

Line planning for freight-passenger mobility systems



Problem description

In this thesis, the aim is to integrate freight transportation into urban rail transit systems, effectively combining passenger and freight transport. With the rapid growth of the global economy and e-commerce, freight transportation has surged, putting immense pressure on road networks and exacerbating environmental pollution. Therefore, utilizing existing urban rail transit infrastructure for freight transport during off-peak hours presents a promising solution. In off-peak periods, urban rail systems can be underutilized for passenger mobility, allowing freight services to use the excess capacity. Strategic-level decisions need to be made regarding line planning, train capacity allocation, and truck routing for deliveries on roads. The proposed approach will be applied to a case study in Beijing, where the metro system has successfully integrated freight transportation, providing an innovative solution to reduce road congestion, lower emissions, and enhance the utilization of urban rail infrastructure. This approach aims to achieve economies of scale, optimize resource utilization, and increase overall system efficiency and profitability. Moreover, it promises to improve urban logistics by providing a reliable and sustainable alternative to traditional road freight, contributing to more environmentally friendly urban mobility solutions.

Assignment

The project will involve the following steps:

- Identify different demand scenarios for both passenger and freight transport.
- Design a strategic-level optimization model for this problem.
- Introduce a heuristic algorithm for an integrated network of passenger and freight transport.

Candidate

- Should have: coding skills in Java, knowledge of optimization and heuristics methods.
- Good to have: knowledge of column generation algorithm, routing modelling.

Research group

Sustainable Urban Multimodal mobility (SUM)

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