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16. Abstract

MIOH UTC SC2p2-4 2010-Final

In just-in-time (JIT) manufacturing environments, on-time delivery is a key performance measure for dispatching and routing freight vehicles. Growing travel time delays and variability, attributable to increasing congestion in transportation networks, are greatly impacting the efficiency of JIT logistics operations. Recurrent and non-recurrent congestion are the two primary reasons for delivery delay and variability. Over 50 percent of all travel time delays are attributable to non-recurrent congestion sources such as incidents. Despite its importance, state-of-the-art dynamic routing algorithms assume away the effect of these incidents on travel time. In this study, we propose a stochastic dynamic programming formulation for dynamic routing of vehicles in non-stationary stochastic networks subject to both recurrent and non-recurrent congestion. We also propose alternative models to estimate incident induced delays that can be integrated with dynamic routing algorithms.

Proposed dynamic routing models exploit real-time traffic information regarding speeds and incidents from Intelligent Transportation System (ITS) sources to improve delivery performance. Results are very promising when the algorithms are tested in a simulated network of southeast Michigan freeways using historical data from the MITS Center and Traffic.com.

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