

“Development of a Python-Based Method for Converting OpenStreetMap Railway Data into RailML Data to be used for Railway Capacity Analysis”

The increasing availability of open geospatial data offers new opportunities for data-driven railway operations analysis. In particular, OpenStreetMap (OSM) and its railway-specific extension OpenRailwayMap provide detailed, publicly accessible infrastructure data. However, this data is not directly compatible with established railway modelling and simulation tools, which typically rely on standardized data formats such as RailML.

The objective of this thesis is to develop a Python-based method for extracting railway infrastructure data from OpenStreetMap (with a focus on OpenRailwayMap) and converting it into a structured RailML representation. The resulting RailML data set shall be suitable as an input for railway operations and capacity analysis in the context of railway operations research.

First, the fundamentals of railway capacity analysis and its data requirements shall be explained. Afterwards, the relevant OSM railway data structures, tags, and relations, as well as the identification of required infrastructure elements for performance studies have to be analysed. Based on this analysis, a modular and extensible Python workflow shall be designed and implemented to parse, process, and map OSM data to corresponding RailML elements.

Furthermore, the developed method shall be validated using multiple representative railway network sections. The resulting RailML output shall be assessed with regard to completeness, consistency, and suitability for subsequent railway performance or capacity investigations.