

Edge Proposal: Blue Bikes

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Problem:

Nearly every Blue Bike user in Boston has experienced wanting to ride a blue bike, only to discover the docking station is empty. Due to asymmetric supply and demand of Blue Bike stations, many customers find themselves unable to ride at various times in the day, and often ask themselves whether they should wait for a bike to arrive or not.

Data:

We currently have Blue Bike Trip data by Month from 2015-2021. The trip data includes every trip in the specific month, the start and end station, the start and end time, the latitude and longitude, and if the customer was a subscriber or one-time user.

Proposed Solution:

In order to improve the general Blue Bike user experience, our analysis aims to:

1. Provide Blue Bike with a list of bike stations that would benefit most from interventions aimed to both improve customer experience and potentially increase revenue (e.g., stations that require more capacity, or frequent re-filling).
2. Provide Blue Bike customers with an estimate regarding how long they should wait until they can expect a bike station to become non-empty.

Methodology:

1. **Build a predictive analytics model for labeling:** Given the time of day, predict a label using Classification Methods to determine whether there are any bikes docked at a station (Yes or No).
 - a. Outputs: Labels of 0 or 1 (0 if no bikes, 1 if one or more bikes are docked).
2. **Build a predictive analytics model for wait times:** Given that station X at time Y has no bikes, use regression methods to predict how long it will take for a bike to arrive (i.e., become non-empty).
 - a. Outputs: A calculated wait time for an empty station X given a time of day Y.

Initial Results:

Through exploratory data analysis we have identified the most demanded stations (MIT/Mass Ave) and the time of day when the most rides are occurring (noon and 5PM). We are plan to address the most demanded stations as we believe the most cost-savings can occur there.

Future Steps and Expected Impact:

Provide intervention analysis for stations where wait times are significant.

Intervention 1: Refill the bike station more often

- i. Increase current infrastructure to restock bike stands at more frequent occurrences.
- ii. Pros: Satisfies more demand. Cons: High variable cost to restock more often.

Intervention 2: Add more capacity to high demand bike stations

- iii. Based on wait times, add more bike docks and bikes to high demand stations so that each of these stands can satisfy customer demand.
- iv. Pros: Solves problem of docks always being full or empty. Cons: High fixed cost of adding new docks.

Intervention 3: Incentivize plans for riders to docks bikes at lower demand stations

- v. Subsidize rides for instances where demand is high so that bikers will park bikes at lower demand areas.
- vi. Pros: Cost of moving bikes not fully on Blue Bike (should reduce cost). Cons: Cost of subsidizing bikes will decrease profit, and we must assume users will want to move their bikes to lower demand areas.

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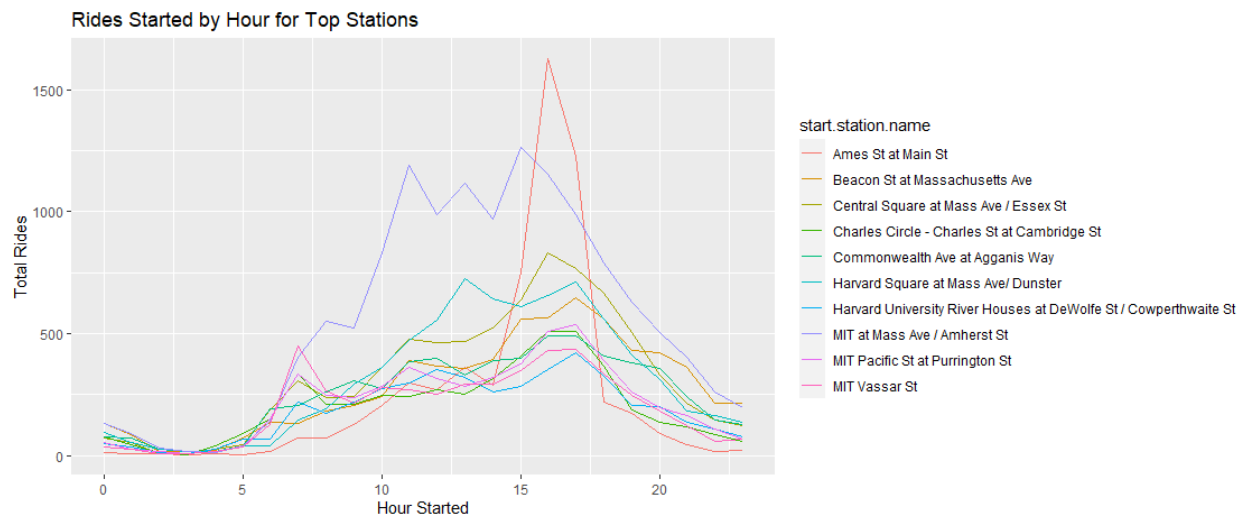
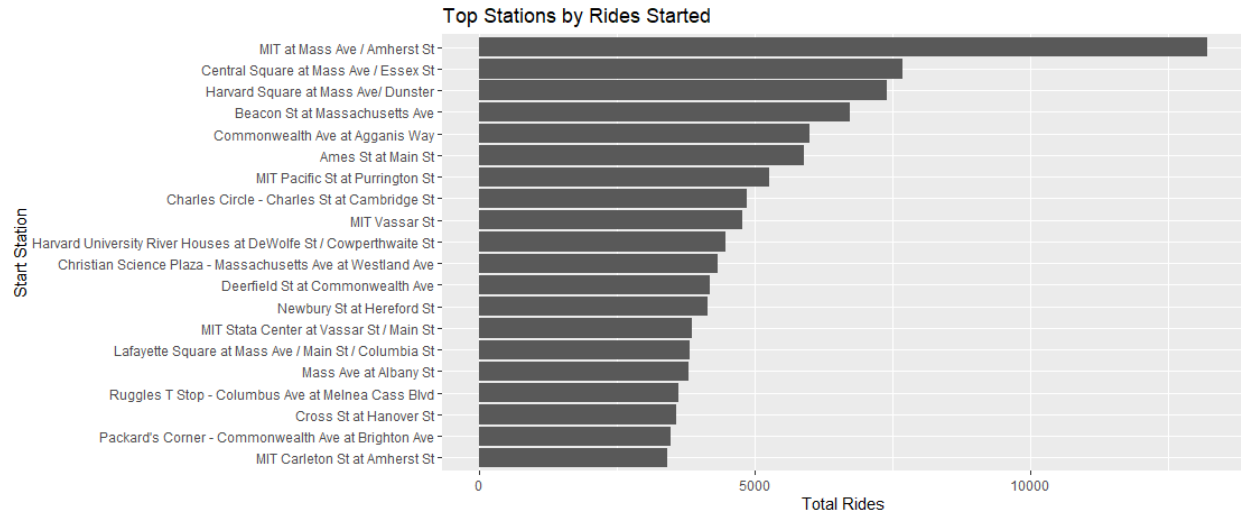
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Appendix

Data Screenshot:

tripduration	starttime	stoptime	start station id	start station name	start station latitude	start station longitude	end station id	end station name
651	00:04.0	10:55.9	93	JFK/UMass T Stop	42.32033974	-71.05118036	296	Farragut Rd at E. 6th St
961	00:10.3	16:12.3	425	The Dimock Center	42.31930943	-71.09639924	55	Boylston St at Massach
801	00:11.2	13:32.4	61	Boylston St at Fairfield St	42.348762	-71.082383	47	Cross St at Hanover St
1030	00:11.4	17:21.9	61	Boylston St at Fairfield St	42.348762	-71.082383	94	Main St at Austin St
1112	00:13.3	18:46.3	186	Congress St at Northern Ave	42.3481	-71.03764	23	Boston City Hall - 28 St
489	00:21.2	08:30.9	381	Inman Square at Springfield St.	42.37426714	-71.10026479	110	Harvard University Gu
2310	00:23.4	38:53.7	205	Bowdoin St at Quincy St	42.30785224	-71.06512249	378	191 Beacon St
287	00:24.1	05:12.1	360	Bartlett St at John Elliot Sq	42.3294633	-71.0901582	27	Roxbury Crossing T St

Graphs:



EDA Ideas

- What are the top 15 single use stations.
- When are the most single uses occurring.
- Calculate yearly revenue.