Abstract:

Recent advances in communication and computing technologies made travel time measurements available more than ever before. On urban signalized arterials, travel times are strongly influenced by traffic signals. Yet, these travel times are rarely used to deduce information about performance of the signals. This study presents a novel method, based on well-known principles, to estimate performance of traffic signals (or more precisely their major through movements) based on travel time measurements. The travel times are collected between signals in the field, by using one of the point-to-point travel time measurement technologies. Closed-circuit television cameras and signal databases are used to collect traffic demand and signal timings, respectively. Then, Volume/Capacity ratio of major movement of the downstream signal is computed based on the demand and signal timings. This Volume/Capacity ratio is then correlated with the travel times on the relevant intersection approach. The best volume-delay function is found, among many, to fit the field data. This volume-delay function is then used to estimate Volume/Capacity ratios and, indirectly, few other signal performance metrics. The method, called Travel Time based Signal Performance Measurements, is automated and displayed on a Google Map. The findings show that the proposed method is accurate and robust enough to provide necessary information about signal performance. A newly developed volume-delay function is found to work just slightly better than the Bureau of Public Roads curve. Several issues,
which may reduce the accuracy of the proposed method, are identified and their fixes are proposed in future research.

Stichworte:
Volume/Capacity Ratio, Travel Time, Volume-Delay Function, Traffic Signals, Intelligent Transportation Systems, Calibration, Validation

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