enviroCar – citizen science for sustainable traffic

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Optimizing traffic flow is a challenging task, affecting both the mobility of people and the environment. Up to now, traffic monitoring is based on small samples using GPS devices or remote sensors such as cameras. Citizens are usually not actively involved in the process of collecting or analyzing traffic data. The enviroCar project (www.envirocar.org) aims at addressing this situation by providing an open platform that can be used by everyone to collect and analyze traffic-related data and thus to achieve sustainable traffic management by answering questions such as: How is the average speed on a certain route? Where are exceptionally long waiting times in front of traffic lights? At which crossings do more cars stop than drive through? Where are hotspots of fuel consumption and air pollutant emission during a certain time interval?

In this presentation, an overview on the enviroCar project is given and current research challenges addressed in the context of the project are presented. Citizens are able to participate by registering at the enviroCar portal and downloading the enviroCar Android app. Once installed, the Android app allows citizens to collect car sensor data, e.g. speed, mass air flow, or intake temperature via an On-Board Diagnosis 2 (OBD-II) Adapter. After finishing a car ride, the data can be uploaded to the central enviroCar server where the data is anonymized and published as open data. Each enviroCar member has a profile page giving control on his own data and providing statistics on personal driving behavior. The portal also allows comparing personal statistics with the statistics of other members. It thus facilitates analysis whether, for example, a member is driving in a more fuel saving manner than other users.

Besides only acting as a data collector, citizens can also explore the enviroCar data in online maps or download the data in standard formats for certain spatial areas and/or time intervals allowing them to conduct spatio-temporal analyses by themselves. Thus, the platform also provides a means to analyze issues, such as repeated stops at a particular traffic light, and to communicate the results to other stakeholders, e.g. traffic planners or politicians. For traffic planners, the enviroCar project can also serve as a valuable additional data source for evaluating certain decisions, e.g. changing traffic light sequences.

As not only the pure GPS data but also the car sensor data is collected, enviroCar enables to directly relate the traffic data to environmental parameters such as air pollutant emissions and thus to identify, for example, hotspots of CO_2 emissions in a street network. Current research activities comprise technical issues, such as implementing scalable solutions for visualizing and analyzing big data sets, on improving estimation methods for fuel consumption and air pollutant emissions, but also include the development of novel spatio-temporal analysis and visualization methods and novel incentives for participation in crowd-sourcing and analyzing geospatial information.