Scalable Methods for Monitoring Limited Access Roadways using Crowd-Sourced Probe Data

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Abstract

Commercial crowd-sourced probe vehicle data has been gaining traction in recent years as a ubiquitous and scalable resource for identifying traffic congestion on limited access roadways. It is routinely used in real-time by navigation software that displays color coded maps. However, outside of public agency traffic management centers, there are no factual “big picture” reports on traffic conditions. The media tries to fill this gap, but they either provide descriptions of construction locations, or highly subjective opinions. This paper proposes and illustrates a “big picture” characterization of regional and national traffic conditions using archived and real-time data. Average speeds of vehicles on segments of roadway can be retrieved in near real-time at one-minute intervals to produce performance metrics that measure cumulative miles of congestion per route, per entire Metropolitan Statistical Area (MSA), and on coast-to-coast Interstates using speed profile analysis. Moreover, both real-time and historic archival performance measures can be used for after-action analysis of major traffic events. In this study, the traffic congestion for four MSAs and two Interstates during the week of June 28 to July 6 was used as a case study to illustrate the concepts.

Data Reduction

1-minute sample 15-minute median

94% reduction in query response time

Congestion At-A-Glance

July 2, 2015

Metro Congestion

July 2, 2015 at 5:00PM Locally

Metro Level: 4,645 segments, 2,503 miles

Corridor Level: 64 segments, 53.8 miles

Segment Level: 1 segment, 0.5 miles

Proper Data Scope

Scope of one segment

Scope of corridor

Scope of one corridor

Scope of one Interstate

Scope of one segment

National Level: ~170,000 segments, 127,000 miles

30% of I-10 congestion

17% of I-80 congestion

30% of I-80 congestion

15% of I-80 congestion

67% of I-80 congestion in PA