A New Hint of Transportation Analysis of NYC Bike Share System

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Abstract:

Like all other sharing systems, Airbnb the housing sharing system, Uber the car sharing system, Citi Bike is the network of bicycle rental stations intended for point-to-point transportation. Data shows Citi Bike is New York City's largest bike sharing system. It’s a convenient solution for trips that are too far to walk but too short for a taxi or the subway. The bike sharing system is combined with all other transportation methods available in the area for commuters. So in order to help users better understand data used to find out the best stations for renting bikes, and the bike stations that have the best service available for users, there is a need to visualise the data to come up with proper conclusions.

The Process would be :

1. Collecting data regarding user's who have used the bike sharing system.
2. Visualising the data collected.
3. Understanding the data, in order to come up with conclusions regarding the bike system.

Literature Survey:

1. NYC Bike Share

74% of New Yorkers support bike share (August 2012 Quinnipiac poll) Janette Sadik-Khan - Former commissioner of the New York City Department of Transportation (2007–2013).In just the last five years, New York City has made huge strides in creating modern, safer streets. Drawing from Mayor Michael Bloomberg's PlaNYC sustainability agenda, we've established more than 300 miles of bike lanes, 30 plazas and made expansive street safety redesigns to accommodate all street users citywide—all while recording the five safest years in city history and logging remarkable economic gains in corridors where projects were implemented. Citi Bike presents a new way for New Yorkers to get around that takes advantage of these changes to our streets, and it also marks a new standard for public participation in planning.

2. Exploring NYC Bike Share Data

Many bike share systems make available their trip data for those who want to understand how their systems are used. The bike share system in New York City, Citi Bike, is one of them, but they don't provide much more than the data. I've got some experience in obtaining and preparing their data for visualization, so in this article I will show you how to get started with this rich data source.

3. Bike Share Opportunities in NYC

Bike-share programs represent a unique opportunity for the City ofNew York to re-envision transportation within the urban sphere. As a transportation system, bike-shares are ideally designed for densely populated cities like New York. Distances between many major destinations are small and almost 50% of New York's workforce lives within a reasonable bicycling distance (less than 5 miles) of their place of work. Importantly, bike-shares offer immediate transportation solutions as they can be built, installed and open for business in months rather than years. Bike-share programs offer options for economic growth and job creation, as well as providing considerable health benefits

4. Data Visualisation on NYC Citi Bike

Any Citi Bike client has come up against two frustrating scenarios: the empty dock at the start and full dock at the end of the trip. Researchers call this as "rebalancing" problem as part of "fleet optimization" questions. This problem has attracted the attention of

data scientists to develop complex methodologies to optimize the available bikes and open docks.Following I attempt to utilize the shiny visualization app to provide a hint for the 3 questions:

1. Fleet Routing Pattern Detection: what are the most popular routes during peak hours and off-peak? What is the direction of the flow?

2. Station Balance Prediction: what is the average volume of imbalance in the distributed system? What is the station-level inflow and outflow? Is it sensitive to the time? How does it look like in a time series?

3. Reducing rebalancing demand: What are the riders' activities like? Is it possible to rebalance through pricing schemes? The visualization app is intended to provide a way to explore different comparative measures at the route, station and system levels with spatial attributes and time series.

5. Impact of Bike Sharing in New York City

The motivation of the bikeshare usage has also been studied:
70% of Capital Bikeshare (Washington D.C.) riders choose bikeshare as the quickest and easiest way to get to their destination . Bicycling to work decreases risk of mortality in approximately 40% after multivariate adjustment, including leisure time physical activity. Hubway Bikeshare (Boston, MA) started to pilot programs of subsidized memberships while implementing stations in low-revenue areas in order to increase access and equity of ridership . Cities stand to gain $2.6 billion annually in indirect savings based on lower road construction costs, reduced accidents, and lower carbon dioxide emissions

Reference Links:

1. NYC Bike Share

https://www.nyc.gov/html/dot/downloads/pdf/bike-share-outreach-report.pdf

2. Exploring NYC Bike Share Data

https://towardsdatascience.com/exploring-bike-share-data-3e3b2f28760c

3. Bike Share Opportunities in NYC

https://www1.nyc.gov/assets/planning/download/pdf/plans/transportation/bike_share_complete.pdf

4. Data Visualization on NYC Citi Bike

https://nycdatascience.com/blog/r/data-visulization-on-nyc-citi-bike/

5. Impact of Bike Sharing in New York City

https://arxiv.org/pdf/1808.06606.pdf