Predicting Bike Sharing Station Demand in the City of Chicago

Problem statement: Can Divvy's system of bicycles and e-scooters be further optimized to serve users as efficiently as possible?

Context: With over 1000 stations, 17,000 bicycles and 1500 e-scooters, Chicago's bicycle sharing system, Divvy, has been in operation since 2013. How does the Department of Transportation know how to distribute service stations and vehicles as the population and travel trends change?

Using the available data on previous trips taken with Divvy's vehicles, our goal is to predict demand and availability and identify patterns that will allow us to provide recommendations to optimize the network.

Criteria for success: Our model of bicycle and e-scooter demand will lead to one or more suggestions that would increase the efficiency of the system if implemented by the city.

Scope of solution space: The model will use whichever algorithm is determined to work best (regression, random forest, etc.) and should help us to generate recommendations such as to add and/or remove a station at a particular location, change the number of ports at a station, change operating times, or prioritize repair and maintenance at certain locations more than others.

Constraints: This appears to be a very large dataset directly from Divvy and it may need some cleaning, although no missing values are apparent. Trips of under 60 seconds and trips taken by maintenance workers inspecting the network are excluded.

Weather data will need to be combined with the trip data if we want to include it in our model. Chicago may not include precipitation and air temperature data for all of the time period we want to explore, in which case a national weather service may be a better source.

Stakeholders: The Chicago Dept. of Transportation, Lyft, the residents of the city, and visitors who want to use and benefit from the system

Data sources: Divvy's trip data is freely available for the public to download and is released monthly on the website: https://divvybikes.com/system-data

Summaries, metadata, and a list of currently operating stations are also available from the Chicago Data Portal.
https://data.cityofchicago.org/Transportation/Divvy-Trips/fg6s-gzvg/about_data

Weather data is also freely available. Our first potential source is Chicago's weather stations along Lake Michigan:
https://data.cityofchicago.org/Parks-Recreation/Beach-Weather-Stations-Automated-Sensors-2015-Inte/6re5-b8w4

Deliverables: A Github repo containing

- All code and all work for each step of the project
- A final slide deck
- A written project report