ETH
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TIK
Institut für Technische Informatik
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Computer Engineering and
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Semester or Master Thesis:

Healthy Navigation

Motivation: Urban air pollution is a major concern in modern cities. Atmospheric pollutants considerably affect human health; they are responsible for a variety of respiratory illnesses and some are known to cause cancer if humans are exposed to them for extended periods of time. Additionally, air pollution is responsible for environmental problems, *e.g.*, acid rain and depletion of the ozone layer.

As part of the OpenSense project, we build small sensor nodes to monitor different air pollutants, such as ozone, carbon monoxide, and ultrafine particles. The sensor nodes traverse the city of Zurich on top of 10 trams. We use the collected measurements to construct high-resolution exposure maps of Zurich, as illustrated on the left side of Fig. 1.

Figure 1: High-resolution exposure maps can be used to find optimal routes with low exposure levels.

Task: The goal of this thesis is to use high-resolution exposure maps to find optimal routes between two arbitrary locations in Zurich. This involves the following tasks:

- Study related literature and come up with an idea how to calculate the most healthy route.
- Implement an algorithm of your choice and evaluate its efficiency (*e.g.*, regarding distance, exposure level, and change in altitude).
- Compare your algorithm with a standard navigation algorithm (*e.g.*, Google route planner).
- Make your Healthy Navigation Service easily accessible with a smartphone and let us know if your friends like using it ;-).

OpenSense web page: www.opensense.ethz.ch

Requirements: For this thesis, you should enjoy programming in C++ or Java and be interested in solving optimization problems efficiently.

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

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