Capital Bikeshare System

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IST 719

Background

The Capital Bikeshare is a growing program founded in late 2010 in Washington, DC. It provides residents and visitors to the city with an opportunity to rent bicycles. Patrons rent bicycles as needed and typically use the bicycle for less than 30 minutes. The rental process is automated, with more than 300 bicycle stations of various sizes and levels of usage located around the city and surrounding suburbs.

The Audience

The following analysis and visualizations are meant to help multiple Bikeshare stakeholders gain a better understanding of the system. First, management of the Capital Bikeshare program gain a better understanding of how the system has grown, how different factors affect how the system is used, and where additional resources may be needed. Secondly, the municipalities that financially support Capital Bikeshare have a vested interest to see how the system is being used. By demonstrating the level and scope of usage by users these municipalities may be more inclined to continue and perhaps increase their support. Finally, Bikeshare users may find it interesting to see how their participation compares to the overall use within the larger system.

The Data

The Capital Bikeshare program collects data on bicycle usage and makes it publicly available. The metadata includes:

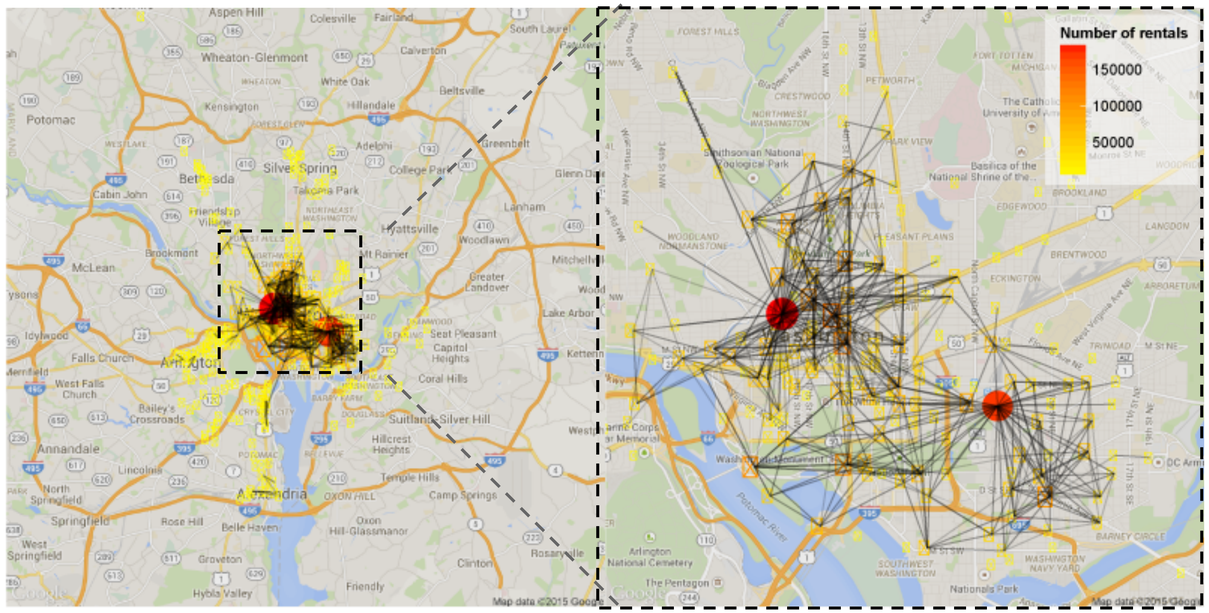
- **Duration —** Duration of trip
- **Start date** – Includes start date and time
- **End date** – Includes end date and time
- **Start station** – Includes starting station name, geo location, and ID number
- **End station** – Includes ending station name, geo location, and ID number
- **Bike # -** – Includes ID number of bicycle used for the trip
- **Member Type** – Lists whether user was a Registered (annual or monthly) or Casual (1 to 5 day)
- **Weather data** – scraped from wunderground.com to determine the temperature every day that Capital Bikeshare has existed.

Analysis Questions

- How has the Capital Bikeshare system grown overtime?
- What are the key stressors on the system? Do weather, time of day, and station popularity affect system usage?

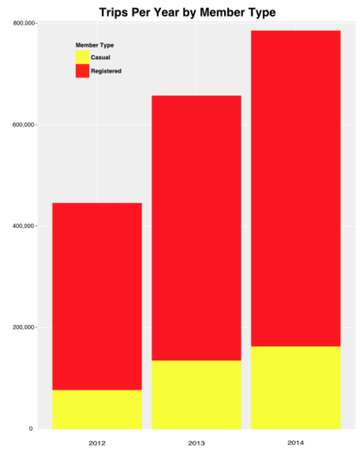
Tools Used

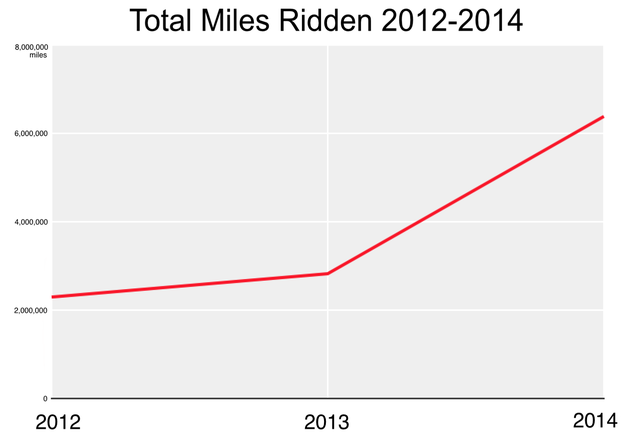
To scrape weather data, we used *Python*. Data analysis was done in *R Studio* and the visualizations used the *GGplot2* package within R. *Adobe Illustrator* was also used to polish some of the visualizations.

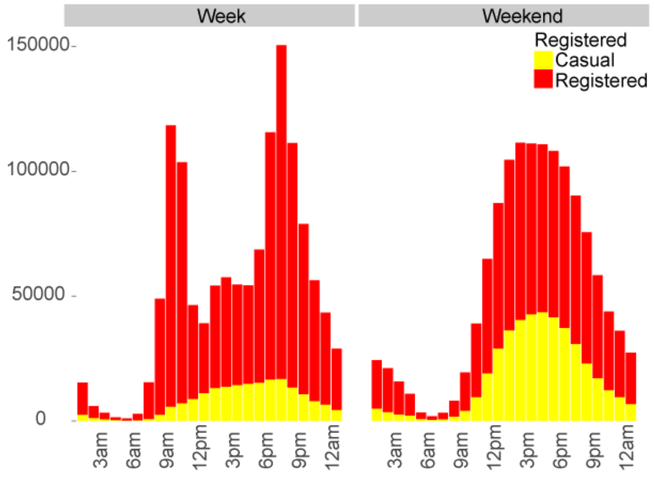


Above: The top 500 most frequently made trips are all of short distances, and are almost exclusively within the District of Columbia. Users will most likely drop their bike off near to where they checked it out.

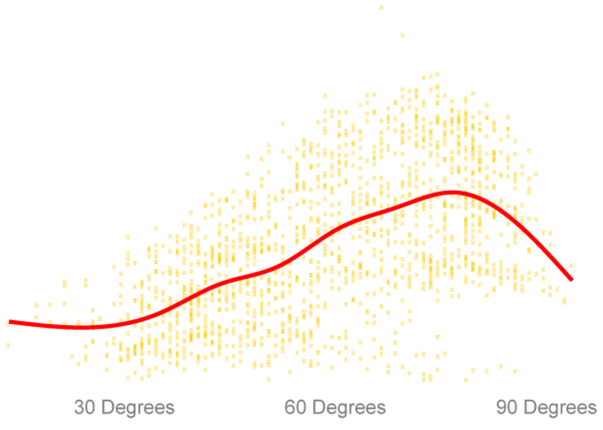
Right: Capital Bikeshare is a growing program, evidenced by a 76% increase in the number of trips taken and nearly tripling the number of miles ridden between 2012 and 2014.



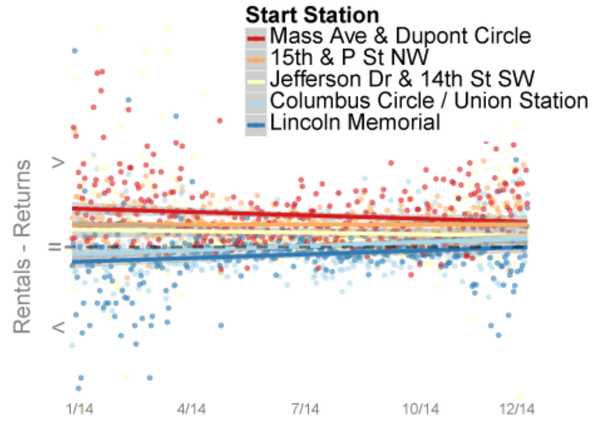




Stressor 1: During the week, registered users rent bikes at a high level during rush hour. During the weekend, casual riders jump in bike usage and overall system usage peaks in the early afternoon.



Stressor 2: As the temperature rises, more bikes are checked out. Above 75 degrees fahrenheit, rentals peak and then begin to decline as the temperature is too high for users.



Stressor 3: Bikes are rented and returned at different stations, resulting in too much or too little supply, resulting in need for Capital Bikeshare staff to move bikes.