

VACANCY INTERNSHIP PROJECT

We are looking for students interested in carrying out their internship project at Dat.mobility

Including observed data on trip level into a tour based travel demand model

Problem description

Recently, Dat.mobility has added the tour based microscopic travel demand model Octavius to OmniTRANS transport planning software (see <https://www.slideshare.net/LuukBrederode/development-of-a-microscopic-tour-based-demand-model-without-statistical-noise2> for more info). This explanatory model can be used to forecast the number and type of tours (activity chains) along with their destinations and modes for each individual person and household within the study area. The behavioral models within Octavius are estimated directly from travel survey microdata, but their estimation method does not allow to include observed mode- and destination choices on more (spatially) aggregated levels (e.g. mobile phone, OV-chipcard or ANPR data). However, these more aggregated data sources are included in the Mobility Spectrum (Possel et al., 2020), which is a descriptive multi-proportional gravity model (Brederode et al., 2019) that fuses these data together with network and land use data into a consistent set of origin-destination ('OD') matrices on trip level.

To refine Octavius with these aggregated data sources, its effects on the tour-level may be split up into effects on trip-level, which can then be projected onto the OD matrices from the Mobility Spectrum using a pivot point method (Daly et al., 2005), but the split up from tours to trips would break tour consistency (matching end- and start points of subsequent trips in a tour).

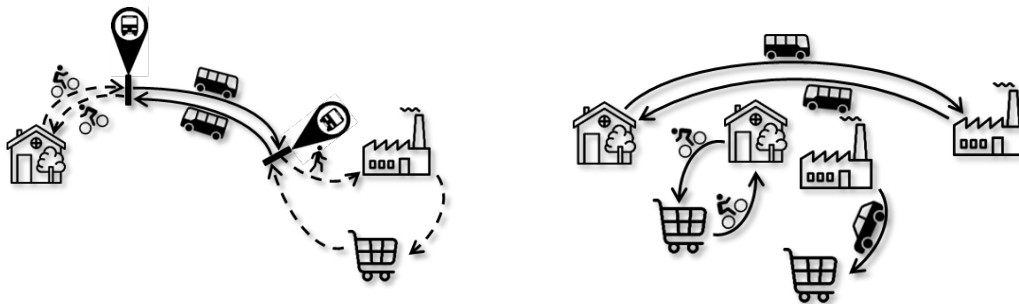


Figure left: a home-work-shopping-home tour; figure right: typical representation of the same tour in a trip based transport model

Internship / Master thesis assignment

The goal of this research is adapt or develop an alternative method to include aggregated data sources in Octavius. This could be in the form of a more advanced pivoting method, but alternative approaches may also be considered. Roughly, the assignment will consist of the following stages:

1. Literature research into mode and destination choice models within strategic transport model systems (e.g.: Ortuzár and Willumsen, 2011)
2. Literature research into pivot point methods and their extendibility from trip to tour and alternative methods
3. Selection and implementation of a limited number of promising methods in prototypical form
4. Conduct tests on theoretical small transport model instances to select most promising method
5. (if time allows) conduct case study on the strategic transport model of Almere to compare the most promising method with the reference method (pivot point on trip level).

Research group

Dat.mobility Deventer

Daily supervisor: Ir. Luuk Brederode (Dat.mobility, Delft University of Technology)

When interested in this internship or Masters thesis assignment on Including observed data on trip level into a tour based travel demand model, please contact Ir. Luuk Brederode (lbrederode@dat.nl), +31 (0) 627369830)

References

- Brederode, L., Pots, M., Fransen, R., Brethouwer, J.-T., 2019. Big Data fusion and parametrization for strategic transport demand models, in: 2019 6th International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS). Presented at the 2019 6th International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS), pp. 1–8. <https://doi.org/10.1109/MTITS.2019.8883333>
- Daly, A., Fox, J., Tuinenga, J.G., 2005. Pivot-Point Procedures in Practical Travel Demand Forecasting (No. ersa05p784), ERSA conference papers. European Regional Science Association.
- Ortuzár, J.D., Willumsen, L.G., 2011. Modelling Transport, 4th Edition, 4th edition. ed. Wiley.
- Possel, B., Graaf, S.D., Brederode, L., 2020. The Mobility Spectrum: A data driven strategic transport model for the whole of The Netherlands. Presented at the European Transport Conference 2020, online due to COVID19, p. 12.