Dynamic delay management at railways: a Semi-Markovian Decision approach

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At railways the capacity is scarce. An increasing demand challenges policy makers to think of innovative ways in which the current infrastructure might be used. The Program for High-Frequency Railway Transport (in Dutch: Programma Hoogfrequent Spoorvervoer), which has been launched recently by the Dutch government, is an example of such innovative movement. This program sets aside the traditional timetables, which characterize the railways nowadays, and paves the way for timetable-free railway operation. This new approach will result in a dynamic environment which requires conflict resolution methods that are dynamic and robust. But even in today's railway system, the need for such resolution methods is evident.

This thesis presents an innovative approach based on the theory of the Semi-Markovian Decision Processes and examines its potential as a dynamic delay management mechanism. The approach is compared to the resolution method used nowadays by ProRail (the Dutch railway infrastructure manager) and to a number of other heuristics. The research presented in this thesis shows promising results that reveal the potential of the approach.

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