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Institut für Technische Informatik
und Kommunikationsnetze
Computer Engineering and
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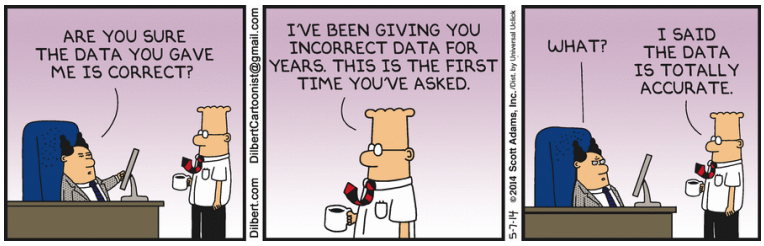
Semester Thesis:

Towards High Data Quality in Mobile Crowdsensing



Motivation and Informal Description: In the recent years the concept of *crowdsensing* has become a powerful instrument for collecting information about physical environments. A large group of users equipped with mobile devices (smartphones or smartwatches) collectively extract data to monitor a certain process of common interest. For instance, Google uses location traces of smartphones to generate city-wide traffic estimations. Other famous examples are *OpenStreetMap*, noise (*NoiseTube*, *Ear-phone*), air quality (*OpenSense*) or water level (*Creekwatch*) monitoring.

An important challenge in typical crowdsensing applications that has often be overlooked is data quality. Mobile devices are usually equipped with low-cost sensors and, thus, their data can be affected by various human activities during data collection. For instance, measuring the room temperature with a smartwatch might be inaccurate if the user is currently enjoying a hot soup. A similar behavior might be observable if the user is walking instead of standing still while taking measurements. In other words, the context of users can degrade the data quality in crowdsensing applications.

Tasks: In this thesis we want to investigate the effect of various contexts on data quality of mobile devices and develop powerful mechanisms to tackle this problem. This involves the following coarse tasks:

- Development of a sensor deployment consisting of *(i)* static sensors in our office space (ETZ G floor) and *(ii)* mobile sensors using a wristband (e.g. the *Thunderboard Sense* from Silicon Labs) and a smartphone.
- Conducting experiments to identify and analyze the dependency of user context on data quality. We will use the measurements from the static sensors as reference (ground-truth) and compare them to mobile measurements in various contexts.
- Development and evaluation of mechanisms and algorithms to tackle low data quality. This can be done using simple sensor fusion concepts or complex machine learning approaches.

Requirements: Basic programming knowledge. Previous knowledge in C, Android development (Java) and Tensorflow (python-based machine learning tool) can be advantageous but is not required.

Interested? Please have a look at http://www.tec.ethz.ch/research.html and contact us for more details!

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