

Modelling equilibrium for a multi-criteria selfish routing network equilibrium flow problem

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Abstract

The selfish routing of network flow often considers a single objective, namely travel time or travel distance, and optimisation models are often guided by the principle of user equilibrium (UE).

A more challenging approach is to consider multiple objectives simultaneously, as for example distance, travel time and pollution. In this paper we present a bi-criteria problem whereby the road users selfish objective of minimising their travel time is at odds with the objective of minimising the overall fuel consumption of all road users.

Our aim is to manipulate “free” parameters such as speed limits, in an attempt to coerce the road users into behaviour which helps the latter objective. Motivated by the work done on the Price of Anarchy (PoA) into classifying the suboptimality of equilibrium with respect to the minimum total travel time we look to classify the equilibrium solutions with respect to a weighted sum model of the minimum total travel time and overall fuel consumption.

This talk is based on a joint work with Stuart Berry, Sam O’Neill (University of Derby, UK), Nicolae Popovici (Babes-Bolyai University, Romania) and Raja Ramachandran (Alagappa University, India).