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Optimization and its Applications  
in Learning and Industry  
(OptALI)

IRSES

Ongoing Deliverable D1.2

Operations Research for Robust Bus  
Timetables in Auckland

Start date of the Workpackage: December 2010

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Participants: UGOE  
UNIKL  
DTU  
UOA  
UC

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# Research Seminar

offered by Marc Goerigk (?-UGOE-?)

February–July ? 2012,

in Auckland, New Zealand

Subject: Operations Research for Robust Bus Timetables in Auckland

Problem: A well-known problem arising in public bus transport systems is the clustering of buses of the same line. The delay of a single bus will cause more passengers waiting for this bus, thus increasing the time it needs to stop at shelters, and therefore further increasing its delay, while the following bus needs to pick up less persons and thus reduces its distance to the previous bus. This way, it is an unfortunate yet common sight to find three buses arriving at the same time.

Operations Research is able to provide assistance in the timetabling process in order to avoid this problem. In this project we consider different approaches to improve the timetable reliability using optimization tools.

Main Results: We designed a software tool that makes use of a feedback loop between two phases: A microscopic simulation tool, and a macroscopic optimization tool.

In the simulation step, we evaluate the robustness of a given timetable by using detailed models concerning bus travel times, passenger boarding and deboarding, and bus capacities.

The resulting robustness measure is then used in an optimization step to calibrate the data of a linear integer program that finds the most robust timetable under additional constraints controlling the level of service quality.

The resulting timetable is then fed back to the simulation step, and so on until a timetable with desired characteristics is found. Experimental results are pending.

Participants: students and researchers from UOA.

Publication: