Evaluation of Freeway Traffic Data Acquisition: Technology, Quality and Cost

Comparing the cost and accuracy of travel time data as provided by both Caltrans’ systems and third party vendors

WHAT IS THE NEED?

Travel time is of great interest to both Caltrans and the traveling public, and its direct measurement or estimation is an essential element of intelligent transportation systems. Innovations in wireless detectors, such as Bluetooth and Wi-Fi, bring new opportunities to directly acquire travel time measurements for freeways. Furthermore, private data providers, such as INRIX, Waze and HERE Maps, have integrated travel time data from various data sources including probe vehicle data. These active commercial data services are potential data sources that Caltrans can leverage through public private partnerships or purchase agreements. Caltrans management has requested that DRISI compare the cost of implementing wireless detection systems by state forces to purchasing similar data directly from vendors.

WHAT ARE WE DOING?

The proposed research will analyze the travel time, i.e. link travel speed, data obtained from the new Bluetooth travel time detection systems deployed on US-50 from Tahoe to Sacramento, and the WiFi travel time detection systems currently being deployed on I-80 EB and US-89, to quantify their accuracy and reliability, and compare it against data provided by private traffic data vendors. The data from both sources will be characterized and validated against traditional loop detectors data obtained from PeMS, Caltrans’ Performance Management System. A microscopic traffic simulation for a section of the studied sites will be developed and calibrated to study the effects of sampling rate and density on the accuracy of Bluetooth/WiFi travel time data. The speed data from the section of I-80 with dual loops will be used to estimate section travel times, and these estimated times will be used to ground-truth the Bluetooth/WiFi travel time data. The proposed research will also investigate the cost of acquiring segment travel time/speed data for various scales of coverage from potential vendors. These results will be documented in a final project report, where the pros and cons of various data acquisition methods will be highlighted.

WHAT IS OUR GOAL?

The goal is to compare the cost and effectiveness of implementing travel time data collection systems by Caltrans staff versus purchasing similar data directly from vendors.

WHAT IS THE BENEFIT?

This research will enable Caltrans managers to decide what to do in order to most efficiently and effectively impart travel time information to the motoring public. It will provide an understanding of the quality, reliability and other characteristics of travel time measurements from various sources. It will give insights into the effectiveness of various sampling rates, positions and distribution densities of potential Caltrans-deployed detectors and evaluate and compare the costs of alternative data sources from vendors.

WHAT IS THE PROGRESS TO DATE?

The Bluetooth travel time detection systems are already deployed on US-50 from Tahoe to Sacramento, and the WiFi travel time detection systems are currently being deployed on I-80 EB and US-89. A research panel has been assembled to assess the cost and effectiveness of data provided by these systems compared to that of data provided by various third party vendors. They have solicited and reviewed a proposal from a research institution at UC Davis. The next step is to execute a contract between Caltrans and UC Davis to perform the approved research.
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The system receives transmissions from individual Bluetooth devices at various stations.
Average travel times are calculated from event data

Average times to various destinations are displayed on Changeable Message Signs