



## **Mobility profiling from Smartphone sensordata: confidently know how people travel**

**Mobidot** provides ICT tools and services to her business customers to support smart mobility solutions for end-users. Our goal is to support and help organisations, who are active with mobility and transport management, to get insight into the travel behaviour of their target groups in a flexible and cost-effective manner and to provide them with incentive tooling to influence the travel behaviour of people in a personal way.

With the rapid penetration of Smartphones in our society new opportunities emerge to tackle the social and economic problem of mobility in a more human-centered way. We call this personal mobility. Smartphones make it possible to measure travel behavior at the individual level. Mobidot has developed tracker software that, integrated in an App, measures individual outdoor movements in a 24x7 automated manner using, in a smart way, the sensors of the Smartphone. The tracker software is coupled to the Mobidot central software platform which enriches, cleans, analysis and stores the displacement data of the individual and deduces a personal mobility profile (travel logbook) out of that. This knowledge is used to provide tailor-made feedback and information to the traveler and encourage and entice the individual to smart mobility choices. These personalised incentives for mobility improvements can include social community and gamification features to make people move better.

Taking into account people's behavior and what people find important creates new opportunities for governmental authorities, but also for stakeholders such as employers, transport companies or event organisers, to solve transport and traffic bottlenecks in an alternative way. Not through expensive investments in infrastructure, but to look for smart ways to know more on individual travel behaviour and help and challenge people to optimize their travel.

### **SWI Problem formulation.**

Our SWI problem formulation focusses on advancing the quality of our data derivation. Mobidot infers the *route*, *role*, *objective* and *mode* of transportation from Smartphone data. Smartphones possess a variety of sensors, including GPS, mobile telephone (4G) and wi-fi signals, accelerometer-based mode, etc. that can be used to determine the motion and position of the user, when coupled with geographic databases.

The continual monitoring and recording of data from Smartphone sensors and the comparison with online geographic databases strains battery usage, and hence a sensing strategy must be devised to optimize information gathering with minimal energy usage. The **first objective of the SWI problem** is to optimize data measurement quality against battery usage. Sub-objectives:

- 1) Devise an optimal scheduling plan for sensing, for instance, regularly via a Smartphone in 'heartbeat' operating mode that detects changes in travel patterns.

Detection of optional triggers, adjustment of sensing intervals depending on transportation mode inferred.

- 2) Develop a method to filter data on the mobile site in such a way that the crucial information is contained, while the redundant information is thrown away, yet maintaining the performance of the trip analysis (route, mode, role, objective).
- 3) Develop methods for inferring motion given sparse data (intermittent or incomplete).

The **second objective of the SWI problem** is to detect obvious errors in the automatically derived role, objective and mode detection as already performed by the central software platform of Mobidot:

- 1) Identify, based on the provided dataset including Smartphone sensor data (GPS, telephone and accelerometer), (online) geographic databases, and the already inferred information by Mobidot, what the obvious cases are where the automatic inference is likely to be in error.
- 2) Minimize false inferences ('ghost trips'). These are displacements that are detected by the system, but which are not really made by the end-user. A potential reason is GPS drift or a series of inaccurate locations.

Mobidot will provide all relevant and needed data to be able to develop data deduction improvements and test approaches and methods. This includes sample Smartphone multi-sensor data, sensor energy usage stats and samples of resulting anonymised mobility profiles