



Drive-By Sensing for Urban Monitoring: An Optimization Framework

Problem description

Drive-by sensing is a relatively new approach that leverages mobile platforms such as buses, taxis, and bikes to provide extensive spatiotemporal coverage of sensor networks for various applications, including air pollution monitoring, traffic monitoring, and pedestrian flow monitoring.

This thesis aims to develop an optimization model for sensor networks by integrating mobile platforms with the objective of maximizing spatiotemporal sensor network coverage while minimizing costs. The proposed model determines the optimal combination of mobile platforms for sensing tasks based on schedules and real trajectories. The decision variables include the type of sensors, as well as the type and number of mobile platforms used for sensing tasks. This approach will be applied to a real-world case study in the Netherlands, focusing on a specific application to enhance sensor network performance while considering constraints such as budget and accuracy.

Assignment

The project will involve the following steps:

- Collect and process data on the trajectories of mobile platforms.
- Develop an optimization model for a sensor network by leveraging mobile platforms for sensing tasks.
- Apply the proposed approach to a real-world case study to evaluate the performance of the developed model.

Candidate background

Should have: coding skills in Python, knowledge of optimization and heuristics methods.

Good to have: Data analysis and visualization skills.

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