Analyzation of Traffic Patterns in Relation to Delays in Boston Public Transit

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Project Description

Questions we aim to answer:
- How do local transit stop delays effect traffic on a citywide scale?
- Do delays in public transit times correlate with increased traffic?

Applications of information we learn:
- Train an algorithm to predict traffics delays based on timeliness of public transit

Our group hopes to uncover a relationship between the frequency/ timeliness of Uber rides and the reliability of public transit in the Boston area. We will develop an average travel time on Uber for various start and stop points throughout the city; this data will represent average traffic patterns. Then, we will explore any correlations between delays experienced for riders on individual bus, commuter rail, and subway lines, and variations from our established baseline for Uber traffic times.
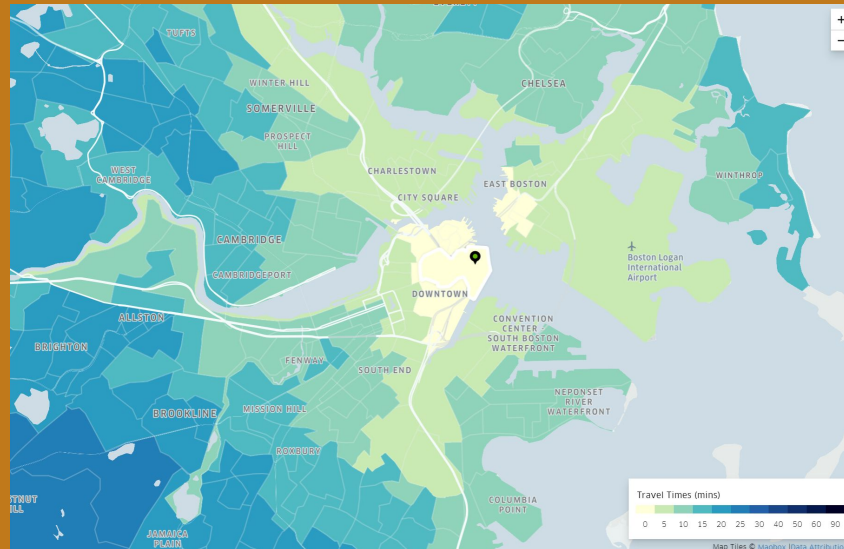
Prior Work

Forecasting Spatiotemporal Impact of Traffic Incidents on Road Networks - https://infolab.usc.edu/DocsDemos/Penny_ICDM13.pdf

Datasets

Uber Movement: downloaded

www.movement.uber.com

Datasets

Massachusetts Bay Transit Authority (MTBA) Reliability Data: partially downloaded

http://www.mbtabackontrack.com/performance/index.html#/download

SERVICE_DATE	PEAK_OFFPEAK_IND	MODE_TY	ROUTE_OR_LINE	ROUTE_TY	STOP	METRIC_TYPE	OTP_NUMERATOR	OTP_DENOMINATOR
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		9 OTH		Headway / Schedule Adherence	333	479
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		10 OTH		Headway / Schedule Adherence	243	376
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-B Line	Green Line	Chestnut Hill Avenue	Passenger Wait Time	60.41102848	257.4472577
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-B Line	Green Line	Packards Corner	Passenger Wait Time	293.4471863	1077.642557
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-C Line	Green Line	Dean Road	Passenger Wait Time	37.99584447	183.9093108
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-C Line	Green Line	North Station	Passenger Wait Time	169.3393143	1045.603063
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-C Line	Green Line	Park Street	Passenger Wait Time	1132.448707	5514.960726
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-D Line	Green Line	Arlington	Passenger Wait Time	214.1303402	1100.742991
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-D Line	Green Line	Copley	Passenger Wait Time	471.0720361	2418.977029
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Green-E Line	Green Line	Museum of Fine Arts	Passenger Wait Time	221.4807922	932.281855
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Orange Line	Orange Line	Tufts Medical Center	Passenger Wait Time	209.7355428	3315.210571
2/7/2017 0:00	Off-Peak Service (All Other Times)	Rail	Red Line	Red Line	Downtown Crossing	Passenger Wait Time	499.0062263	8455.407573
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Bus		17 OTH		Headway / Schedule Adherence	127	165
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Bus		21 OTH		Headway / Schedule Adherence	188	327
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Bus		210 OTH		Headway / Schedule Adherence	92	153
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Bus		442 OTH		Headway / Schedule Adherence	104	141
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Bus		55 OTH		Headway / Schedule Adherence	28	84
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Bus	SL2	SL		Headway / Schedule Adherence	261	286
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Rail	Blue Line	Blue Line	Beachmont	Passenger Wait Time	49.07906571	1117.681778
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Rail	Blue Line	Blue Line	Bowdoin	Passenger Wait Time	22.76120287	969.2208834
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Rail	Green-C Line	Green Line	Copley	Passenger Wait Time	441.0574132	1795.315057
2/7/2017 0:00	Peak Service (Weekdays 6:30-9:30AM, 3:30PM-6:30PM)	Rail	Red Line	Red Line	Quincy Center	Passenger Wait Time	71.09260013	1945.235924
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		105 OTH		Headway / Schedule Adherence	58	87
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		191 OTH		Headway / Schedule Adherence	18	22
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		192 OTH		Headway / Schedule Adherence	9	17
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		236 OTH		Headway / Schedule Adherence	83	127
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		238 OTH		Headway / Schedule Adherence	207	259
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		325 OTH		Headway / Schedule Adherence	1	1
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		354 OTH		Headway / Schedule Adherence	31	53
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		45 OTH		Headway / Schedule Adherence	334	471
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		503 OTH		Headway / Schedule Adherence	7	8
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		93 OTH		Headway / Schedule Adherence	123	220
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus		95 OTH		Headway / Schedule Adherence	142	190
2/7/2017 0:00	Off-Peak Service (All Other Times)	Bus	SL1	SL		Headway / Schedule Adherence	800	928

Proposed Work

Uber Dataset: Clean data for use, remove rows with empty timestamps, create baselines for comparison/analysis from route data.

MBTA Dataset: Combine subsets of data, clean data for use, compare with baselines from Uber Data during delays.

List of Tools

- Github
- Jupyter Notebooks
- Pandas
- Matplotlib
- Spyder
- Numpy
- SciKit Learn

Evaluation of Results

Correlation Analysis

Multivariate Linear Regression