MULTICRITERIA TRAFFIC EQUILIBRIUM MODEL IN STOCHASTIC NETWORKS

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ABSTRACT

In general, traffic assignment models use travel time as the basis for path choice. They also assume that the link travel times are fixed and known by all travelers. However, link travel times do vary. Therefore it seems reasonable to assume that travelers are sensitive to this uncertainty. The assumption of this dissertation is that the travelers are sensitive to this variability and that they take it into account in making path choices. Moreover, travelers minimize a generalized cost that combines mean travel time with the variability in the trip time, either directly or through an indirect measure such as the 95^{th} percentile travel time. This gives an ability to guard against being late. In this research, an algorithm is developed that solves a multi-criteria traffic equilibrium model in which the travelers make route choices based on this combined generalized cost.

In addition, to show the benefits of using this new information, a capital investment study is conducted. It selects sets of link improvements that yield the greatest reduction in the average generalized cost when comparing the base case equilibrium solution with the new one. The investment strategies are concerned with future demand and improving the link capacities. The overall network performance is evaluated, such as total vehicle-generalized cost (network planners' perspective) or average generalized cost per vehicle (users' aim to minimize), and the best investment strategy is suggested based on the limits of capital resources.