Chair of Traffic Engineering and Control
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Systematic Integration of Heterogeneous Urban Demand Data into a Microscopic SUMO Simulation Framework

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Motivation / Background

- Urban areas are characterized by **multimodal traffic demand**
- Demand generation for microscopic traffic simulations typically relies on **heterogeneous data sources** that differ in spatial coverage, temporal resolution and transport mode representation
- The 'MCube DatSim 2.0' project aims at developing a **data-driven multimodal demand and network generation framework** for microscopic traffic simulations, based on the example of the city of Munich - the goal is the development of a 'Digital Mobility Twin' for ex-ante evaluations of the impact of mobility interventions on urban air quality

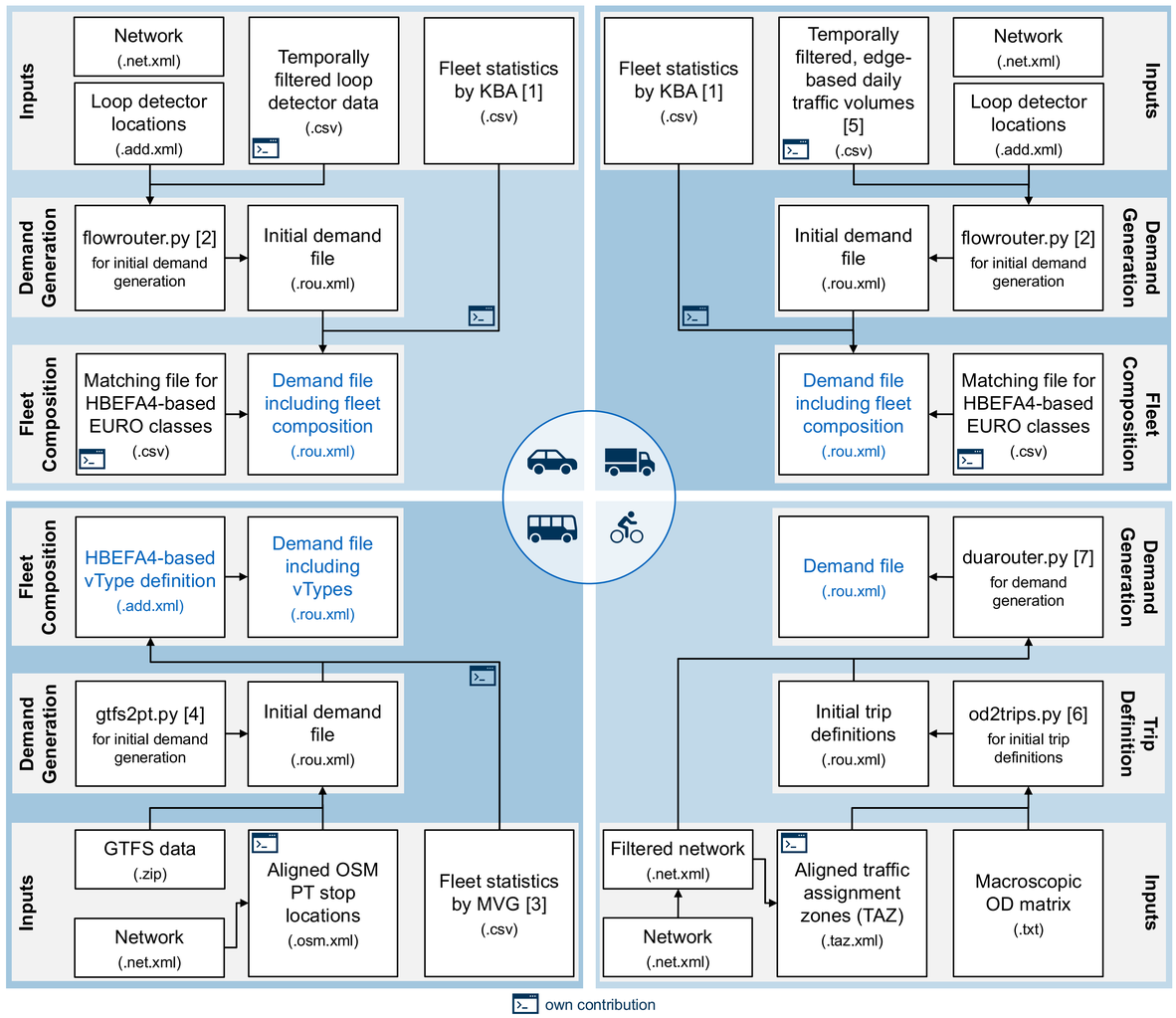
General Approach

- Aligned with an underlying SUMO network for parts of the city of Munich (study area covers approx. 11.6 km^2), the proposed framework generates **temporally consistent mode-specific demand files** based on:
  - (i) Lane-specific loop-detector data for *motorized traffic*
  - (ii) GTFS data for *public transport*
  - (iii) Spatially resolved maps of daily *heavy duty traffic*
  - (iv) Macroscopic OD-matrices for *bicycle traffic*
- Subsequently, the proposed framework can generate **reproducible demand scenarios that assign mode-specific fleet compositions** (HBEFA4-based EURO classes) based on available fleet composition statistics
- The proposed framework relies on geospatial matching rather than network-specific attributes, such as edge or lane IDs, to **ensure transferability across networks**

The complete simulation setup, including data processing scripts, input data and generated mode-specific demand files (with assigned fleet composition) is **available on GitHub**

GitHub

Methodology



Limitations

The proposed demand generation framework:

- partially requires manual input, such as the creation of auxiliary matching files
- is developed for specific data formats
- The generated mode-specific demand files:
- currently lack calibration and validation

Future Work

- Integration of further data sources (e.g. where currently manual matching files are necessary) and further data formats
- Evaluation of loop detector quality
- Microscopic traffic data collection for 17 intersections in the study area over a period of 6 months
- Calibration and validation of initial demand generation (flows, turning rates, queue lengths at intersections, etc.) and road user behavior (e.g. acceleration, deceleration, car following)
- Open-source publication of calibration and validation data and pipeline

References

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