Cross-Platform Mobile Sensing and Activity Recognition

Key words: mobile computing, activity detection, classifier converter, UI adaption

There are many smartphone apps on the market that track a user's activity, eating behavior, fitness, sleep and so on. Though, most of these apps work for one operating system and require the developer to have programming knowledge. Moreover, they do not offer their recognition services and results to other apps.

What we want to achieve is a cross-platform mobile activity recognition platform which enables a crowdsourcing of training data and a delivery of activity classifiers to a wide range of web and cross-platform applications. We will build up upon existing TECO systems such ActiServ [1] and jActivity [2] and leverage their crowdsourcing and sensing capabilities.

You will implement a way to deliver activity recognition classifiers in a unique format to several applications. Hence, you will review available, state-of-the-art classifier formats and libraries and define a suitable, common output format such as JavaScript or JSON.

The converter will be tested with at least three different input classifier types. Moreover, the generated classifier will be exemplary implemented into an example web application. This might be a website that adjusts its font size depending on the user activity. In a next step, user preferences such as "preferred walking font size" might be collected and stored locally on the device.

In summary, your task within this topic are:

- Building up on existing activity recognition approaches
- Review of common classifier systems and formats
- Implementation of a classifier converter
- Evaluation of the classifiers in an example web application
- Real-world evaluation to gain training and test data
- Scientific working and writing

Work share for the first semester: 5 ECTS lecture, 3 ECTS seminar, 2 ECTS practical work.

Requirements: Web programming, JavaScript; knowledge about machine learning (WEKA, R, Mahout, Spark MLlib , …) or programming languages runnable on servers (e.g. Python) are desirable

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References:
[1] http://www.teco.edu/~berch/publications/ISWC10
[2] http://www.teco.edu/~budde/publications/MUM2013_poster_hauber.pdf