



City-wide benefits of shared taxi rides

General description

Modern taxi services, also known as ride-hailing services, like Uber and Lyft offer in addition to individual rides also shared rides, where travellers pay less while allowing for longer travel and/or waiting time. Pooling passengers into shared-rides is believed to be a game-changer in modern mobility as a service (MaaS). There are high expectations on reducing congestion and externalities of car traffic through providing door-to-door alternative service at a low price. At the same time, the potential for pooling rides and the additional empty-vehicle trips it may induce, remain largely unknown and call for the development of new methods and experiments.

Recently proposed methods allow to match trips into attractive shared rides, applicable also for large sets of urban trips. Single OD trip requests are effectively matched into shared rides, attractive due to price discount compensating for the discomfort of sharing. Resulting shared-rides may be further analysed and quantified to understand the actual scale and potent of trip sharing benefits.

Assignment description

In this programme you will use shareability algorithm recently developed at the Smart Public Transport Lab, where trip demand for Amsterdam and other Dutch cities is matched into shared-rides.

Shared rides resulting from the algorithm are subject to a number of factors:

- spatial and temporal distribution of the demand,
- demand structure (trip purposes, activities chains, sociodemographic of travellers)
- behavioural parameters (value-of-time, so called willingness to share, etc.)
- system settings of shared-taxi (discount for shared rides, scheduling horizon, matching objective).

You will use and develop the in-house python code and run series of experiments to analyse, visualise and describe the resulting shareability and possibly develop and extend the method.

There are several possible master thesis topics that can be pursued in this context, including:

- optimal capacity of shared vehicles (is three enough, or using 8 person vans is desirable),
- optimal sharing discount and how it changes with the demand (how much cheaper than an individual ride does a shared ride need to be?)
- are the shared-trips profitable for service providers
- how sharing changes with trip density, is it more effective for longer or shorter trips, for condensed or dispersed origins/destinations
- machine learning methods to quickly identify shareable trips in a very large search space.

Candidate background

T&P or TIL students who have knowledge and interest in network and demand analyses and have very good programming skills, in particular with Python and have affinity with optimisation. Able to handle large datasets and large-scale computational requirements.

Research group

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