Seminar

Big Data Analytics in Real-Time Mobility Management

Friday, March, 24 12:00 Room 40

We live on a digital era. Weather, communications and social interactions start, happen and/or are triggered on some sort of *cloud* – which represent the ultimate footprint of our existence. Consequently, millions of digital data interactions result from our daily activities. The challenge of transforming such sparse, noisy and incomplete sources of heterogeneous data into valuable information is huge. Nowadays, such information is key to keep up a high modernization pace across multiple industries. Transportation is not an exception. One of the key insights on mobility data mining are GPS traces. Portable digital devices equipped with GPS antennas are ubiquitous sources of continuous information for location-based decision support systems. The availability of these traces on the human mobility patterns is growing explosively, as industrial players modernize their infrastructure, fleets as well as the planning/control of their operations. However, this type of data possesses unique characteristics such as non-stationarity, recurrent drifts or high communication rate. These latest issues clearly disallow the application of traditional off-the-shelf Machine Learning frameworks to solve these problems.

Real-Time Mobility Data Mining

Dr. Luis Moreira-Matias
Senior Researcher
NEC Laboratories Europe (Heidelberg, Germany)

In this presentation, we approach a series of Transportation problems. Solutions involve near-optimal decision support systems based on straightforward Machine Learning pipelines which can handle the particularities of these problems. The covered applications include Mass Transit Planning (e.g. buses and subways), Operations of On-Demand Transportation Networks (e.g. taxis and car-sharing) and Freeway Congestion Prediction and Categorization. Experimental results on real-world case studies of NORAM, EMEA and APAC illustrate the potential of the proposed methodologies.

Luis Moreira-Matias received his Ms.c. degree in Informatics Engineering and Ph.d. degree in Machine Learning from the University of Porto, in 2009 and 2015, respectively. During his studies, he won an International Data Mining competition held during a Research Summer School at TU Dortmund (2012). Luis served in the Program Committee of multiple high-impact research venues such as ECML/PKDD, IEEE ITSC or TRB, among others. Currently, he is Senior Researcher at NEC Laboratories Europe (Heidelberg, Germany), integrated in the Intelligent Transportation Systems group. His research interests include (Adaptive) Machine Learning and Big Data Analytics applied to improve Urban Mobility in general. He authored 30+ publications on related topics.

Big Floating Car Data for Traffic Dynamics Estimation

Natalia Isaenko
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Floating Car Data (FCD) collected by probe vehicles open new horizons to studying traffic dynamics by providing ubiquitous information both in time and space dimensions at any point of the network. In the last years, many data-driven methods have been introduced for short term traffic predictions. While most methods are based on time-series models, few methods exploit time-space correlations to catch the physical characteristics of the traffic congestion on the road networks. In this presentation we aim at providing a comparative framework on Machine Learning techniques for Short-term traffic predictions.

Natalia Isaenko received her Master's degree in Transport Engineering (2014) at La Sapienza University in Rome and was honoured "Excellent Graduate Student" award for outstanding academic achievements. Upon graduation she joined Transport Department of the University of Rome "La Sapienza" as a grant holder within a multidisciplinary project concerning application of online traffic analysis and methods for traffic estimation. She started her Ph.D in Short-Term Traffic forecasting in 2015 at La Sapienza University in Rome.