Till fakultetsnämnden,

Anmälan: Önskemål om licentiatseminarium

-------------------------------------------------

Doktorandens namn och titel: Johanna Törnquist, Civ.Ing.

Forskarutbildningsämnets benämning: Datavetenskap

Examensbenämning: Teknologie Licentiat

Uppsatsens titel: Computer-based decision support for handling uncertainty in railway traffic and transportation

Poängomfattning för uppsatsen: 40

Datum, tidpunkt, lokal för licentiatseminarium: 8 januari 2004, kl. 13.15, Rio Grande, BTH, Karlshamn

Granskare: Dr. Per Kreuger, SICS (Swedish Institute of Computer Science)

Uppsatsen finns tillgänglig senast tre veckor före seminariet vid: http://www.assert.bth.se/Lic.pdf

Uppsatsens abstract:

Railway transportation has great potential, but interdependencies in the railway traffic make trains very sensitive to disturbances, which can be difficult to handle. Using railway in an intermodal transport chain may complicate the interconnections with other modes if there is large uncertainty in the performance of the railway. A study based on interviews with several customers of the Swedish National Railway Administration shows that the customers lack information regarding occurrences of disturbances and the consequences for their trains, i.e. the new estimated time of arrival. This information is necessary when taking actions within the customers’ organisation to minimise the negative impacts. Predicting the consequences of a disturbance and the effects of counter measures taken by the Swedish train traffic managers is today an overwhelming task considering there is no computational decision support available. However, provided that the traffic and decision-making could be simulated, the effects from disturbances and actions taken could be computed. Requirements regarding computational time for a simulation are obviously significant and affect the usefulness in a real-time environment. For strategic purposes, a simulator could also serve as an analytical tool for evaluating strategies for handling certain types of disturbances. An approach to model the different layers of such a simulator, taken into account the infrastructure, the traffic flow and the influence of the traffic management decisions and transport operators, is presented. The part that covers the interaction between train traffic and infrastructure has been implemented as a small-scale discrete-event simulator. The simulator is extended by an optimisation approach, attempting to act as decision support
for the train traffic managers when handling disturbances by generating effective counter measures. It is composed by a linear model specifying the timetable of a sub-network and solved by optimisation software. Iteratively, a heuristic is applied to modify the timetable by changing meets and overtakes and generate a new updated linear model to be solved. In addition to consider the train traffic system as an explicit part of a transport chain, it can be seen as a black box where some relations between input and output are known. We have investigated how uncertainty in the reliability related to one or several transport links can be handled when combining several links into a transport chain. A simulation-based approach is proposed.

Paul Davidsson                  Peter Värbrand
Biträdande handledare och examinator    Handledare