Morning Tutorial

Mining Data from Mobile Devices:
A Survey of Smart Sensing and Analytics

Spiros Papadimitriou & Tina Eliassi-Rad

Abstract

Mobile connected devices, and smartphones in particular, are rapidly emerging as a dominant computing and sensing platform. This poses several unique opportunities for data collection and analysis, as well as new challenges. In this tutorial, we survey the state-of-the-art in terms of mining data from mobile devices across different application areas such as ads, healthcare, geo-social, public policy, etc. Our tutorial has three parts. In part one, we summarize data collection in terms of various sensing modalities. In part two, we present cross-cutting challenges such as real-time analysis, security, and we outline cross-cutting methods for mobile data mining such as network inference, streaming algorithms, etc. In the last part, we specifically overview emerging and fast-growing application areas, such as noted above. Concluding, we briefly highlight the opportunities for joint design of new data collection techniques and analysis methods, suggesting additional directions for future research.

Instructors

Spiros Papadimitriou is mainly interested in data mining for graphs and streaming data, clustering, time series, large-scale data processing, and mobile applications. His interests span from the very small (embedded devices, and sensors; Arduino) to the very large (large-scale data processing and analysis; Hadoop). He has published more than forty papers on these topics in refereed conferences and journals. He received the best paper award in SDM 2008, has three invited journal publications in best paper issues, several book chapters and he has filed multiple patents.

He has also been invited to give keynote talks on graph and social network analysis (WAAMD 2008, and ADN 2009) and tutorials on time series stream mining (University of Maine Summer School, 2008) and large-scale analytics (Carnegie Mellon University, 2012). In the past, he has also developed and released a number of Android applications (including live-view mobile OCR, and web service clients) that have 50,000 downloads. He is currently an assistant professor at Rutgers University (MSIS-RBS). Prior to that, he was a research scientist at Google, and a research staff member at IBM Research. He was a Siebel scholarship recipient in 2005. He obtained his MSc and PhD degrees from Carnegie Mellon University.

Tina Eliassi-Rad is an Associate Professor of Computer Science at Rutgers University. Before joining academia, she was a Member of Technical Staff and Principal Investigator at Lawrence Livermore National Laboratory. Tina earned her Ph.D. in Computer Sciences (with a minor in Mathematical Statistics) at the University of Wisconsin-Madison. Within data mining and machine learning, Tina's research has been applied to the World-Wide Web, text corpora, large-scale scientific simulation data, complex networks, and cyber situational awareness. She has published over 50 peer-reviewed papers (including a best paper runner-up award at ICDM'09 and a best interdisciplinary paper award at CIKM'12); and has given over 70 invited presentations. Tina is an action editor for the Data Mining and Knowledge Discovery Journal. In 2010, she received an Outstanding Mentor Award from the US DOE Office of Science and a Directorate Gold Award from Lawrence Livermore National Laboratory for work on cyber situational awareness. For more details, visit http://eliassi.org.