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Effects of Anticipatory Control with Multiple User Classes

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Abstract

In this paper the integrated traffic control and traffic assignment problem is studied. This problem can be considered as a non-cooperative game in which the traffic authority, that controls the traffic signals, and the road users are the players, who use their own strategy and seek their own optimum. The game theoretical formulation leads to several different control strategies in which users' reactions to traffic control decisions are taken into account. Users' reactions can be the choice of route, departure time or even mode, but here only route choice is considered.

In this paper some of these control strategies for traffic signal control are described: Webster control, Smith's P0, Anticipatory Control and System Optimum Control. The first two control strategies are well known and described in the literature. The anticipatory control strategy can be formulated as a bi-level optimisation problem and this problem is solved using genetic algorithms. Also the system optimum solution can be found using genetic algorithms, simultaneously optimising route flows and green times.

In the paper the assignment method, together with the traffic model, is formulated. In the assignment several user classes, each with its own perception of route costs, are defined and taken into account. For several simple example networks the traffic control methods are tested and it is shown that taking route choice into account is beneficial to the network performance. Further research will focus on the improvement of the traffic model used in the control optimisation, realistic networks and the problem of departure time choice.

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