before, is being generated at massive scales. As a result, the understanding of human behavior from mobile sensor data at large-scale, where populations of cell phone users are analyzed, with appropriate privacy-protection mechanisms in place, over (possibly) long periods of time, has emerged as a frontier domain in computing and in social science, and recognized as having potentially high impact in real life, whether it is personal life, business, or government. In addition to its scientific value, the use of mobile phones as part of computational methods to analyze people's routines and relations opens the possibility to a multitude of applications, including information access, sensible healthcare, personal self-assessment, and creative expression.

The research in this domain is currently scattered over several communities, including ubiquitous and wearable computing, statistical networks, machine learning, and multimedia. Each of these communities has started to analyze specific aspects of this rich domain with different emphasis, often with disparate methodological tools. The short course has two main objectives: to present the scientific and technological state-of-the-art in mobile phone-based modeling of human activities from a coherent perspective; and to motivate further work in this domain by discussing both the most important lessons learned so far and the variety of open problems. The course is suitable for graduate students and young researchers in computer science, electrical engineering, and new media.

The short course will cover the following topics:

Sensor data in mobile phones.

Application data in mobile phones.

Privacy and phone-based sensing.

Research resources.

Modeling activities from single and multiple data sources.

Open problems and opportunities.

The course will include a variety of examples and demos, and will contain pointers to the recent literature for further study and also to publicly available resources for further research.