



Data-driven approach for quantifying resilience in railway networks

Problem description

In the Netherlands, internal factors causing failures (e.g. infrastructure, vehicle) take up to 70% of all disruptions in the network. On average, about 14 of such disruptions occur every day. Some of these disruptions remain even unnoticed by passengers, e.g. a switch failure in Vlissingen. However, others generate problems spreading all over the network causing many cancelled and heavily delayed trains leading to great dissatisfaction of passengers. For example, on 22 August 2018, signal and point failures caused that almost no trains run through the Schiphol tunnel for most of the day affecting tens of thousands passengers (<http://tiny.cc/Schiphol>).

Therefore, it is crucial to determine the most critical disruptions in order to build awareness within railway stakeholders, be better prepared and take greater attention before such disruptions occur. Also, railway planning could take into account such disruptions to improve resilience of future operations. Finally, knowing critical elements would lead towards better allocation of emergency teams and reserve rolling stock in order to respond faster to future disruptions.

Assignment

- Analyse current approaches for estimating resilience in transport networks
- Analyse real historical railway traffic realization data
- Define new resilience metrics
- Develop a data-driven approach to estimate most critical elements
- Write a report and a scientific paper

Background

A student will have an opportunity to further develop skills in data analysis, machine learning and/or programming. The project can be conducted as final thesis project or research project. The research can be performed within T&P or within a relevant company.

Reference

Bešinović N., (2020). Resilience in railway transport systems: a literature review and research agenda. *Transport Reviews*, <https://doi.org/10.1080/01441647.2020.1728419>

Information

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