Abstract

This work presents a modular system for the simulation of public transport schedules. Two simulation approaches are implemented and compared regarding speed and compliance of results to reality. One approach serves to analyze various priority queue data structures with respect to their impact on overall execution times of simulation runs.

The system is built around a database at first containing sample network and schedule data of the trams in Cologne provided by the Kölner Verkehrsbetriebe (KVB) AG. Other data could be incorporated easily due to the standardized data structure. A simple platform independent graphical user interface (GUI) module enables near-live analysis of simulation results.

Comparing the priority structures yields only a very small advantage for a custom-built structure over a more general priority queue structure, but a much larger time penalty for using an optimized heap structure directly suitable also for sorting and time rollback.

Regarding the different simulation methods the cellular automata approach runs very fast and reproduces most real phenomena, whereas the event based world view - consuming much more execution time when run with a precision of one metre and one second distance- and timewise - indicates the limit of realism achievable with the current scarce data largely reducing the artifacts produced by the cellular automata in some aspects.

The system already offers good support for public transport schedule planners enabling them to dry-test schedule alternatives with respect to a number of quality indicators enhancing the quality of operated schedules for the benefit of all public transport passengers.