



Passenger delay causes and propagation in metro systems

Problem description

Metro operations are subject to recurrent disturbances. Facilitated by the availability of smartcard data, public transport operators increasingly shift into measuring delay from passengers' perspective. Based on tap-in and tap-out records, the operator can estimate the delay experienced on each trip. However, the relation between these delays and their causes is still largely unknown. What is the contribution of different disruption types (e.g. vehicle breakdown, signal failure)? Which passengers are affected by a disruption at a certain station? How can the spill-over effects be measured? Answering these questions will support planners and operators in associating causes with effects and use it to develop business cases for investments/mitigation measures.

Objectives and assignment

The objectives of this master thesis project is to relate causes and effects using statistical and network analysis methods. First, the impacts of various disruptions on passenger time losses using a large database consisting of passenger, train and disruption data for the Washington DC metro system. Second, a model for capturing passenger delay propagation and applying it to the data from Washington DC. The model should co-relate causes and durations of disruptions with spill-over effects, i.e. a pass-delay propagation model, possibly also looking into estimating the recovery time.

Candidate background

T&P or TIL Students who have knowledge and interest in public transport operations, and have affinity with data analysis and mathematical modelling.

Research group

Transport & Planning Department
Daily supervisor: Dr. Oded Cats

External support

The project is performed in cooperation with the Rail group in Washington Metropolitan Area Transit Authority (WMATA), a government agency that operates transit service in the Washington Metropolitan Area in the US.

Information

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