

Bike Availability in Washington DC

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For client: Capital Bikeshare

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Executive Summary

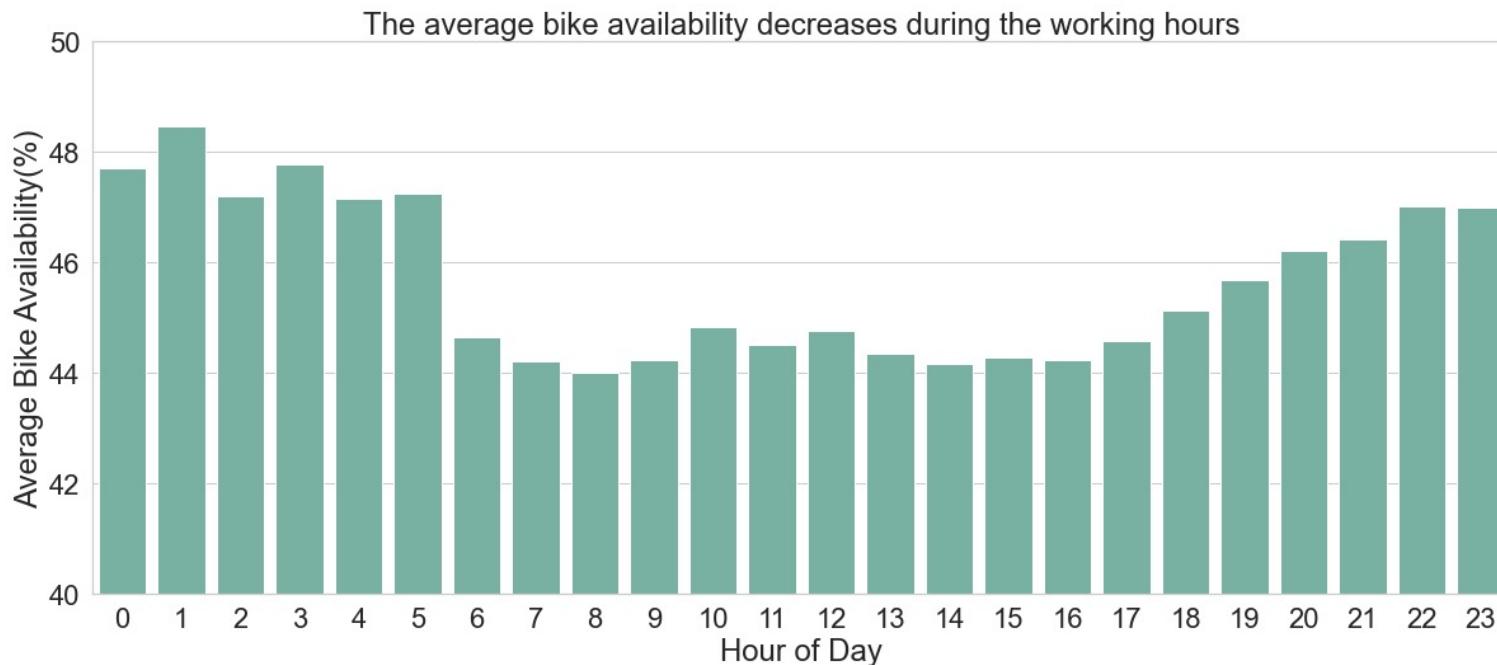
- **Data:** June 2019 capital bike share trip data with location information
 - Bike availability (%): (# of bikes in a station)/(total bike capacity of that station) * 100%
 - Time: Day of the month, Hours in a day, Weekdays or Weekends
 - Location: Longitude & Latitude, City map of Washington DC
- **Methods:** Exploratory data analysis (EDA) – Charts & Maps
- **Results & Conclusions:**
 - Overall Bike Availability Over a Day: Usually higher availability over night than daytime
 - Weekday vs. Weekend: Bike availability on weekends and weekdays is comparable
 - Bikeshare Station's Locations & Capacity: More bikeshare stations and higher capacity in downtown than suburbs
 - Commuting Patterns: Higher bike availability in commercial areas after morning commute, and in residential areas after evening commute

Data Description

- Data origin: Historical data on Capital Bikeshare usage⁽¹⁾
- Data sets:
 - Capital Bikeshare trip data during the month of June 2019 (To eliminate influence of Covid)
 - Capital Bikeshare station locations and capacity
- Main factors:
 - Bike availability (%): (# of bikes in a station)/(total bike capacity of that station) * 100%
 - Time: Day of the month, Hours in a day, Weekdays or Weekends
 - Location: Longitude & Latitude, City map of Washington DC
- Main data manipulation steps:
 - Determine how many bikes are at each station at the beginning of June 2019
 - Calculate how many bikes were reshuffled by the vans and add data points for those transitions
 - Calculate the number of bikes that have arrived and departed from each station for every hour
 - Determine the difference between arrivals and departures, and calculate the rolling sum

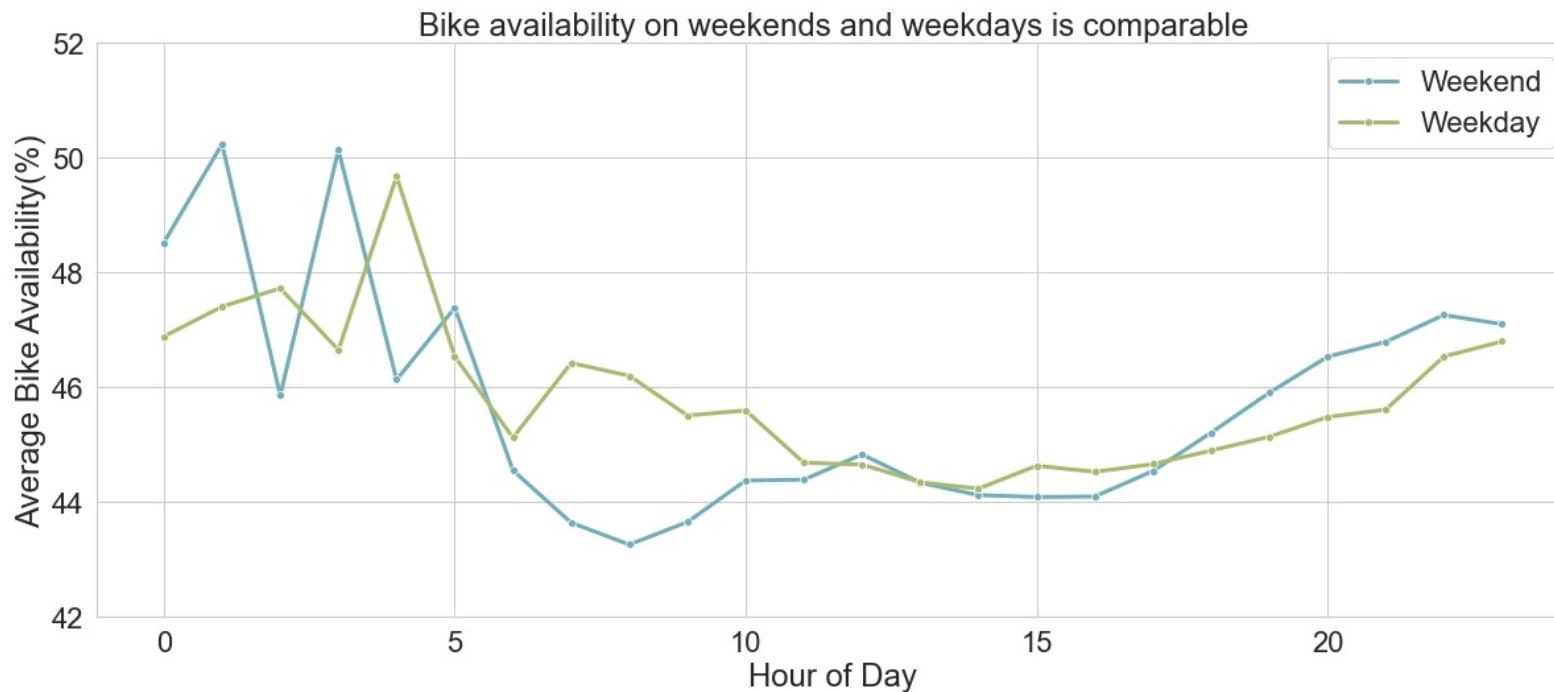
(1). Data accessed from: <https://www.capitalbikeshare.com/system-data>

Overall Bike Availability in a Day



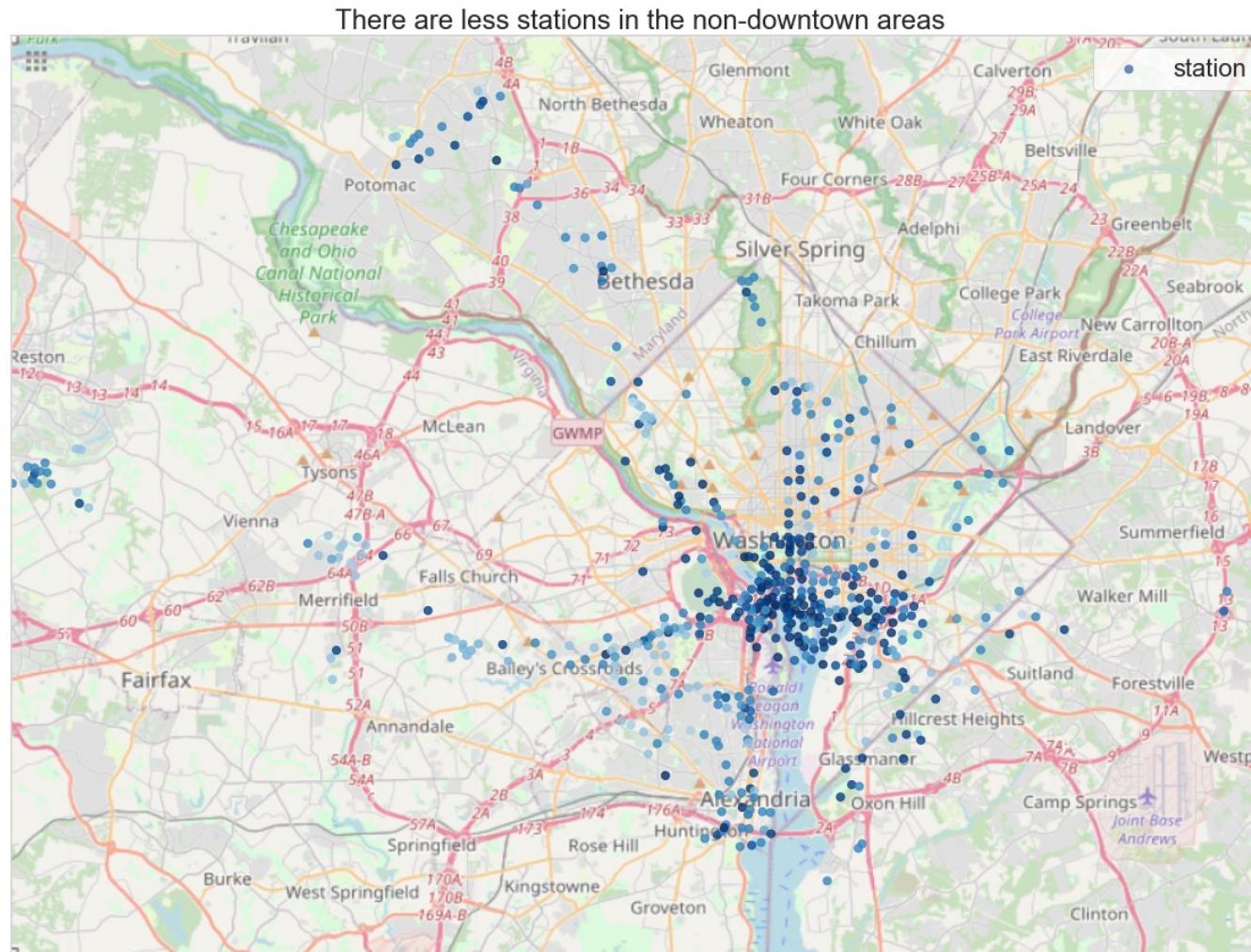
- Higher average bike availability over night than daytime
- Bike availability decrease sharply at 6 a.m., and increase gradually between 5 and 10 p.m.
- Conclusion: Average bike availability is lower in working hours
- Possible reason: More bikes are in use during daytime; Working and living schedules

Weekday vs. Weekend



- The trend of two lines are similar except for some small fluctuations
- Conclusion: Although we originally thought that weekend vs. weekday can influence bike availability over a day, our analysis shows that they are similar

Bikeshare Station's Locations & Capacity

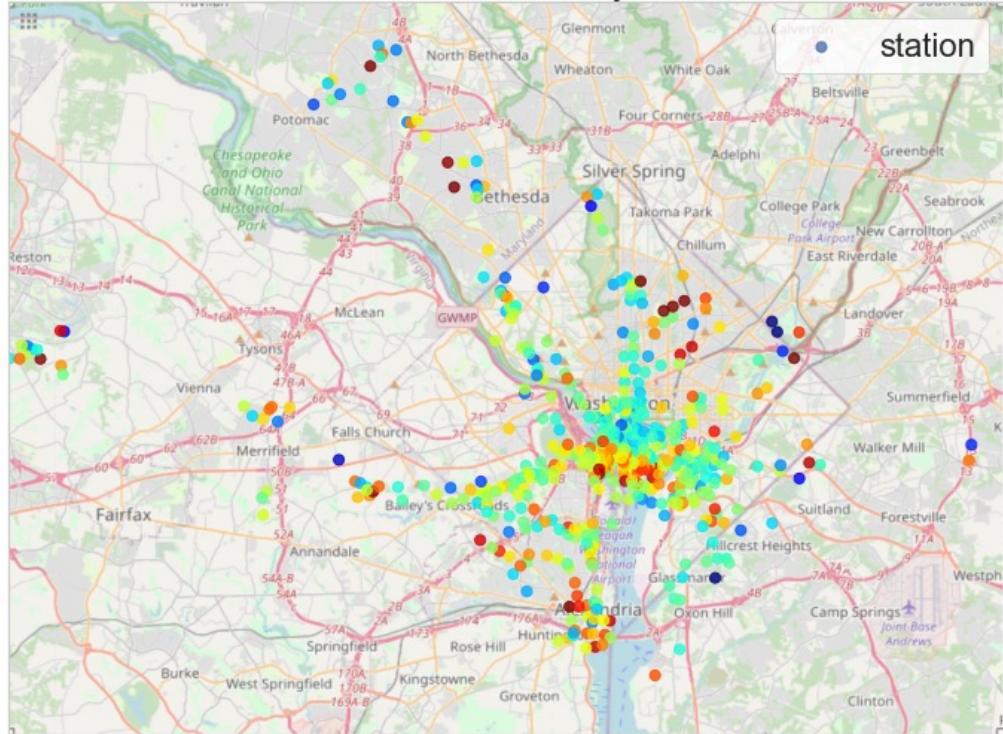


- Observations:
 - Higher density of bikeshare stations in downtown than suburbs; Some small cluster of bike stations in outskirts
 - Higher bikeshare station capacity in downtown areas
- Possible reasons:
 - Larger population & more companies in downtown
 - Clusters of populations and companies in outskirts
- Conclusion:
 - Future analysis should separate downtown and suburban areas

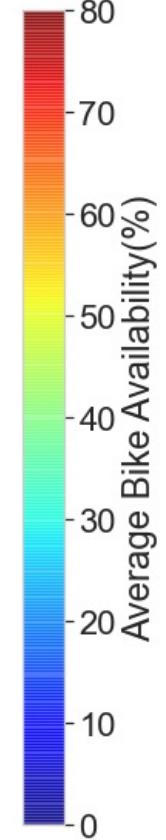
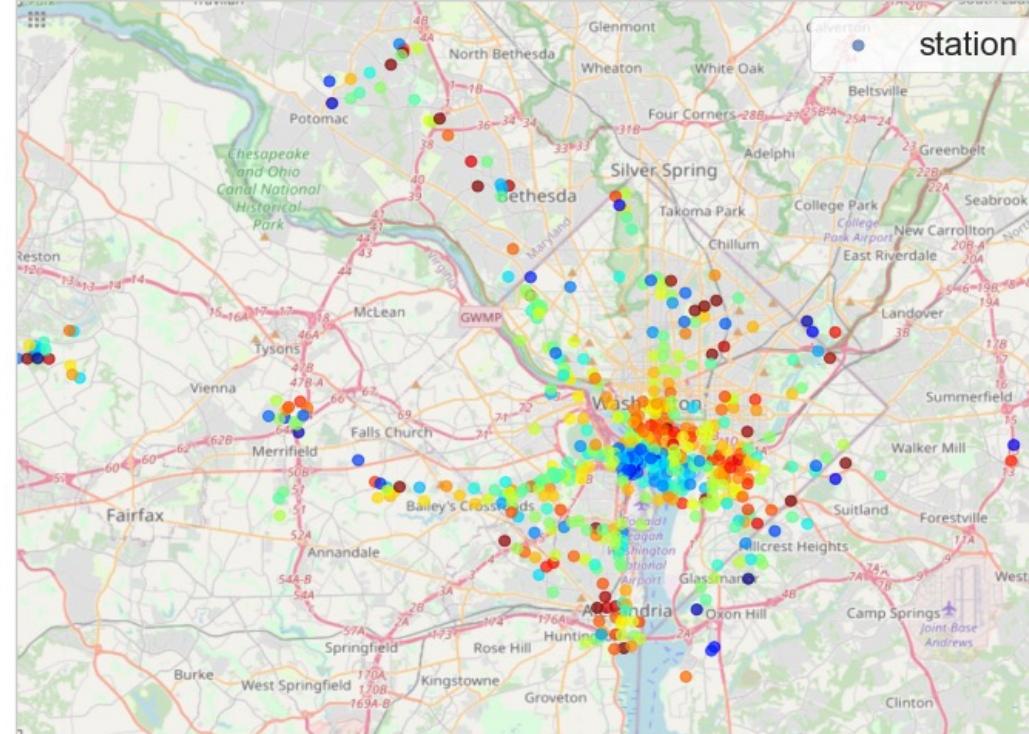
Commuting Patterns

Commuting patterns transfer bike availability throughout the day

June 2019 Hour of Day - 10:00



June 2019, Hour of Day - 19:00



- Bikes are parked in commercial area after commuting in the morning
- They come back to the residential area after commuting in the evening
- Conclusion: Commuting pattern can influence the bike availability distribution over a day

Q & A