

Team 2

CAPITAL BIKESHARE

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Introduction

Capital Bikeshare

Capital Bikeshare is a bicycle-sharing system which serves Washington in D.C., Arlington County in Virginia, the cities of Alexandria, Virginia and Falls Church also in Virginia, Montgomery County on Maryland and Fairfax County in Virginia.

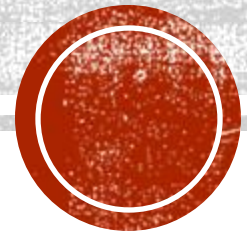
Opened in September 2010, the system was the largest bike sharing service in the United States until New York City's Citi Bike began operations in May 2013.

The goal of this report is to analyze and compare 2018 Q1's performance of the company regarding the previous years (2016 Q1, 2017 Q1)

We will use the mainly data from: *<https://ride.capitalbikeshare.com/system-data> and weather data from *<https://weatherspark.com>**

CURRENT STATUS

2018 Q1



Current Status: Statistics

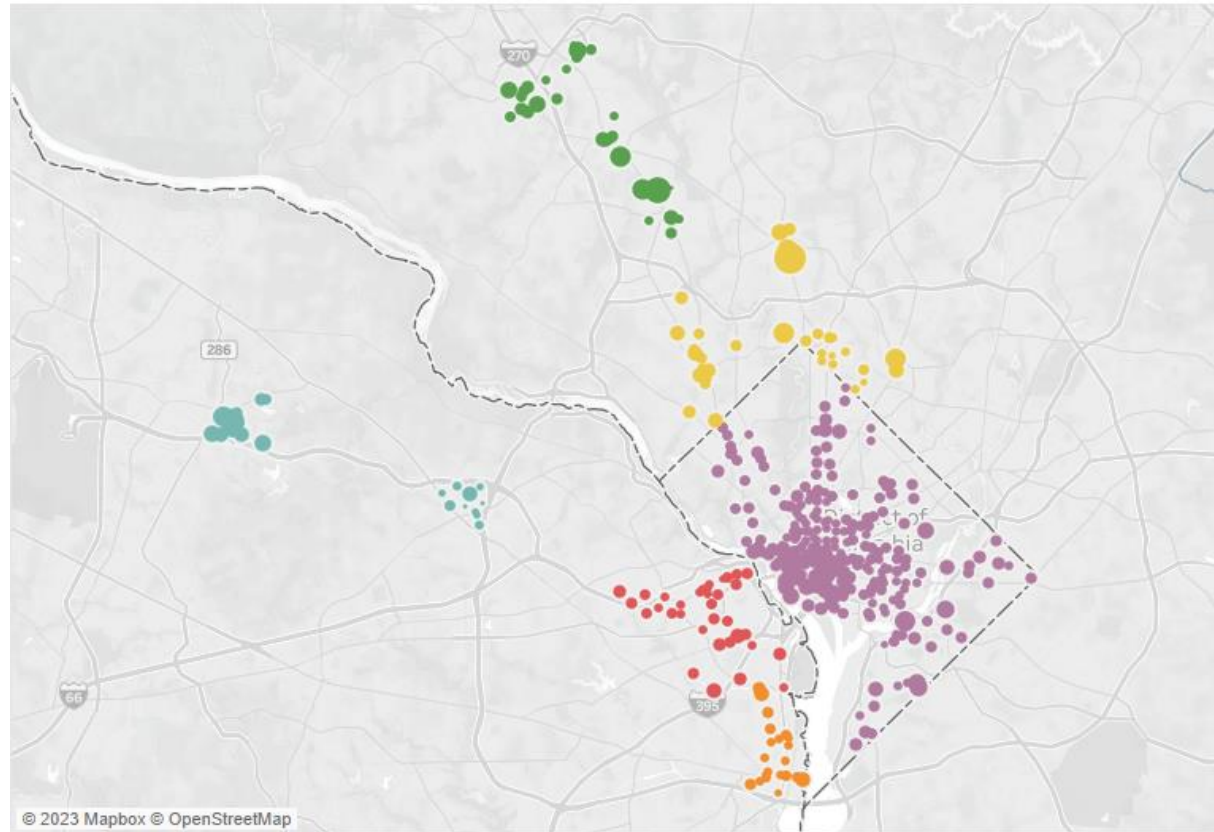
Table 1: 2018 Q1 data

Rides (Members)	496.915
Rides (Casual Users)	9.305
Total Rides	506.220
Average Duration (m)	26
Total Duration (h)	154.535
Number of Stations	499

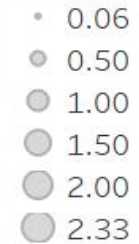
Current Status: Regions Overview

- The company has stations around Washington DC, and near-by areas.
- Most stations can be found in Washington DC central area (*purple color*)
- The longest rides (based on avg trip Duration) mainly take place outside Washington DC, and most specifically in the Montgomery and Fairfax areas.

Capital BikeShare - Stations (2018)



Avg. Duration (h)



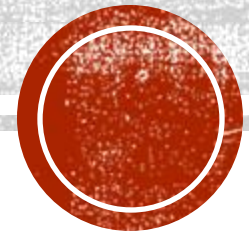
Region



Map based on average of Start LONGITUDE and average of Start LATITUDE. Color shows details about Start Region Name. Size shows average of Duration (h). Details are shown for Start station. The data is filtered on Start LONGITUDE and Start date Year. The Start LONGITUDE filter keeps non-Null values only. The Start date Year filter keeps 2018.

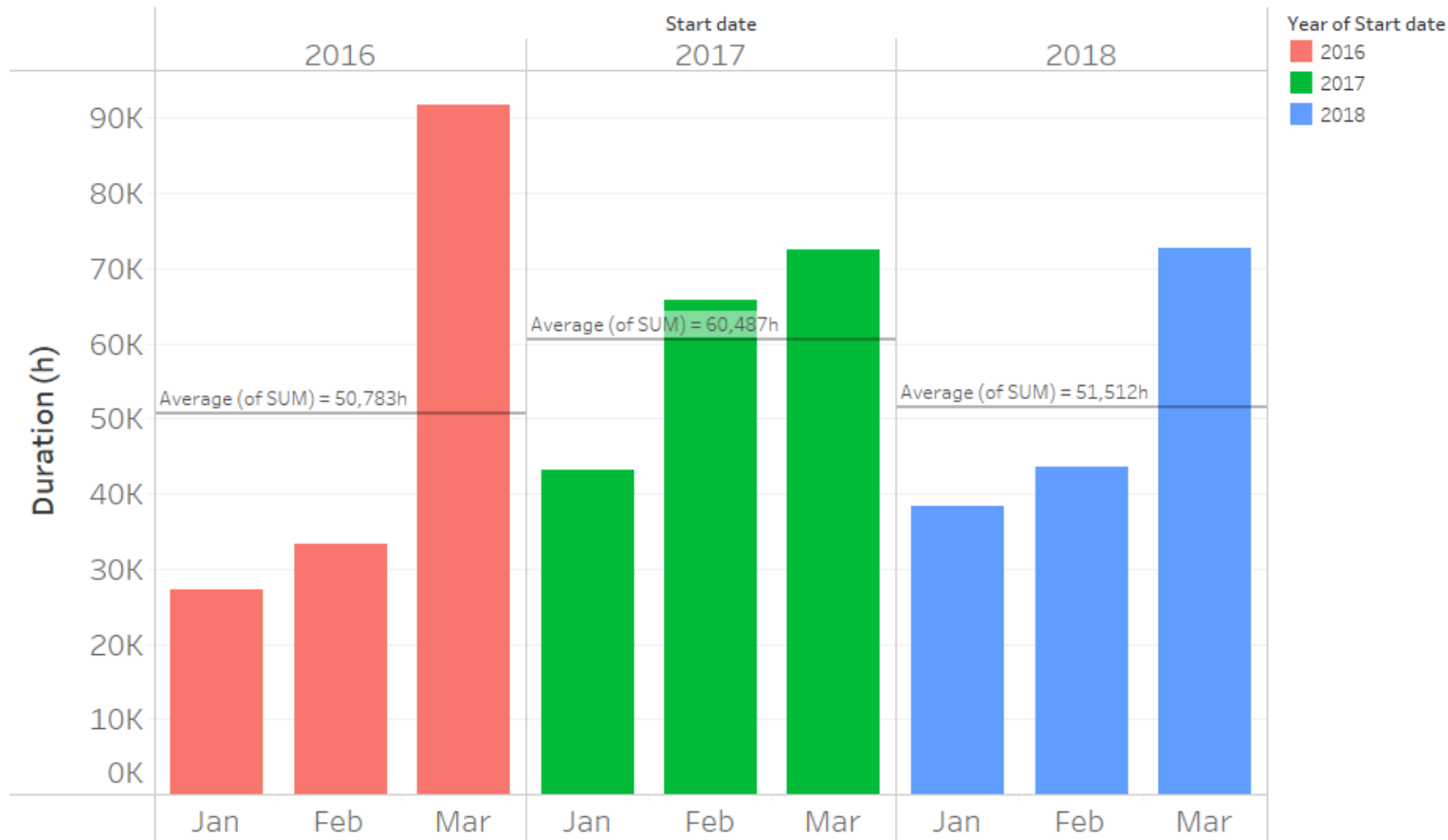
DURATION PERFORMANCE

2018 Q1 vs
2017 Q1 vs
2016 Q1



Duration Performance: Total trips' duration (h) per month

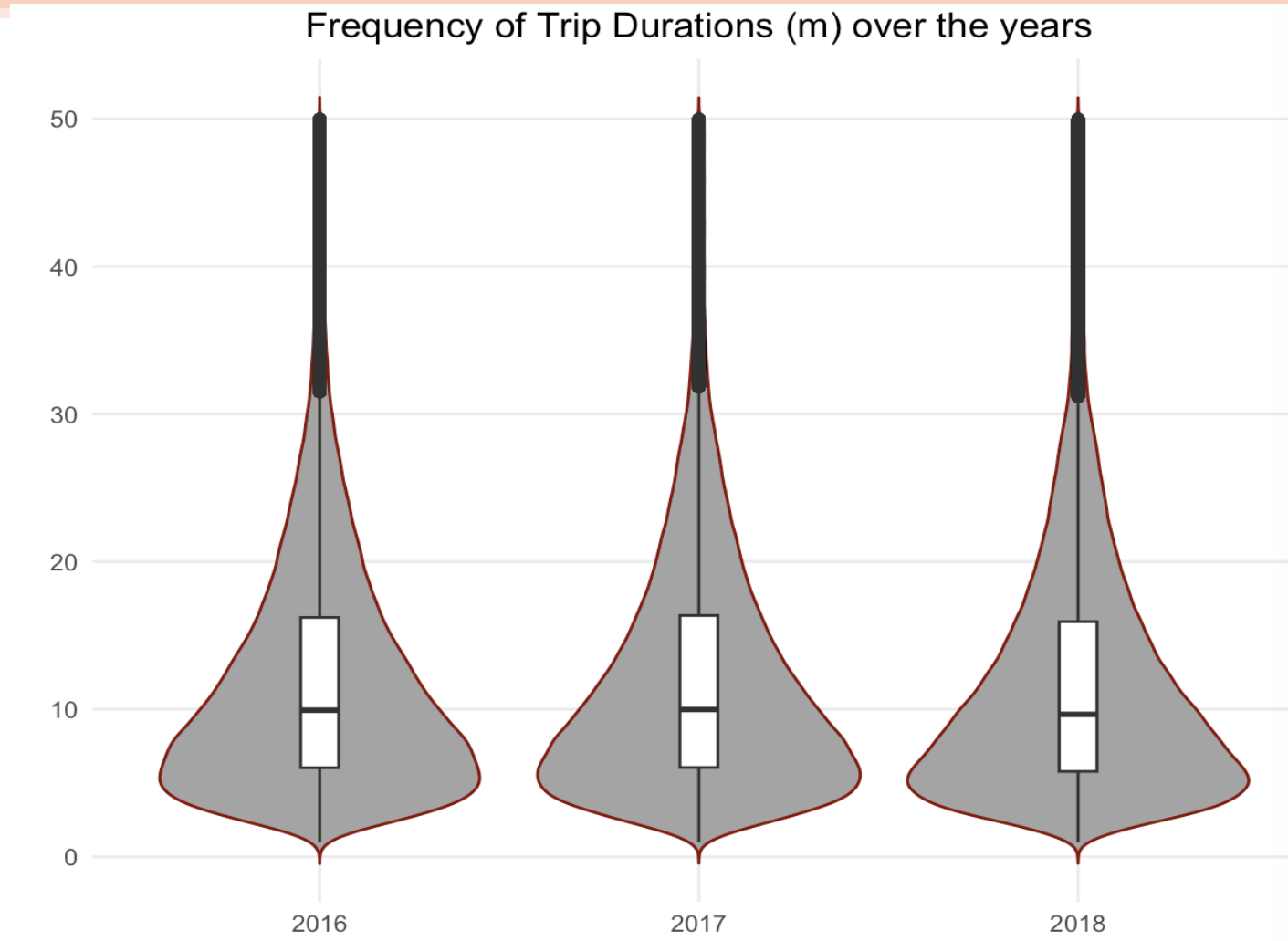
Total Duration per Year & Month



Sum of Duration (h) for each Start date Month broken down by Start date Year. Color shows details about Start date Year.

- In 2018 Q1, the total trips' duration decreased compared to 2017, but was still higher compared to 2016.
- 2017 Q1 was the best, out of the three years firsts semester.
- In individually months, March 2016 was the best followed by March 2018.
- Overall, the first two months of the year are generally less busy, compared to March.

Duration Performance: Frequency of trips' durations (m)

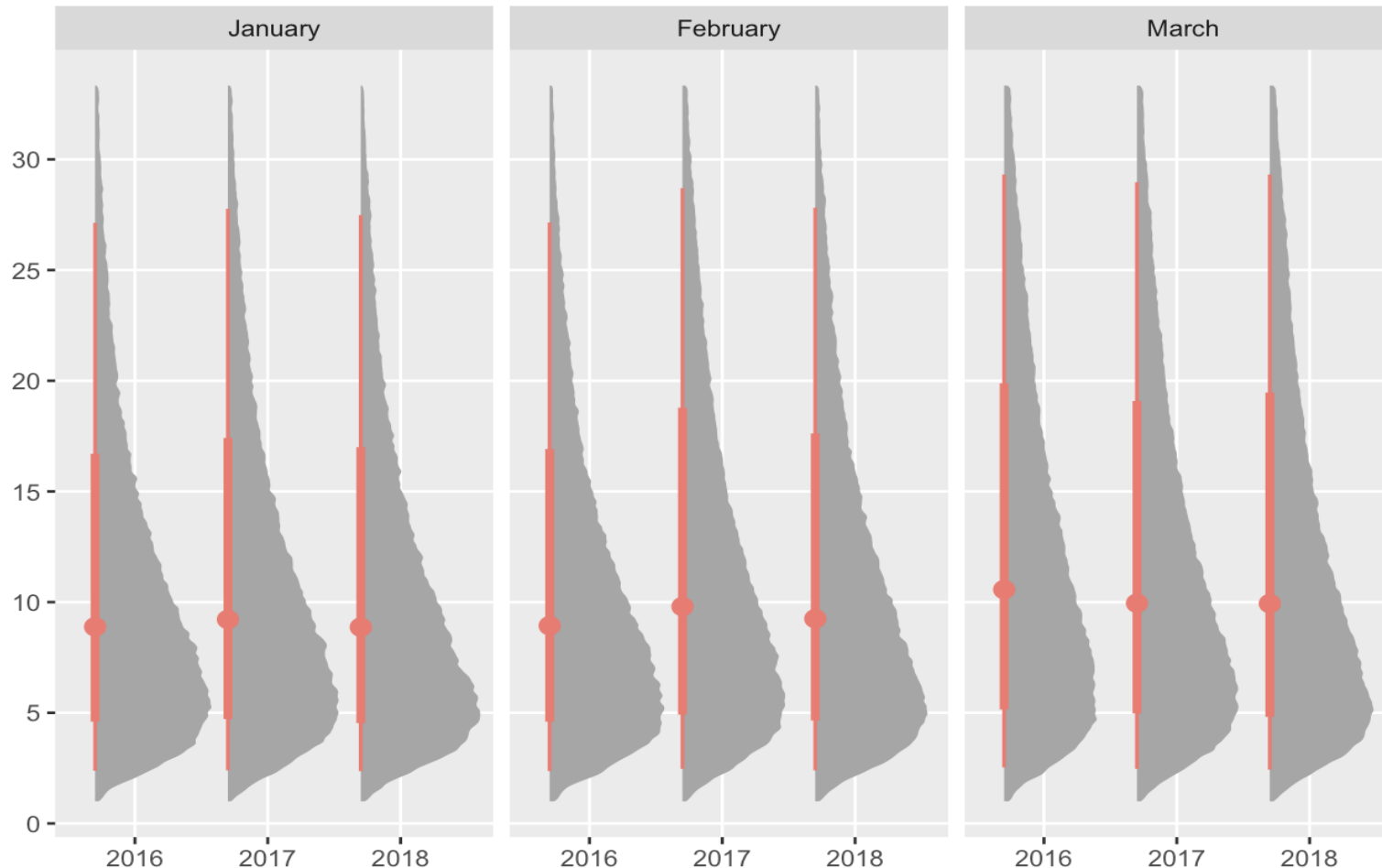


- 2018 Q1 seems to have the biggest density in smaller durations.

This means that more trips of smaller duration took place in 2018 Q1 compared to the other years.

Duration Performance: Frequency of trips' duration (m) per month

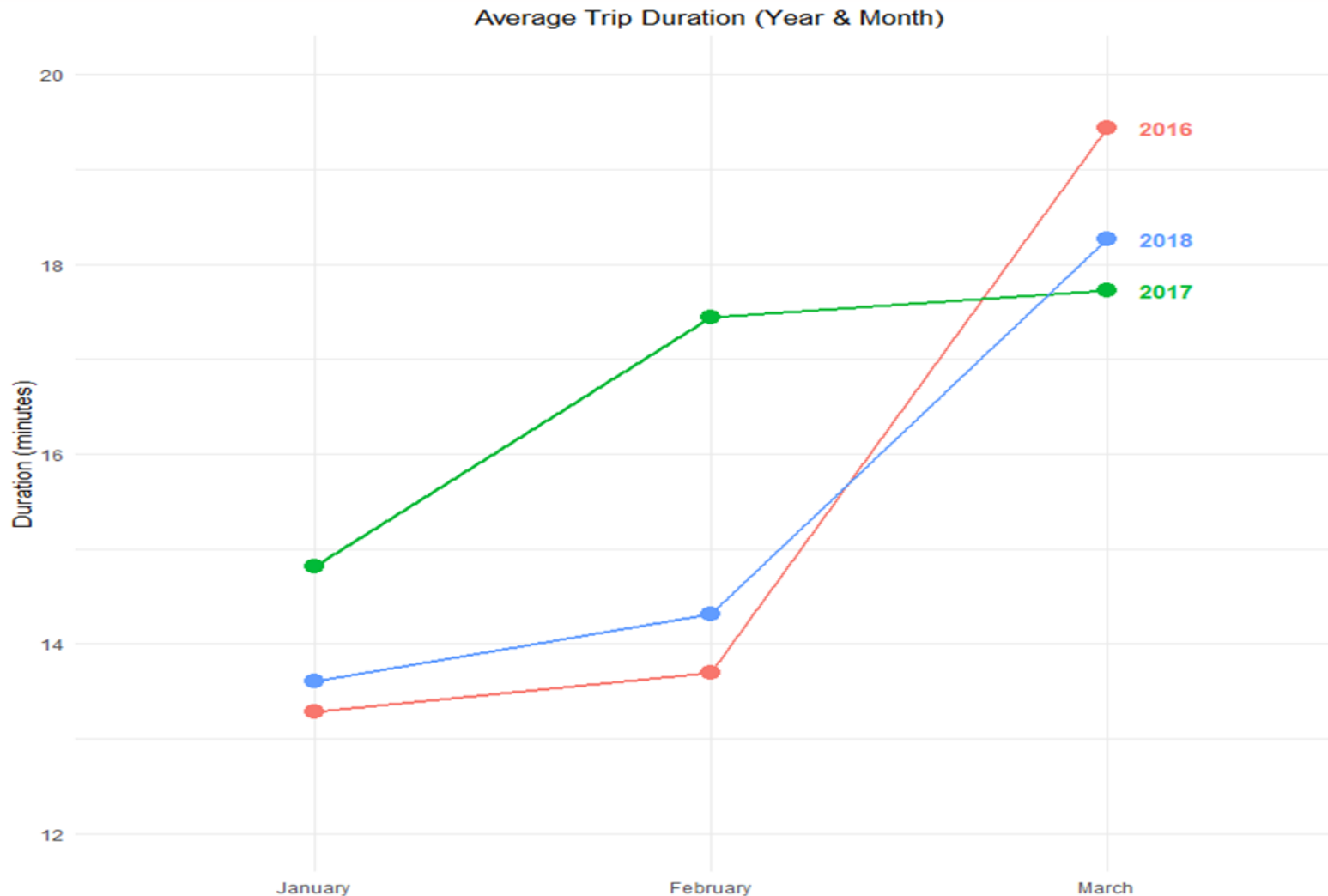
Frequency of Trip Durations (m) per month



This boxplot demonstrates the frequency of trips' durations in minutes per month, over the three years

- In every single month, 2018 had the smallest average value than the rest two years.
- The variance seems to stay constant between months and years.

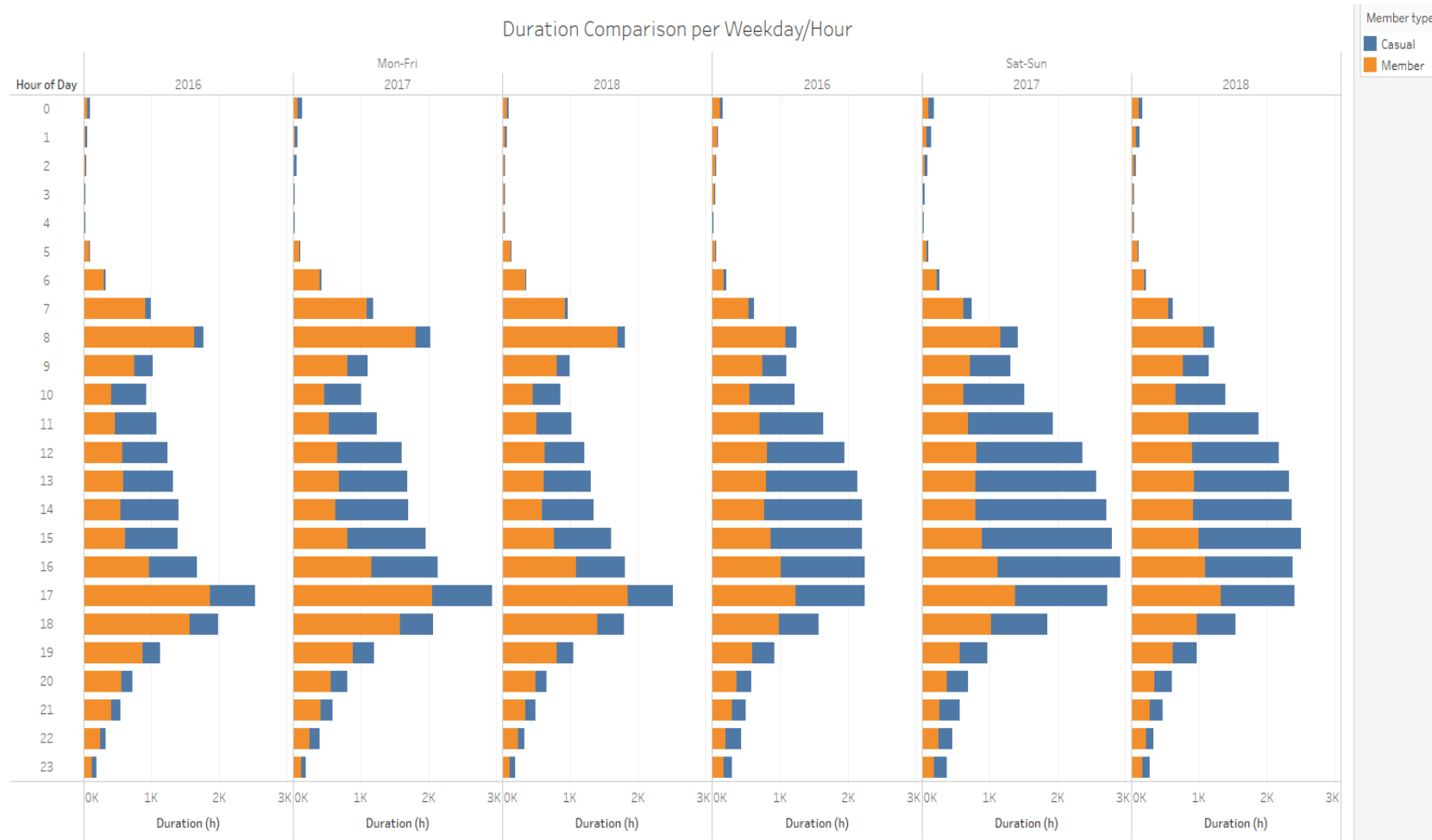
Duration Performance: Average trips' duration (m) per month



- In January of 2018, the average duration was increased by 2.4% compared to 2016 and declined by 8.2% compared to 2017.
- In February of 2018, the average duration was increased by 4.5% compared to 2016 and declined by 17.5% compared to 2017.
- In March of 2018, the average duration was declined by 6% compared to 2016 and increased by 3% compared to 2017.

(The y-axis do not start from 0, otherwise the comparison would not be noticeable.)

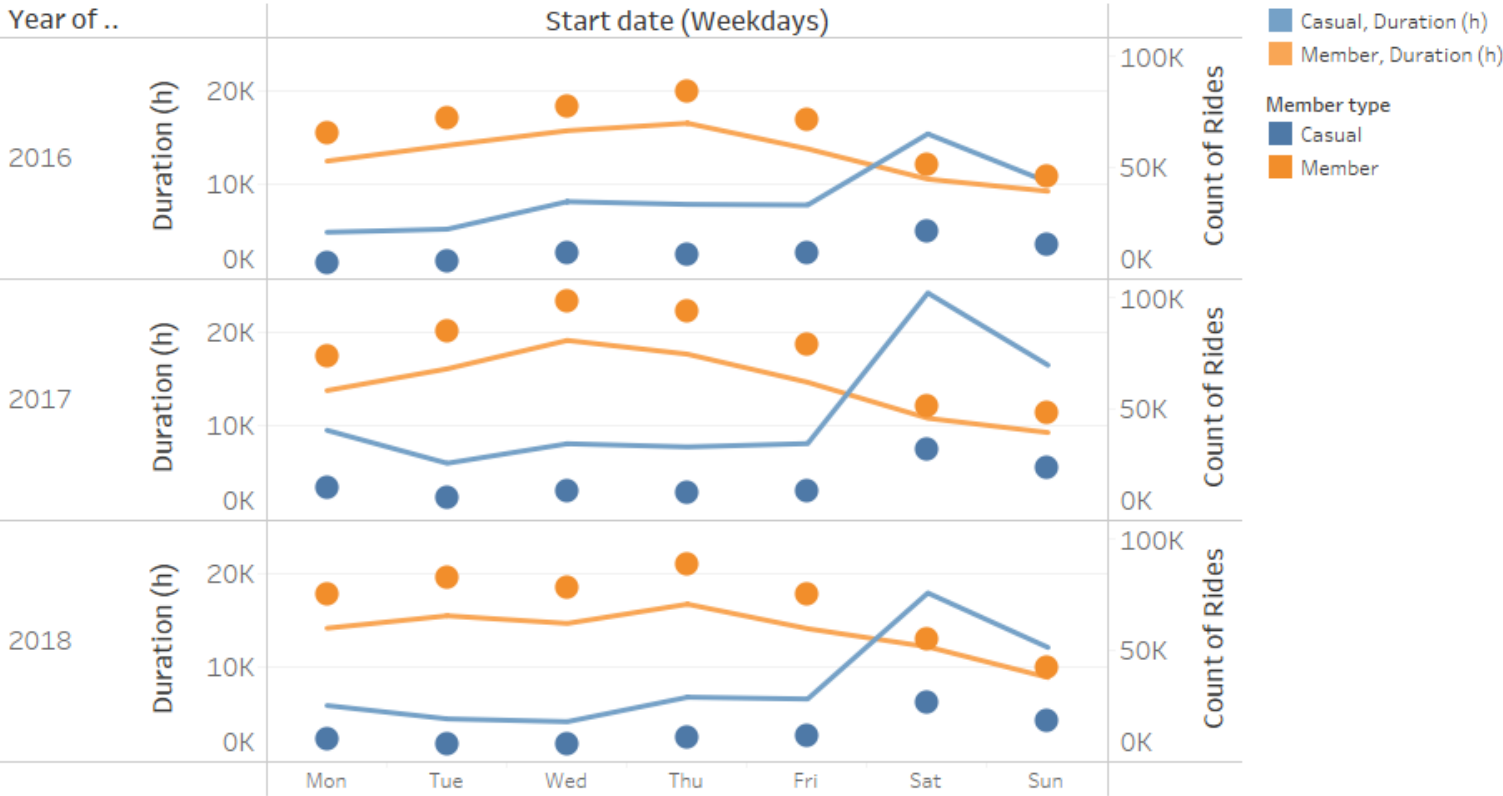
Duration Performance: Comparison per weekday and hour



- As we can see the busiest hours during weekdays are 08:00 and 17:00. In weekend we have a reversed distribution with the busiest hours around midday (12:00 – 16:00). Also, in weekend we have on average biggest trips durations.
- From membership perspective casual users make longest trips regarding duration in weekends and around midday in weekdays.
- From year perspective now, 2017 has the biggest volume in trips duration followed by 2018 and lastly 2016.

Duration Performance: Duration & count of rides / weekday

Duration (line) and Count (circle) of Rides per Weekday per Year



The trends of Duration (h) and count of Duration (h) for Start date (Weekdays) broken down by Start date Year. Color shows details about Member type. Details are shown for Member type. For pane Sum of Duration (h): Color shows details about Member type and Duration (h).

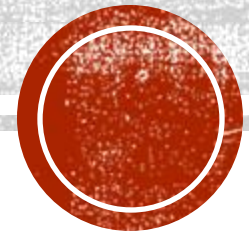
- From Mon-Fri Members contribute more to the total duration of the trips, while in Weekends, and especially on Saturday, Casuals contribute more

In general, members do more, but shorter trips, and casuals take less but longer trips

The behavior of customers is the same over the years

NUMBER OF STATIONS

2018 Q1 vs
2017 Q1 vs
2016 Q1

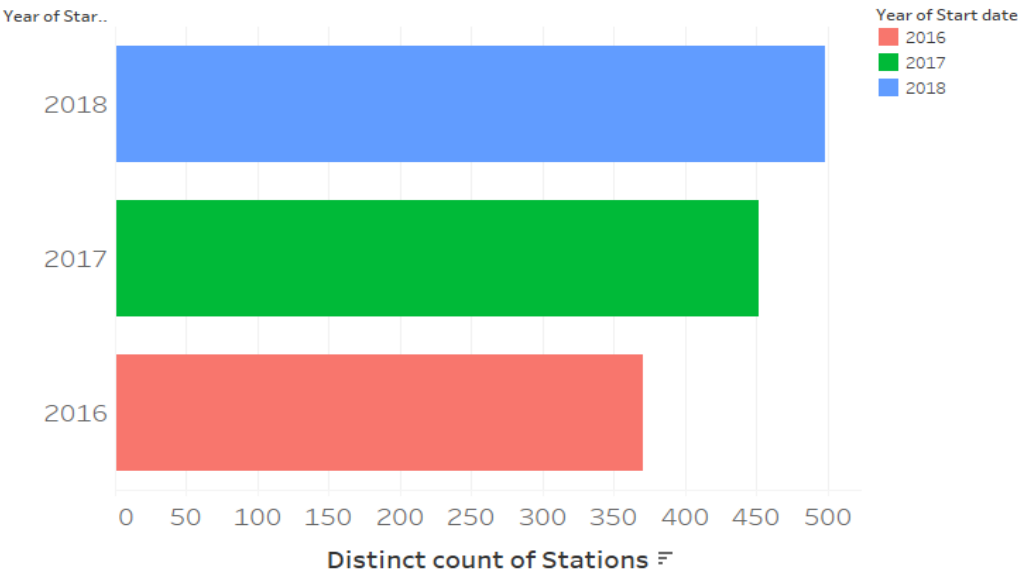


Number of Stations: Total stations per year

There are 499 station in 2018, most of which are gathered around Washington DC.

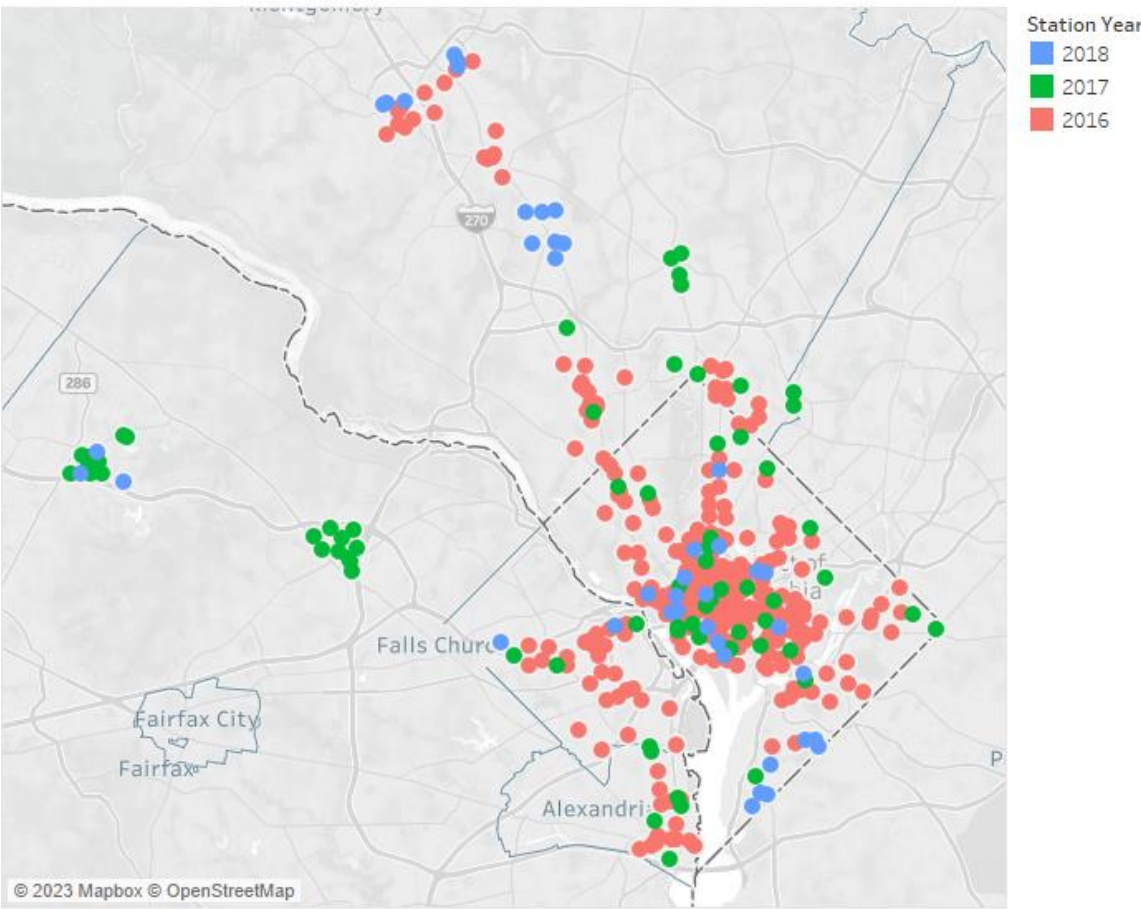
Since 2016 new stations have been introduced, both in Washington DC and outside, with new stations being added, in 2017, to serve a new area in the east (Fairfax County)

Number of stations over the Years



Distinct count of End station number for each Start date Year. Color shows details about Start date Year.

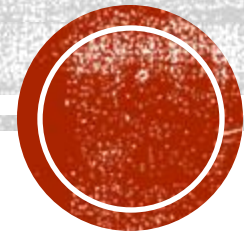
New Stations per year



Map based on Lon and Lat. Color shows details about Station Year.

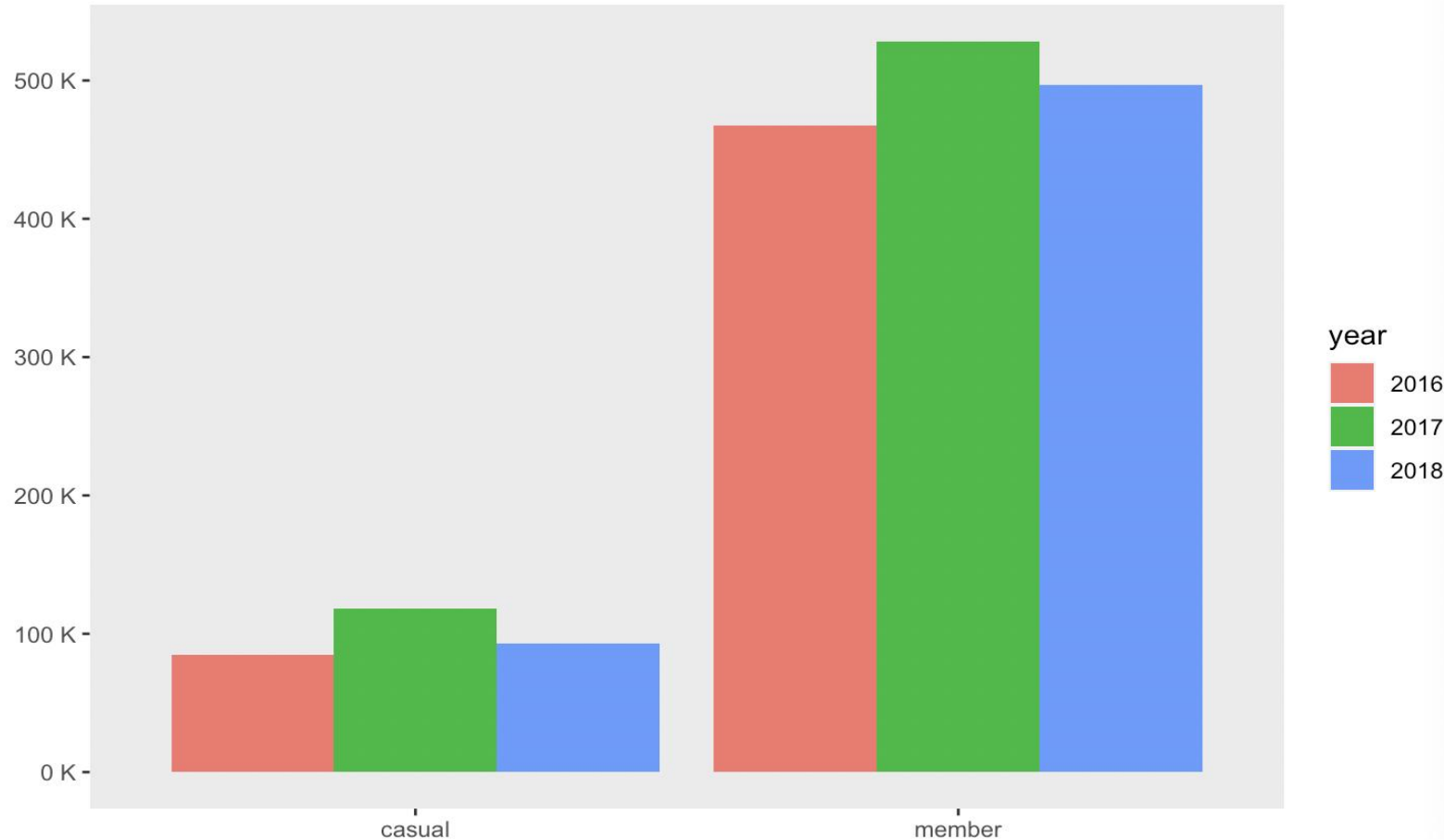
MEMBERSHIP TYPE STATUS

2018 Q1 vs
2017 Q1 vs
2016 Q1



Membership Type Status: Rides' count by membership type

Number of rides by members and casual users over the years



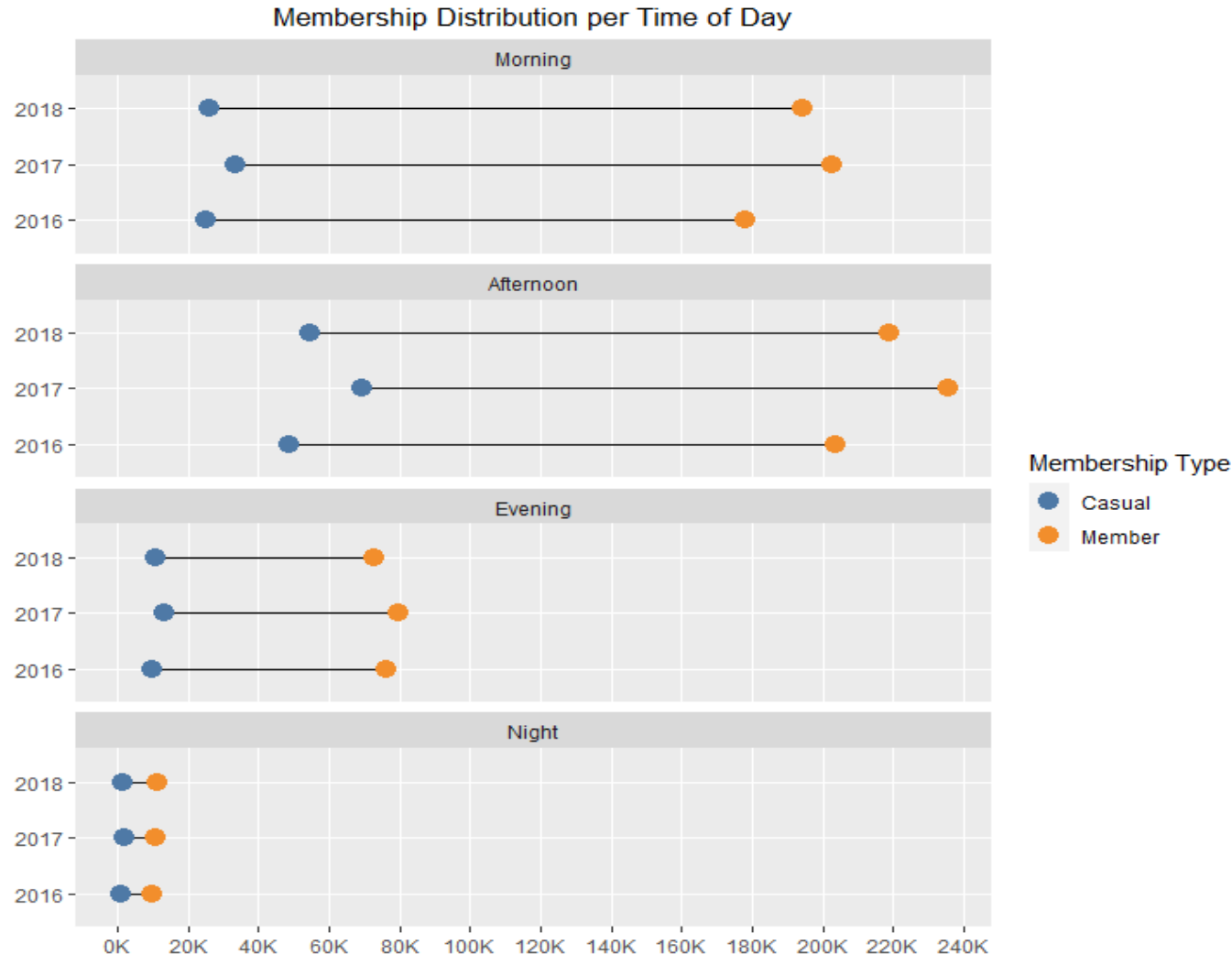
- In Q1 2018, the rides from members have a small increase from Q1 2016 but have been decreased since Q1 2017.
- The same pattern occurs also in the rides from the casual users.

Membership Type Status: Rides' count by membership type per month



- In January and February of 2018, both casual users and members have more rides compared to 2016 but less compared to 2017.
- For the March month, 2018 casual users rides were more than in 2017 but fewer than in 2016. For members rides 2016 was the best year and 2018 the worst.

Membership Type Status: Rides' count by membership type, each time of the day per year semester



The Cleveland dot plots shows the distribution of the users' membership during the day, over the three years. The day was divided in four sections. Morning (06:00 – 12:00), Afternoon (12:00 – 18:00), Evening (18:00 – 00:00) and Night (00:00 – 06:00).

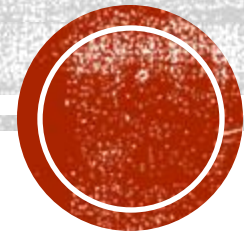
- The members are significantly more than the casual users. The morning and afternoon hours of 2018 have increased both memberships compared to 2016 and decreased respectively in 2017.

- The evening hours of 2018, the casual users were slightly increased, but the members were declined compared to 2016. Regarding 2017, both casual and member users were decreased.

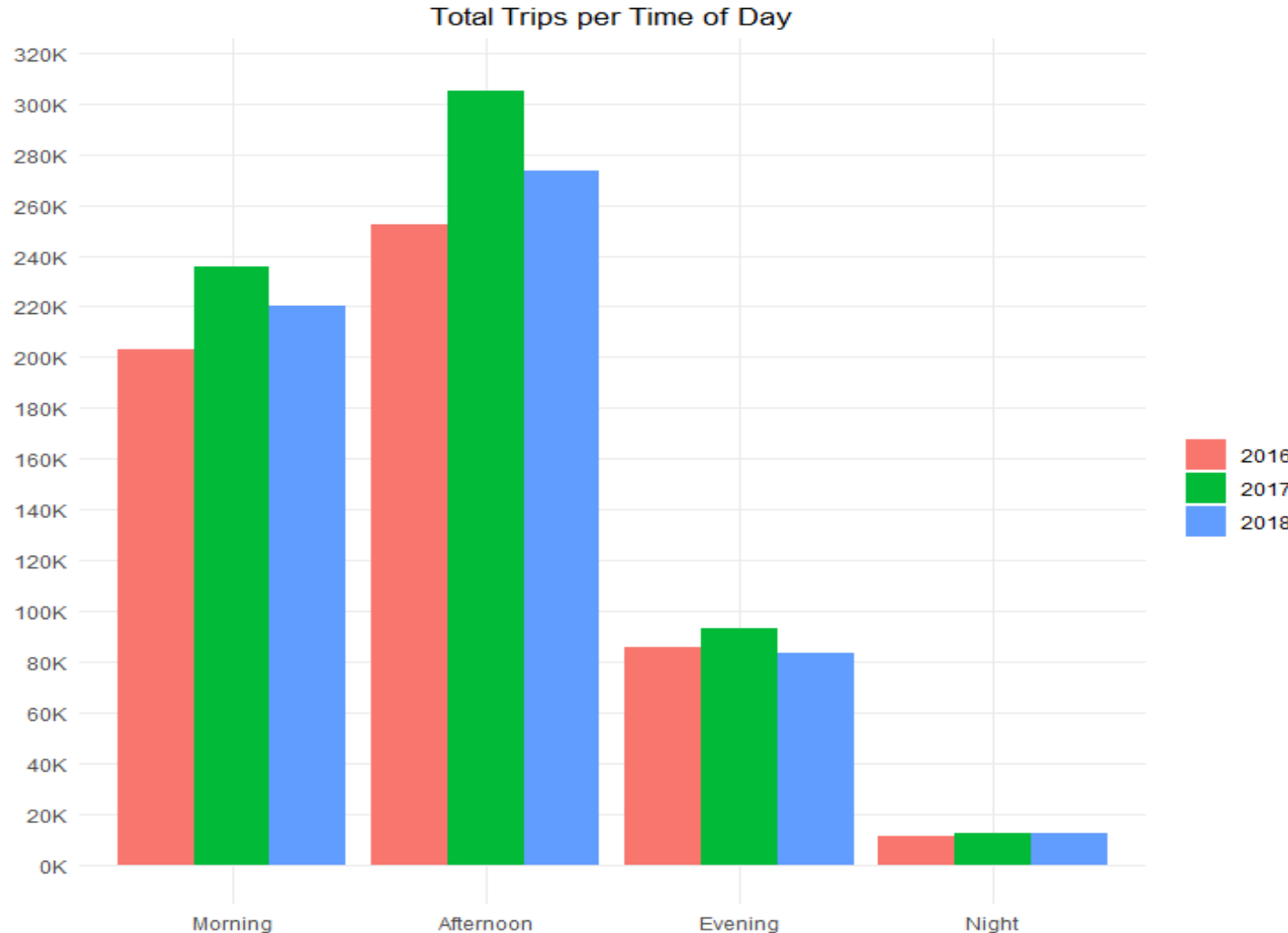
- The night hours, the membership distribution is similar every year.

RIDES / TRIPS STATUS

2018 Q1 vs
2017 Q1 vs
2016 Q1



Rides/Trips Status: Total rides counts for each part of the day



The day was divided in four sections. Morning (06:00 – 12:00), Afternoon (12:00 – 18:00), Evening (18:00 – 00:00) and Night (00:00 – 06:00).

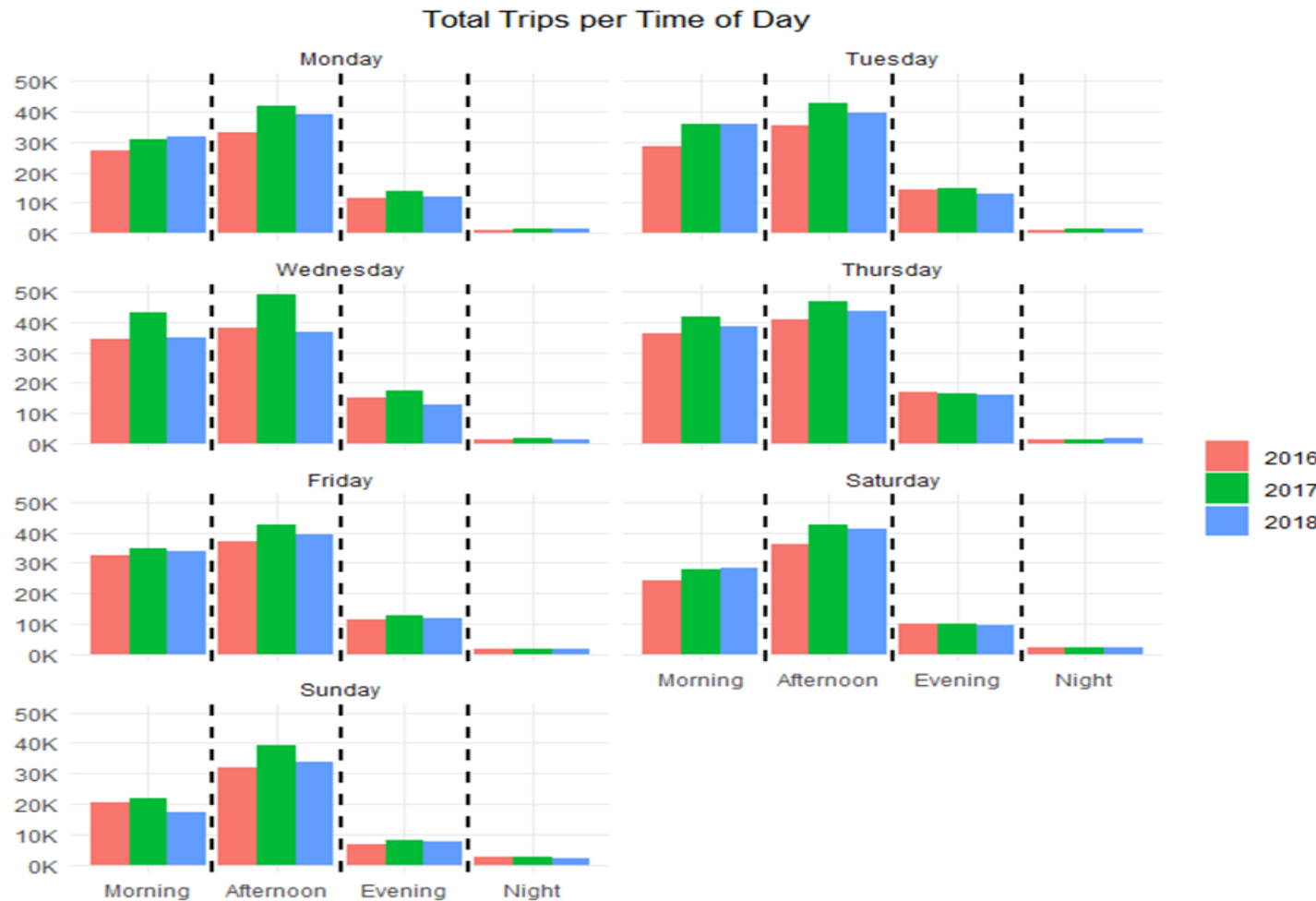
- The peak traffic hours are in the afternoon and the low traffic hours are at night.

- In the morning and afternoon of 2018, the traffic was increased compared to 2016, but decreased compared to 2017.

- In the evening of 2018, the traffic was less than the two previous years.

- In the night of 2018, the traffic was slightly increased.

Rides/Trips Status: Total trips counts per weekday over the years

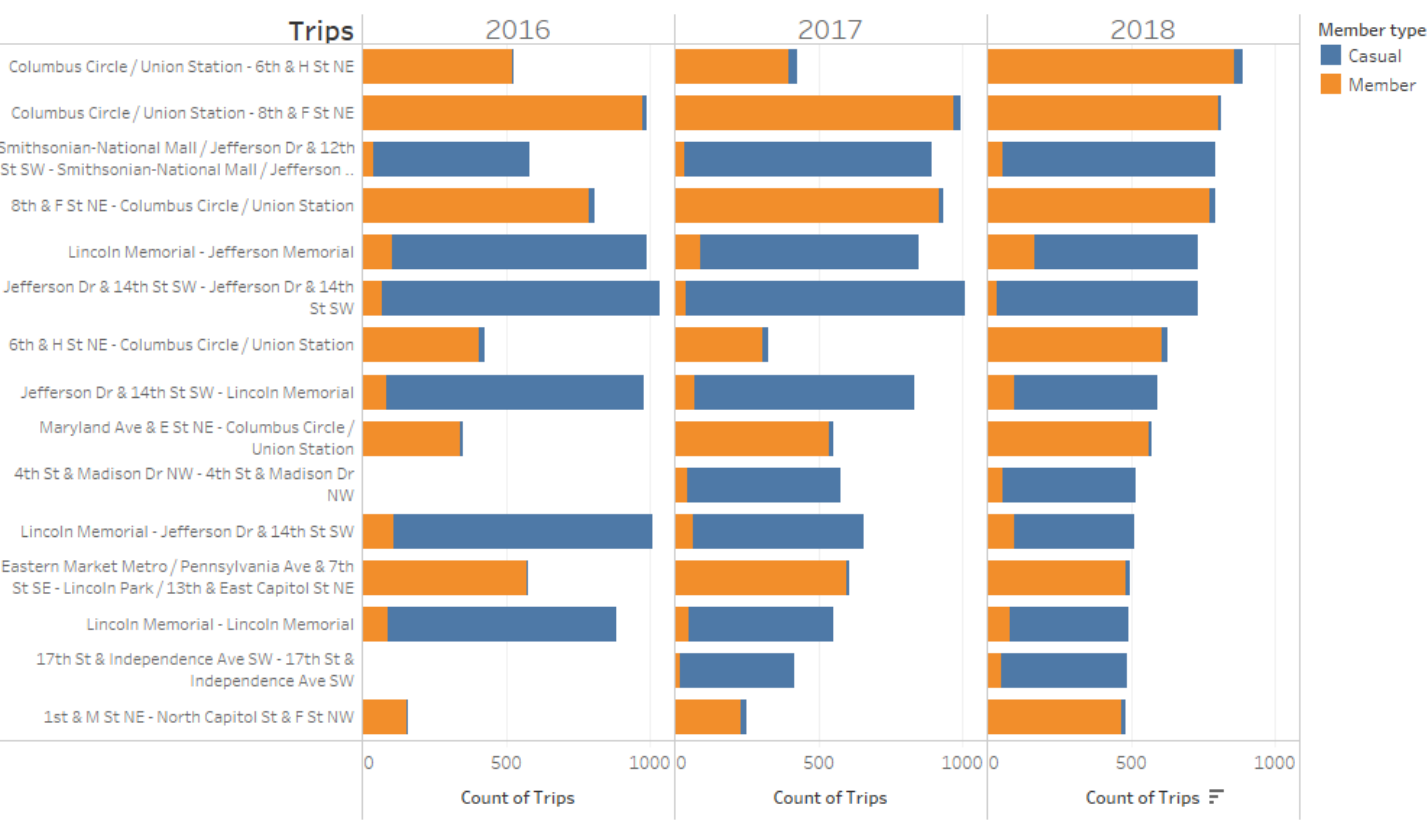


-Although, the trips have a decline tendency in 2018, some growth can be noticed.

-The increase may be viewed mainly on Monday and Saturday mornings and during the night hours of almost every weekday. Also, in the evenings the number of trips are similar.

Rides/Trips Status: Most common trips per year

2018 top 15 most common trips per member type vs previous years



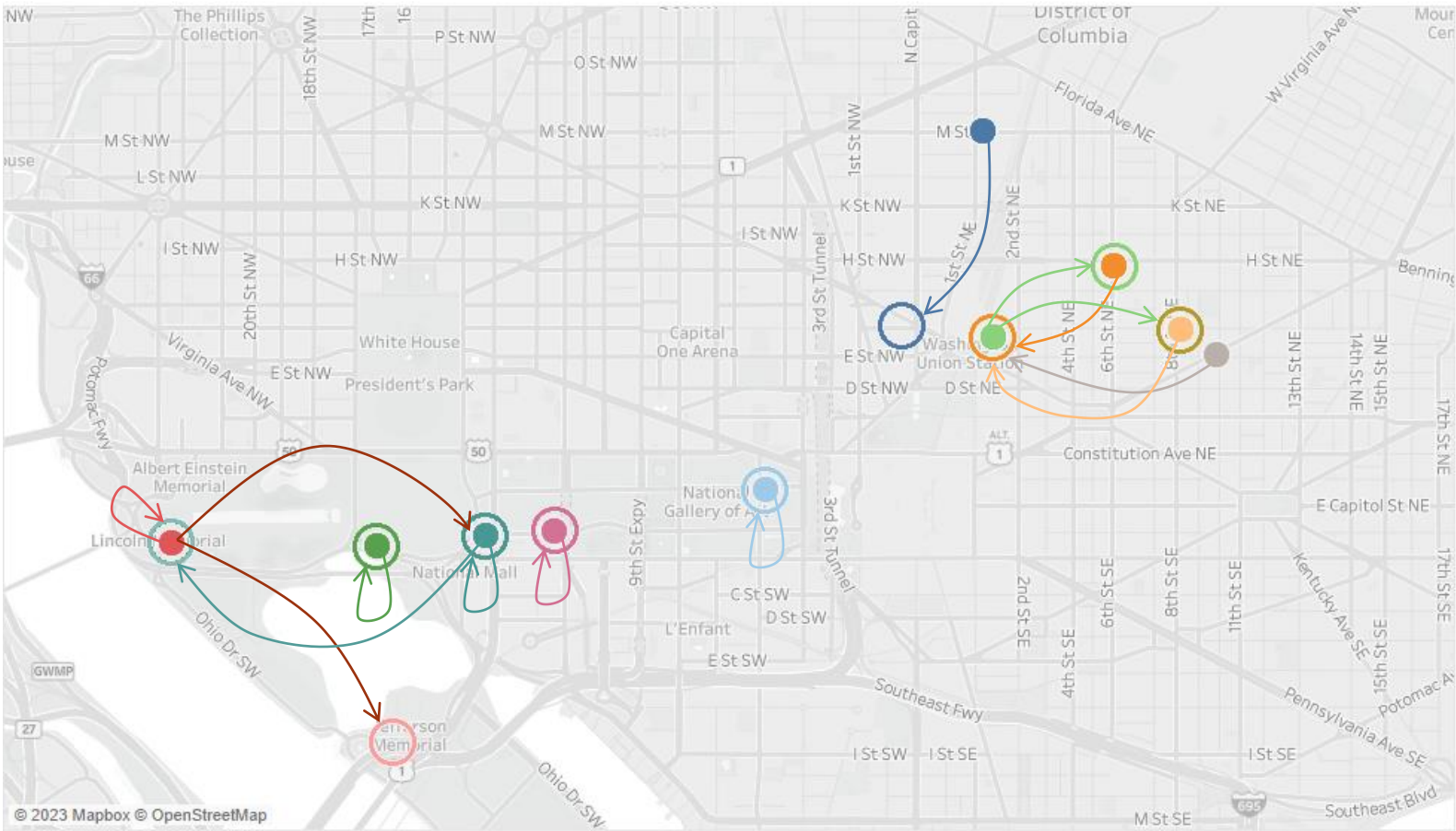
Count of Trips for each Trips broken down by Start date Year. Color shows details about Member type. The view is filtered on Trips, which keeps 15 of 59,960 members.

Filtering Q1 2018 most common trips stations in descending order and compare it with the previous years

- There is a differentiation through the years in the stations so we cannot conclude something in general but take to each case individually.

Rides/Trips Status: Most common trips, 2018

2018 top 15 most common trips



Map based on Longitude (generated) and Longitude (generated) and Latitude (generated) and Latitude (generated). Color shows details about Trips. For pane Latitude (generated): The marks are labeled by Start station. The data is filtered on End LATITUDE and Start LATITUDE. The End LATITUDE filter keeps non-Null values only. The Start LATITUDE filter keeps non-Null values only. The view is filtered on Trips, which keeps 15 of 59,960 members.

The top 14 most common trips take place inside Washington DC Area and are presented in the map.

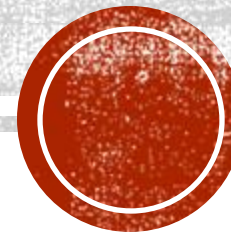
The color represents the 14 distinct trips (Start station – End station). The inner circle (filled) represents the Start Station while the Donut circle (no fill) represent the End station of the trip.

By combining these results with the bar chart provided in the previous slide, we can see that members tend to go from point A to point B, while Casuals usually circle around the same station.

This explains why Casuals tend to have longer rides than Members.

WEATHER ANALYSIS

2018 Q1 vs
2017 Q1 vs
2016 Q1



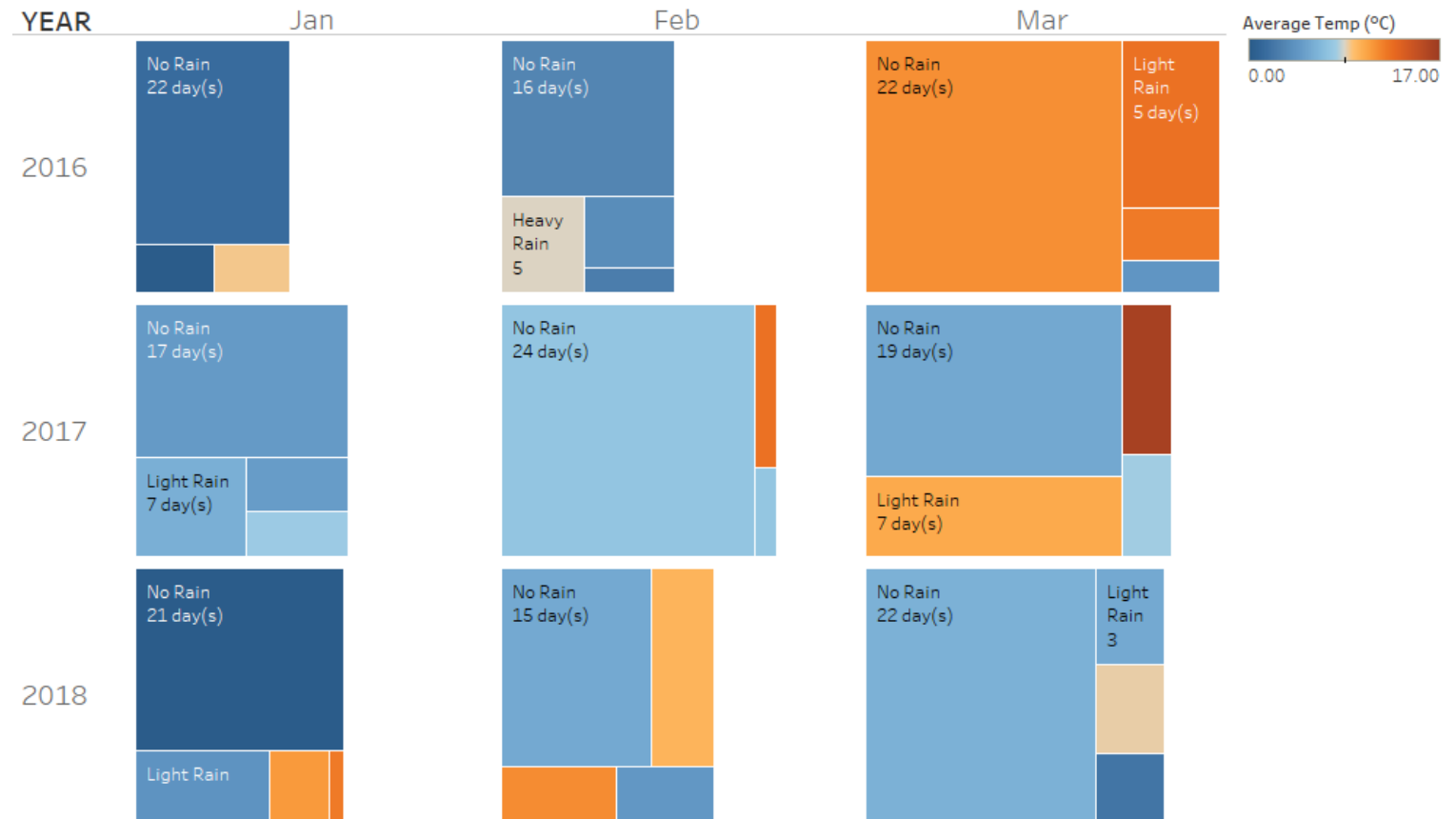
Weather Analysis: Average Temperature and Precipitation

With weather data, a plot was generated which combines the rain precipitation fall and temperature. The size of each block represents the count of days for each group of days based on precipitation levels.

- March of 2016 was warm with many days of rainfall, which explains the good performance.
- In 2018, temperatures were either lower (Jan-Mar) or there were a low number of days with rain (Feb) comparing with the other years.

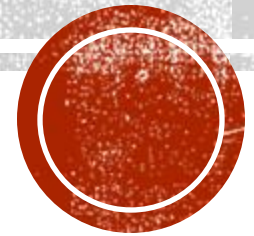
This could explain the performance drop compared to 2017.

Day count per Rainfall Density per year/month & Average temperature



Rain Density and count of Date broken down by Date Month vs. YEAR. Color shows average of Average Temp (°C). Size shows count of Start station number. The marks are labeled by Rain Density and count of Date. The data is filtered on Start date Year, which keeps 2016, 2017 and 2018. The view is filtered on Rain Density, which keeps Heavy Rain, Light Rain, Moderate Rain and No Rain.

CONCLUSIONS



Conclusions

Duration

Q1 2017 was the best performing semester among the other two. So, if we compare Q1 2018 with Q1 2017 we see a decrease in the numbers.

On the other hand, March 2016 was the best performing month among all of them. In correlation with weather data, also March 2016 has the highest temperatures and the lowest rainy days. That indicates a strong correlation between weather and bike trip duration.

Number of Stations

Capital Bikeshare over the years has increased their bike stations. That indicates the positive view of the company.

Membership

As we cannot export data regarding the increase or decrease of the number members, we can say that the number of trips are 4-5 times more than casual users. Also, the number of trips follows the same pattern as duration through the years something we expect also due the weather.

Ride/Trips

The rides/trips regardless the membership peaks all in Q1 2017 for the most time of the days followed by Q1 2018. An exception is made only in night hours (00:00 – 06:00) with Q1 2018 having most of the rides but in absolute numbers this is a tiny percent among the other hours of the day.

THE END

