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RESEARCH SUMMARY

AN INTEGRATED KNOWLEDGE-BASED SYSTEM FOR REAL-TIME ESTIMATION OF INCIDENT DURATIONS AND NONRECURRENT CONGESTION DELAY FOR FREEWAY NETWORKS

Problem Traffic incidents have long been recognized as the main contributor of congestion in highway networks. On congested highways, any incident regardless of involving personal fatalities, injuries, or property damages will cause considerable reduction in roadway capacity due to lane closures or impediments. The capacity reduction during the incident duration will inevitably result in heavy congestion, delay, and thus lead to enormous socioeconomic loss. In the day-to-day traffic control and management, if some reliable way for predicting incident duration in real time is available, responsible agencies can convey information to travelers via the variable message signs (VMS), estimate the resulting queue length and the corresponding total delay, and assess the need to implement detour operations or any other control strategies.

Objectives The objective of this study is to develop an effective model for predicting the duration of a detected incident, allowing responsible agencies to estimate the queue length and the resulting delay. Traffic management teams can also use such information to inform drivers and to determine if any advanced traffic control or detour operations should be activated.

Description The entire project includes three parts: the first part presents the analysis results of incident data from Maryland CHART, an incident response program. The second part reports the calibration process that yields a Rule-based Tree model for predicting the duration of non-fatality related incidents. The third part highlights a supplemental model developed specifically for estimating the duration of incidents that result in fatalities or injuries. Potential applications of the developed incident duration models along with complementary delay as well as queue estimation models are also included in the report.

Results The proposed models have also been found to be quite flexible in assigning appropriate estimated incident duration ranges. For example, with the data set from years 2003 to 2005, the model predicted with 75 percent ***confidence*** for the duration of incidents occurring on weekdays, and with 94 percent ***confidence*** for fatality-related incidents occurred on weekends.

Report Information

This report is available from the Office of Policy and research, Maryland State Highway Administration.

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