Comparison between Two Travel Time Data Results from Using Camera Monitoring and Bluetooth Device Methods

Prepared By: Hao Xiang Qian

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Introduction

The experiment was conducted on June 9 and June 10, 2009 between 6:00 to 10:00 am. The travel time data was collected from using two methods on Don Valley Parkway. Method number one required to calculate the travel time by tracking a truck along the highway and recording the actual time when arriving at different intersections. Method two used a Bluetooth device to measure the travel time. Both results are displayed on graphs and they are shown below with starting intersections Beechwood on northbound and York Mills on southbound.

Comparison Results

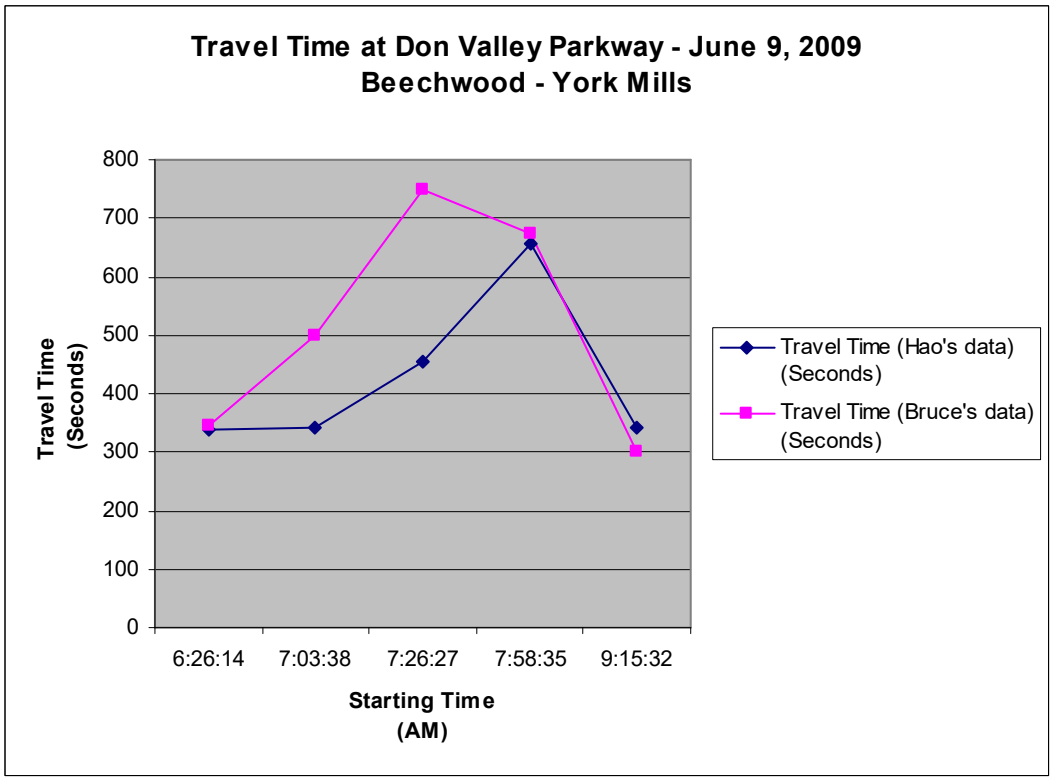

Figure 1 – Two Travel Time Results from Beechwood to York Mills on DVP, June 9, 2009

Since method one was experimented on trucks, the travel time should be slower than the results collected in method two. The two line series are translated along the same direction and the travel time in method one is slower. In other words, the two series of line graphs are in a approximate identical geometric figure, but travel time in method two is higher. If method one holds as the "ground truth" data, the average percentage error for method two compare to method one is approximately 25.74%.

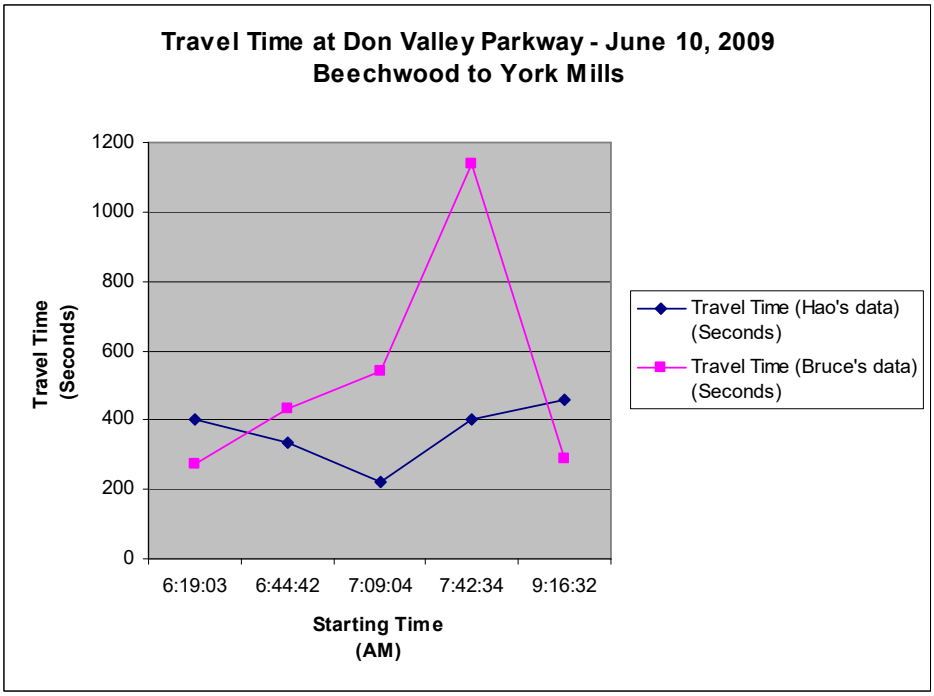

Figure 2 – Two Travel Time Results from Beechwood to York Mills on DVP, June 10, 2009

Unlike the first day, the two line series in this graph are not translated along the same direction. The percentage of errors is increasing while approaching and during the peak hours from 7:00 to 9:00 am. The average percentage error is approximately 85.09%.

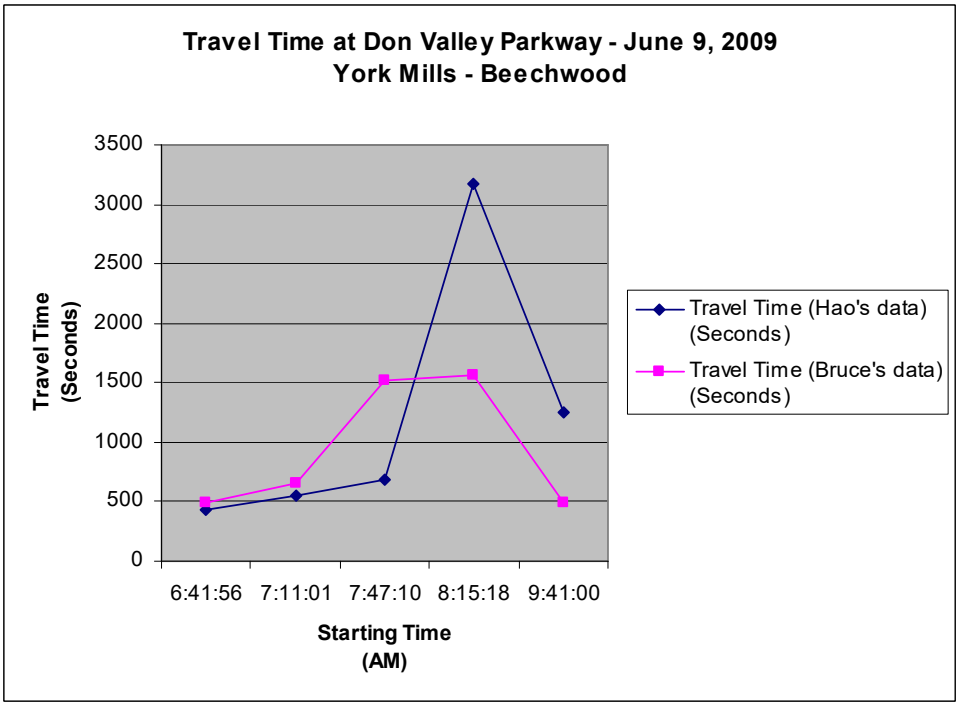

Figure 3 – Two Travel Time Results from York Mills to Beechwood on DVP, June 9, 2009

The major difference between the two series of travel times is during the peak hours at starting time 7:47:10 am and at 8:15:18 am (Accident occurred on the highway where one lane was blocked). Method two collected a travel time that is close to one half of the travel time that method one collected. The average percentage of error for this graph is approximately 53.69%.

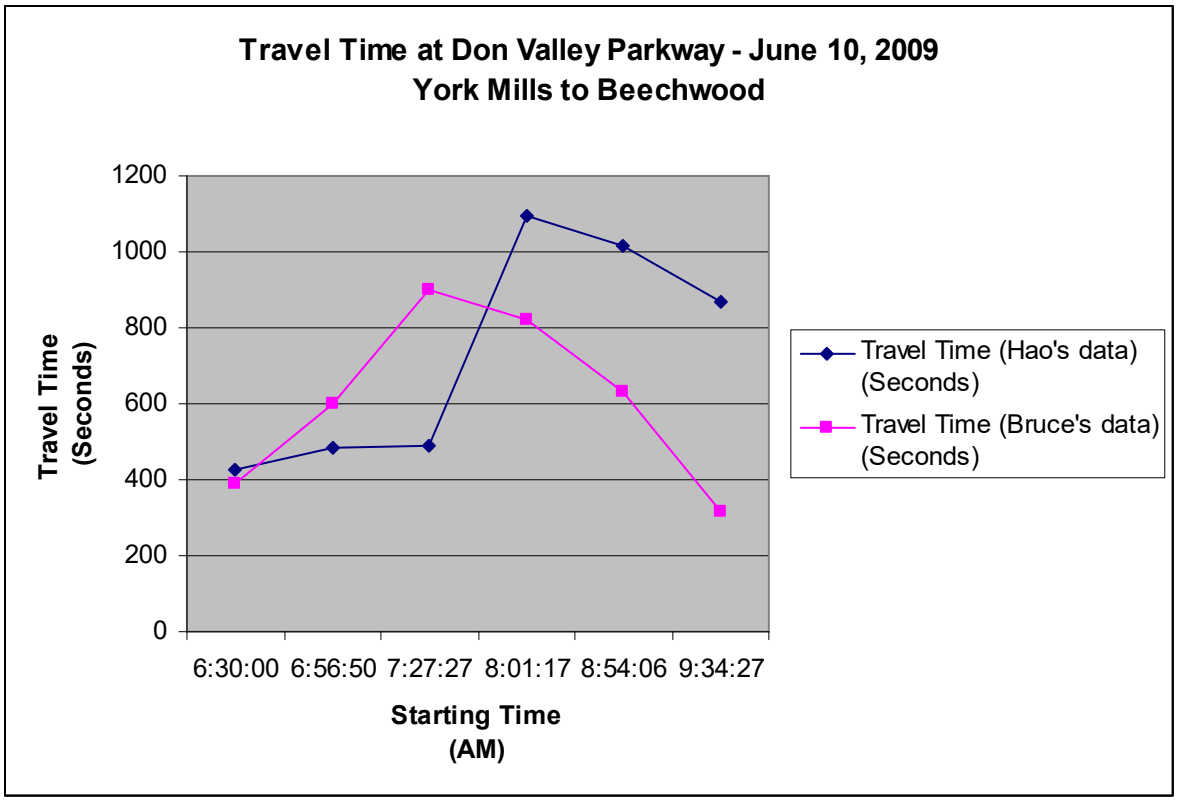

Figure 4 – Two Travel Time Results from York Mills to Beechwood on DVP, June 10 2009

Again, the travel error increases approaching to peak hours. The approximate average percentage error is 40.46%.

Conclusion

One similar trend on all these graphs is the high errors occurred during the peak period transition and actual peak period. Error could also results from the experiment. Missed calculation, time recording inaccuracy and estimation of the travel time results using Bluetooth device may be some of the experiment errors.

Tables of travel time results from the two methods are shown in the Appendix.

Appendix

Don Valley Parkway	Beechwood - York Mills	9-Jun-09	
Starting Time (AM)	Travel Time (Hao's data) (Seconds)	Travel Time (Bruce's data) (Seconds)	Percentage Error (%)
6:26:14	337	344	2.03
7:03:38	342	500	46.2
7:26:27	454	750	65.2
7:58:35	657	675	2.74
9:15:32	343	300	12.54

Figure 2 – Travel Time Data Comparison at DVP Northbound on June 9, 2009

Don Valley Parkway	York Mills - Beechwood	9-Jun-09	
Starting Time (AM)	Travel Time (Hao's data) (Seconds)	Travel Time (Bruce's data) (Seconds)	Percentage Error (%)
6:41:56	425	486	14.35
7:11:01	550	654	18.9
7:47:10	678	1515	123.45
8:15:18	3171	1562	50.74
9:41:00	1247	486	61

Figure 1 – Travel Time Data Comparison at DVP Southbound on June 9, 2009

Don Valley Parkway	Beechwood - York Mills	10-Jun-09	
Starting Time (AM)	Travel Time (Hao's data) (Seconds)	Travel Time (Bruce's data) (Seconds)	Percentage Error (%)
6:19:03	403	272	32.51
6:44:42	335	432	28.96
7:09:04	223	540	142.15
7:42:34	401	1140	184.29
9:16:32	458	286	37.55

Figure 3 – Travel Time Data Comparison at DVP Northbound on June 10, 2009

Don Valley Parkway	York Mills - Beechwood	10-Jun-09	
Starting Time (AM)	Travel Time (Hao's data) (Seconds)	Travel Time (Bruce's data) (Seconds)	Percentage Error (%)
6:30:00	427	390	8.67
6:56:50	485	600	23.7
7:27:27	489	900	84
8:01:17	1097	821	25.16
8:54:06	1014	633	37.57
9:34:27	871	315	63.63

Figure 4 – Travel Time Data Comparison at DVP Southbound on June 10, 2009