Public Transport Flow Simulation

MobiLab - [redacted] 2019

Project Description

The aim of this project is to build on/extend the research of a previous research intern in the MobiLab team. This research has been exploring the possibility of creating simulations of public transport vehicles (metro & tram) and their travelers by extending the OpenTNSim package of TU Delft. The resulting simulations, which have been ran on a small part of the public transport network of Amsterdam, have been proven useful for **creating insights in the effects of closing down certain public transport lines**.

These types of scenario's are not just interesting from a theoretical viewpoint, but they can also yield real-world impact. Example: the municipality is currently in the process of **repairing its quays and bridges**, and in order to do this, certain transportation lines have to be closed down for extended time periods. The insights from network simulations could be very useful to create **scenario blueprints for closing certain public transport lines, in order to allow for specific quay/bridge repairs**. In the most ideal scenario's, other transport lines would not get overloaded, and travelers only experience minor amounts of inconvenience in terms of increased travel time and (walking) distance to/from stations.

The municipality of Amsterdam would benefit greatly from research in the direction described above. Furthermore, the research ideally leads to a basic **open-source tool** to support the municipality of Amsterdam and the public transport provider of Amsterdam (GVB) in creating alternative scenario's in cases of scheduled partial network downtime.

Possible research questions

- How can we **extend or overhaul the current simulation approach** so it **runs efficiently for the entire network**, instead of just a small part of the network?
- How can we optimize the behavior weights used in our simulation, in order to fit our real world data (**ground truth**).
- How could we automatically **create proposals for alternative scenario's** (e.g. letting certain lines run more often, etc.), when parts of the network are scheduled for downtime?
    - Ideally, such solutions mitigate the risk of an increased load of other transport lines, and take the needs of public transport travelers into account.
- How can we **connect our alternative scenario proposals to the actual reality of public transport planners** and their available domain knowledge?
    - Is it actually possible to make certain lines run more often (are enough vehicles and drivers with the necessary knowledge/skills available)?
    - Will people actually take the alternative routes that they would take based on their behavior in our alternative scenario's, or do they have to be informed on the spot or beforehand of the changed situation?
    - Is there any other domain knowledge which would be relevant for creating our simulation model, and for proposing alternative scenario's?

What will the work environment look like for the student?

You will work in the MobiLab team, which has working spaces at the **Datalab** of the Municipality of Amsterdam (Weesperstraat 113) and the **Amsterdam Institute for Advanced Metropolitan Solutions** (Marineterrein Amsterdam). MobiLab is a team of experienced software developers and business analysts, which is knowledgeable regarding machine learning and simulation methods.

What we offer:

- A pleasant working environment
- Collaboration with a team of experienced people
- Responsibility over your project and progress
- A possibility to contribute to (your own?) smart city development
- A monthly internship compensation

From students, we expect the following:

- An independent work ethic
- Machine learning knowledge
- An keen interest in simulation
- Python programming skills
- And most importantly: a passion for their field, an ambition to learn, and a drive to make Amsterdam even more beautiful!