VACANCY INTERNSHIP PROJECT

We are looking for students interested in carrying out their internship project at DAT.Mobility

Estimation of discrete choice models for tour based strategic transport models

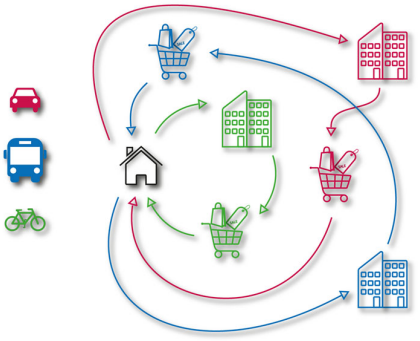
In strategic transport models, traffic is a result of the process of travellers choosing a destination, mode of travel, route and departure time. Most strategic traffic models contain behavioural choice models for each individual choice tied together partly sequentially and partly simultaneously, often imposing conditions of some form of equilibrium (e.g.: user equilibrium or system optimum).

Most choices are modelled using discrete choice models employing the concept of utility maximization. Estimation of these models comes down to iteratively specifying utility functions for each of the discrete choices to be modelled (e.g.: car, bike and public transport in a mode choice model) and performing log-likelihood maximization to find parameters that best fit to a dataset containing observed choices (usually data from a survey). The utility functions employed may contain attributes of the alternative (e.g. the travel time for mode car or the access time, travel time and number of interchanges for public transport), but also attributes of the decision maker (e.g. his/her age, income or household situation).

In the current estimations OViN (CBS, n.d.) is used as the dataset with observed choices. It contains observations reported by its respondents themselves from a week of travel of about 30000 persons).

Problem description

It is well known that by applying market segmentation, the quality of discrete choice models can be improved. In strategic transport models market segmentation is usually applied using the trip purpose (e.g.: work, business, school, shopping, recreational, other) by splitting up the dataset by purpose and then estimate different models for each of them.



Recently, DAT.Mobility has been involved in development of tour-based models that model trips combining multiple purpose into a tour (a chain of different trips). This means that market segmentation should also take place on tour-level. A naïve approach would imply to segment towards all relevant combinations of purposes within a tour; i.e.: all pair wise combinations (‘tuples’) from the set of trip purposes.

However, such segmentation has proven to lead to too small data sets per purpose combination when using OViN. Recently DAT.Mobility together with Kantar and Mobidot has started its own mobility panel (Nederlands VerplaatsingsPanel – NVP) which continuously monitors travel behaviour using a smart phone app component that has access to the geolocation of the phone. From this data origins, destinations, used mode of transport, departure time and routes can be derived. The NVP currently contains about the same number of persons as OViN, but it gathers data year round (instead of just a week). Furthermore, it contains observed instead of reported data and the number of participants is still growing.

Internship / masters thesis assignment

The goal of this research is to find out how to efficiently model mode and destination choices in the context of strategic tour-based transport models. Initially, as a reference, the naïve approach (estimating separate models for each trip purpose tuple) should be applied on OViN data to determine how many and which segments produce insignificant models. Then, the same estimations should be applied on the NVP data to determine to what extent the problem of insignificant models is solved by using a larger dataset. Based on insights from these two estimation a estimation set-up should be developed which results in a set of only significant models. Possible ways to achieve such a setup are:

- Merging segments (purpose combinations) to increase the number of observations per segment
- Adding segment-specific attributes to the utility functions (until now the utility functions for different tuples have simply inherited their attributes from the trip based model of the most important purpose in the tuple).
- Employing a discrete choice modelling type that is more suited to the choice situation at hand and may therefore more efficiently use the data. First off candidates would be to try to use (cross)nested logit or some other type of GEV (generalized extreme value) model that combines multiple segments (tuples) in one estimation process.
- Other ideas developed during the internship…

Research group

DAT.Mobility Deventer

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Literature

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