QUALITY ASSESSMENT OF COMMERCIAL PROBE DATA ON SIGNALIZED ARTERIALS

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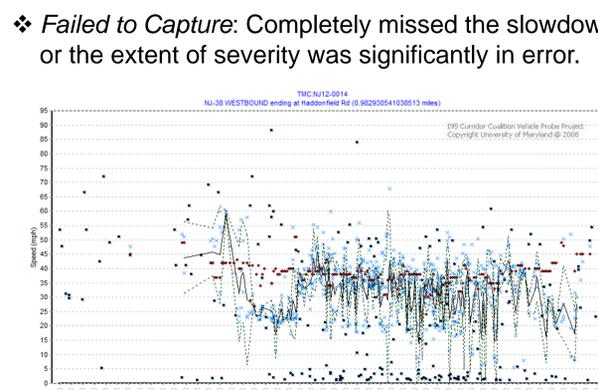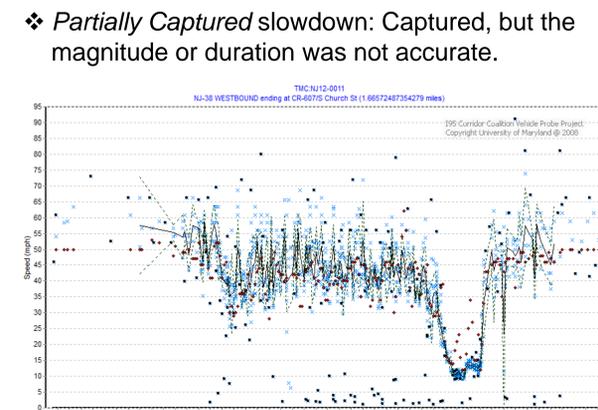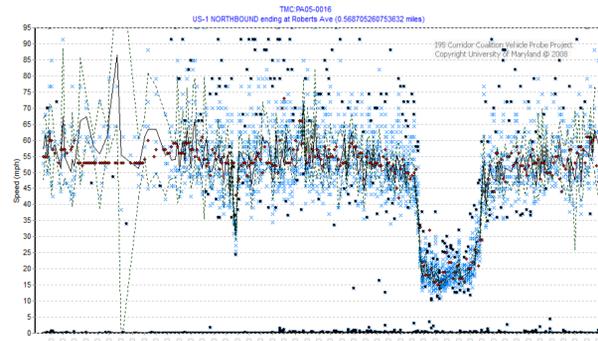
Abstract

The quality and accuracy of commercial probe travel time data reported to the I95 Vehicle Probe Project (VPP) by three vendors on a variety of arterial roadways within the mid-Atlantic region is assessed for quality and accuracy. Bluetooth traffic monitoring (BTM) data collected since mid-2014 to the present as part of an I-95 Corridor Coalition sponsored project is used as reference data. The results indicate significant quality improvement since original study in 2013-14. Quality is now independent of signal density and traffic volume on the corridors tested. The analysis uses the slowdown assessment methodology which quantifies the percentage of significant traffic disruptions accurately captured in the VPP data.

Introduction

➢ The quality of outsourced probe data on freeways has led many D.O.Ts to consider such data for arterial performance monitoring.

➢ Original arterial assessment occurred from April 2013 through June of 2014, in which CATT assessed based on data collection on arterial corridors within the mid-Atlantic region using BTM as reference data. Original study of the I95 Vehicle Probe Project (VPP) from an outsourced probe data vendors concluded that:

1) Probe data was recommended on arterial segments with signal densities up to one signal per mile or less.
2) Probe data be tested and used with caution for signal densities between one and two signals per mile
3) Probe data not be used with signal density more than two signals per mile.

➢ In this research eight case studies conducted after December 2014 to the present using the slowdown analysis method to assess the quality of these probe data.

➢ **Findings indicate that outsourced probe data from all vendors have substantially improved in quality.**

➢ Quality is now independent of signal density and traffic volume (within the range of the corridors tested.)

Slowdown Analysis Method

➢ Slowdown analysis is effective in assessing probe data's ability to capture significant disruptions in traffic.

➢ A significant disruption is defined as a speed reduction of at least 15 mph from nominal for a period of 1 hour or more. On slower speed arterials, the threshold may be reduced to 10 mph, and 30 minutes.

❖ A *Fully Captured* slowdown: Accurately captured both magnitude and duration
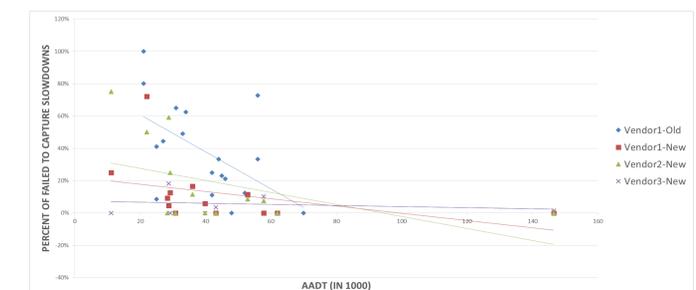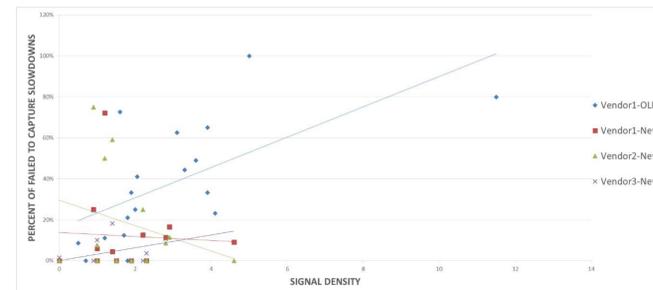(All sample graphs 24 hour plots)

❖ *Partially Captured* slowdown: Captured, but the magnitude or duration was not accurate.

❖ *Failed to Capture*: Completely missed the slowdown, or the extent of severity was significantly in error.

Old Case Study Locations and Slowdown Analysis

Case Study Number	Data Set (State-ID#)	Road #	Average AADT (in 1000)	Average Signal Density	Total Slowdowns	% Fully Captured	% Partially Captured	% Failed to Capture
1	NC-06	NC-55	25.0	2.1	54	15.0%	44.0%	41.0%
2	MD-07	MD-355	44.0	3.9	9	44.4%	22.2%	33.3%
		MD-586	34.0	3.1	8	0.0%	37.5%	62.5%
3	NJ-11	US-1	70.0	0.7	101	63.4%	36.6%	0.0%
		NJ-42	48.0	1.8	4	0.0%	100.0%	0.0%
		US-130	42.0	2.0	4	25.0%	50.0%	25.0%
4	NJ-12	NJ-38	46.0	1.8	57	40.4%	38.6%	21.1%
5	PA-05	NJ-73	52.0	1.7	89	41.6%	46.1%	12.4%
		US-1	45.0	4.1	78	28.2%	48.7%	23.1%
6	PA-06	US-322	25.0	0.5	58	50.0%	41.4%	8.6%
		PA-611	27.0	3.3	18	22.2%	33.3%	44.4%
		PA-611	21.0	11.5	5	0.0%	20.0%	80.0%
7	VA-07	VA-7	56.0	1.9	75	24.0%	42.7%	33.3%
		VA-7	55.0	1.6	22	4.5%	22.7%	72.7%
		US-29	21.0	5.0	1	0.0%	0.0%	100.0%
8	VA-08	US-29	33.0	3.6	49	8.2%	42.9%	49.0%
9	MD-08	MD-140	31.0	3.9	20	0.0%	35.0%	65.0%
			42.0	1.2	18	22.2%	66.7%	11.1%

New Case Study Locations and Slowdown Analysis

Case Study Number	Data Set (State-ID#)	Road #	Average AADT (in 1000)	Average Signal Density	Vendor #	Total Slowdowns	% Fully Captured	% Partially Captured	% Failed to Capture
11	VA-09	US-1	36.0	2.9	1	79	40.5%	43.0%	16.5%
					2		59.5%	29.1%	11.4%
					3				
12	VA-10	US-1	22.0	1.2	1	18	27.8%	0.0%	72.2%
					2		27.8%	22.2%	50.0%
					3				
13	NJ-13	NJ-37	39.8	1.0	1	17	52.9%	41.2%	5.9%
					2		29.4%	58.8%	0.0%
					3		41.2%	58.8%	0.0%
14	NC-07	US-29	28.7	1.4	1	22	40.9%	54.5%	4.5%
					2		4.5%	36.4%	59.1%
					3		50.0%	31.8%	18.2%
		US-74	57.8	1.0	1	79	96.2%	3.8%	0.0%
					2		65.8%	26.6%	7.6%
					3		48.1%	41.8%	10.1%
15	GA02	GA-141	43.2	2.3	1	56	83.9%	12.5%	0.0%
					2		71.4%	25.0%	0.0%
					3		67.9%	28.6%	3.6%
		US-41	30.8	1.9	1	11	81.8%	18.2%	0.0%
					2		54.5%	45.5%	0.0%
					3		63.6%	36.4%	0.0%
		US-19	146.5	1.0	1	68	88.2%	11.8%	0.0%
					2		98.5%	1.5%	0.0%
					3		91.2%	7.4%	1.5%
16	MD-10	US-1	29.2	2.2	1	8.0	75.0%	12.5%	12.5%
					2		62.5%	12.5%	25.0%
					3		100.0%	13.3%	0.0%
		US-29	62.0	1.5	1	30.0	86.7%	13.3%	0.0%
					2		86.7%	13.3%	0.0%
					3		90.0%	10.0%	0.0%
17	PA09	PA-3	28.3	4.6	1	11	27.3%	63.6%	9.1%
					2		90.9%	9.1%	0.0%
					3		45.5%	36.4%	18.2%
		PA-23	11.1	0.9	1	8	12.5%	62.5%	25.0%
					2		0.0%	25.0%	75.0%
					3		87.5%	12.5%	0.0%
18	VA-11	US-50	52.9	2.8	1	140	32.9%	55.7%	11.4%
					2		72.1%	19.3%	8.6%
					3		59.3%	30.0%	10.7%

Signal Density and Volume Correlations & Lack Thereof

Statistics	% Failed to Capture Slowdowns			
	Vendor1-Old	Vendor1-New	Vendor2-New	Vendor3-New
Average	37.9%	12.1%	18.2%	5.7%
Median	33.3%	5.9%	7.6%	1.5%
STDEV	28.9%	19.7%	26.1%	7.4%
Percentile-25	12.0%	0.0%	0.0%	0.0%
Percentile-50	33.3%	5.9%	7.6%	1.5%
Percentile-75	63.1%	14.5%	37.5%	10.7%

Conclusions

➢ This research presents updated case studies comparing commercial probe traffic data to Bluetooth reference data on eight signalized arterial case study locations on the East Coast.

➢ Results improved substantially since 2013-2014, the time of the initial arterial data quality assessment

➢ Results no longer strongly correlated to signal density or average AADT as it was in 2013 & 2014.

➢ The probe data performance improved over time; for example 25 percentile of all three vendors' failed to capture slowdowns is 0% compared to 12% in 2013 & 2014.

➢ **Improvements are significant for all vendors over all statistics.**