Research Project: ***SP309B4F***
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RESEARCH SUMMARY

VALIDATION AND AUGMENTATION OF INRIX ARTERIAL TRAVEL TIME DATA USING INDEPENDENT SOURCES

Problem

Although the freeway travel time data has been validated extensively in recent years, the quality of arterial travel time data is not well known. This project presents a comprehensive validation scheme for arterial travel time data based on GPS probe and Bluetooth generated data as two independent sources. Moreover, a Context Dependent (CD) based travel time fusion framework was developed to improve the reliability of travel time information by fusing data from multiple sources.

Objective

Objectives of this project were twofold. First, a new coefficient-of-variation (CV) based travel time validation scheme was developed to compare and validate travel time for arterials. Second, a Context Dependent based travel time fusion framework was developed to improve the reported data quality.

Description

Comparing and validating reported travel time of one data source by using data from another source requires both spatial and temporal alignment of the validation segment. Travel time data provider companies that utilize probe technology usually report data on Traffic Message Channel (TMC) codes. In order to make data comparable between the sources, it is important to deploy Bluetooth sensors in line with the corresponding TMC segments. A portion of MD 355, major arterial corridor in Maryland, was selected and both probe and Bluetooth data was obtained for year 2012. In addition to time of day impact, various traffic conditions were evaluated in the analysis. Three statistical validation methods including “aggregate mean comparison,” “t-test based comparison” and “travel time variation categorization” were used. Validation results vary for weekdays and weekends. For weekdays, the reported INRIX travel time data showed a larger deviation from base data for time period 5:00-8:00 PM, the evening peak hour period. For weekends, the difference is relatively high during the entire daytime, but lower than that of the evening peak hour period on weekdays.

RESEARCH SUMMARY

In order to improve the data quality and reliability, a data fusion engine was designed that is capable of incorporating GPS probe and Bluetooth generated travel time data for an arterial corridor. The results show an increase in both temporal data coverage benefiting from the complementation of multiple data sources and accuracy of the estimated travel time by applying CD fusion operator.

Results

The CD based travel time fusion framework was used to merge data from INRIX and Bluetooth datasets in order to improve the data quality. The fusion model takes advantage of a fusion belief system corresponding to each fused data point to declare the reliability of the fused data. The model can be flexibly applied to scenarios with other independent data sources. The fused data, with a higher data quality, can be used in various applications such as travel time prediction and travel time reliability evaluation. Both validation and fusion methodologies were successfully applied on a case study in MD 355.

Report Information

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Link to Final Report:

http://www.roads.maryland.gov/OPR_Research/MD-15-SHA-UM-3-6_INRIX-Arterial_Report.pdf