

Mobility, Data Mining and Privacy: Mining Human Movement Patterns from Trajectory Data

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Summary

The technologies of mobile communications and ubiquitous computing pervade our society, and wireless networks sense the movement of people and vehicles, generating large volumes of mobility data, such as mobile phone call records and GPS tracks. This is a scenario of great opportunities and risks : on one side, mining this data can produce useful knowledge, supporting sustainable mobility and intelligent transportation systems ; on the other side, individual privacy is at risk, as the mobility data contain sensitive personal information. A new multidisciplinary research area is emerging at this crossroads of mobility, data mining, and privacy. The talk assesses this research frontier from a data mining perspective, and illustrates the results of a European-wide research project called GeoPKDD, Geographic Privacy-Aware Knowledge Discovery and Delivery. GeoPKDD has created an integrated platform named M-ATLAS for complex analysis of mobility data, which combines spatio-temporal querying capabilities with data mining, visual analytics and semantic technologies, thus providing a full support for the Mobility Knowledge Discovery process. In this talk, we focus on the key data mining models : trajectory patterns and trajectory clustering, and illustrate the analytical power of our system in unveiling the complexity of urban mobility in a large metropolitan area by means of a large scale experiment, based on a massive real life GPS dataset, obtained from 17,000 vehicles with on-board GPS receivers, tracked during one week of ordinary mobile activity in the urban area of the city of Milan, Italy.

Bibliography

Fosca Giannotti is a senior researcher at the Information Science and Technology Institute of the National Research Council at Pisa, Italy. Her current research interests include data mining query languages, knowledge discovery support environment, web-mining, spatio-temporal reasoning, spatio-temporal data mining, and privacy preserving data mining. She has been the coordinator of various European and national research projects and is currently the co-ordinator of the FP6-IST project GeoPKDD : Geographic Privacy-aware Knowledge Discovery and Delivery. She is member of steering committee of the FP7 European coordination Action MODAP : Mobility, Data mining and Privacy. She has taught classes on databases and data mining at universities in Italy and abroad. She is the author of more than one hundred publications and served in the scientific committee of various conferences in the area of

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Logic Programming, Databases, and Data Mining. In 2004 she co-chaired the European conference on Machine Learning and Knowledge Discovery in Data Bases ECML/PKDD 2004 and in 2008 she was the program co-chair of ICDM 2008, the IEEE Int. Conf. on Data Mining. Fosca Giannotti co-leads the Pisa KDD Lab-Knowledge Discovery and Data Mining Laboratory (<http://www-kdd.isti.cnr.it>) - a joint research initiative of the University of Pisa and the Information Science and Technology Institute of the Italian National Research Council, founded in 1995, one of the earliest European research groups specifically targeted at data mining and knowledge discovery. Publications of Fosca Giannotti from DBLP bibliographic server : <http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/g/Giannotti:Fosca.html>