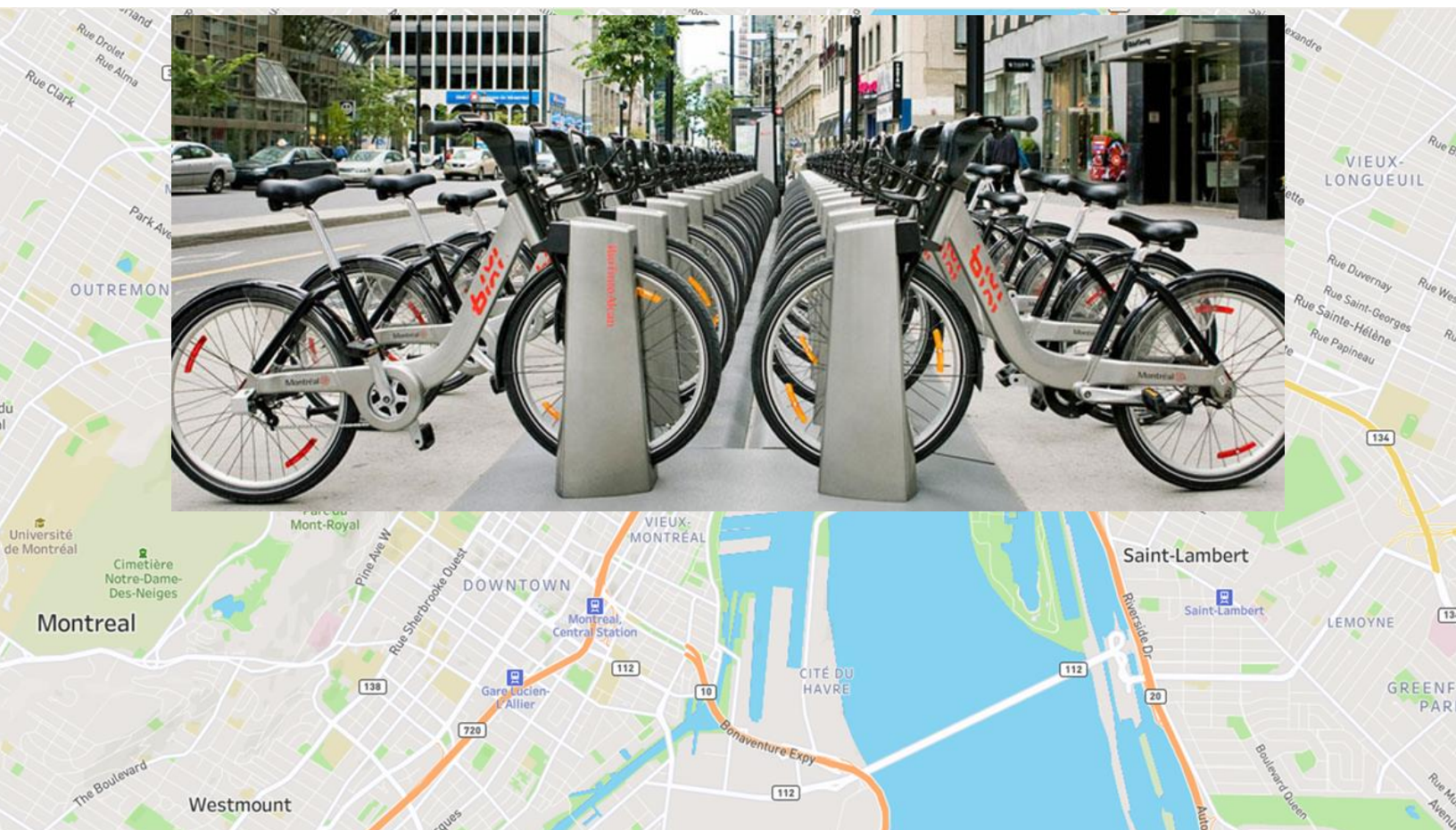


Bixi Project Deliverable 2

Randy Miskuski

Project Due Date: January 31, 2021



Insights

The objective of this memo is to directly answer the given questions outlined in this project, and to make comments and recommendations on what the insights mean, and how to adjust business model as applicable. We will touch on each of the supplied questions and provide meaningful visualizations, as necessary. All the insights will be found with using Tableau, and thoughts will be commented throughout the report.

Question 1.1

Build a visualization to contrast the total number of monthly trips for the calendar years of 2016 and 2017 by month. What differences do you notice about the usage of the Bixi service between the two years?

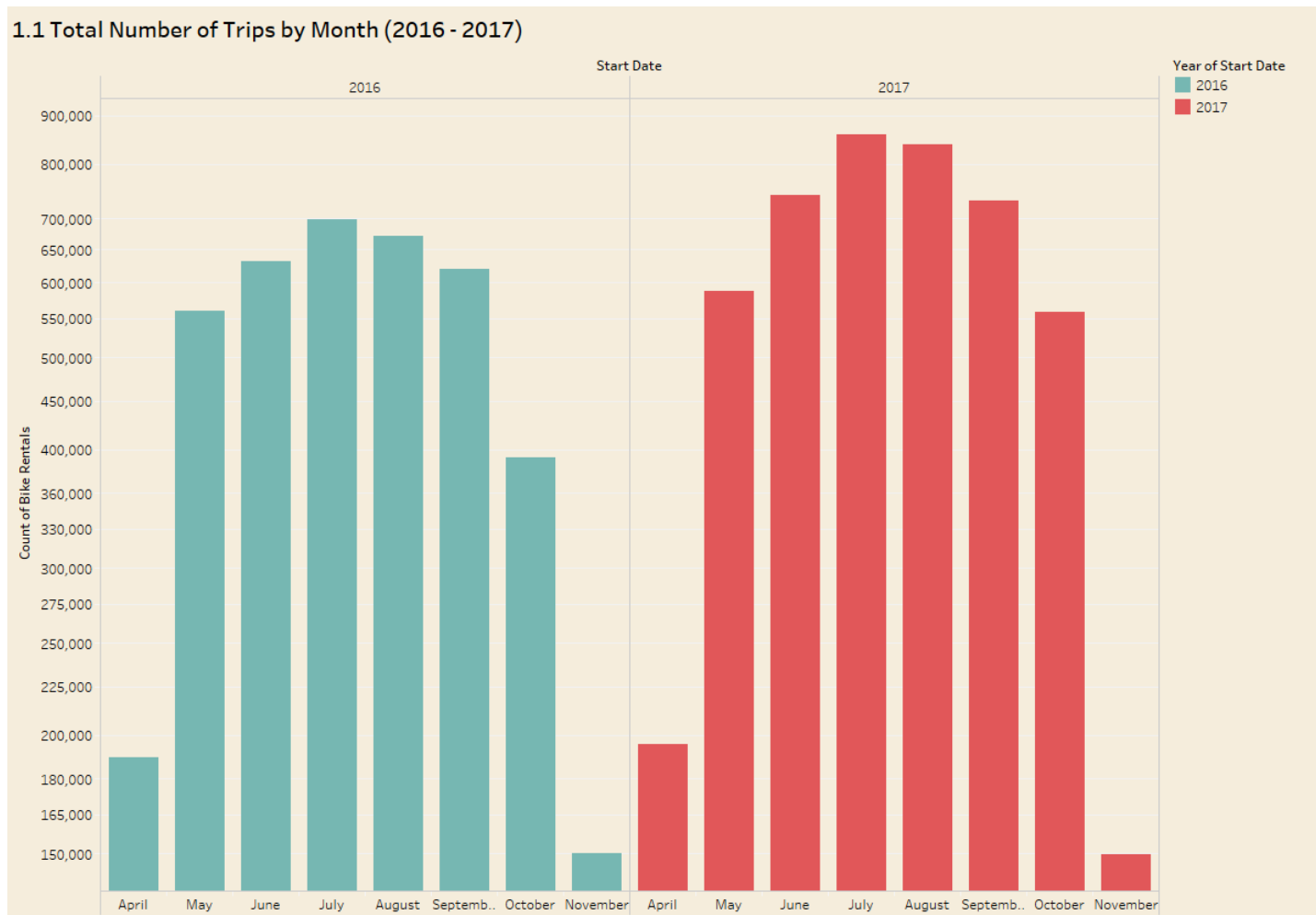


Figure 1: Total Number of Trips by Month (2016 -2017)

When we look at bar chart of Figure 1, we see the amount of bike rentals that were completed in 2016 and 2017. It should be noted that 2017's number of bike rentals was higher for every month proving Bixi's annual growth. By looking at this visualization we see that our best months in both 2016 and 2017 were found to be July and August. Consequently, our worst months were found to be the colder months, April, and November. Montreal has an average April temperature of highs of 9°C and lows of 1°C, and an Average November temperature of highs of 6°C and lows of 0°C. Therefore, there is no big surprise why April and November were dramatically slower than previous months.

Question 1.2

Use a quick calculation to contrast the percentage of trips that occurred in each month per year, between 2016 and 2017; e.g. if 1000 trips occurred in 2017 in total, and 120 of them occurred in July, then July has 12% of trips in 2017. How does the proportional monthly usage differ between 2016 and 2017?

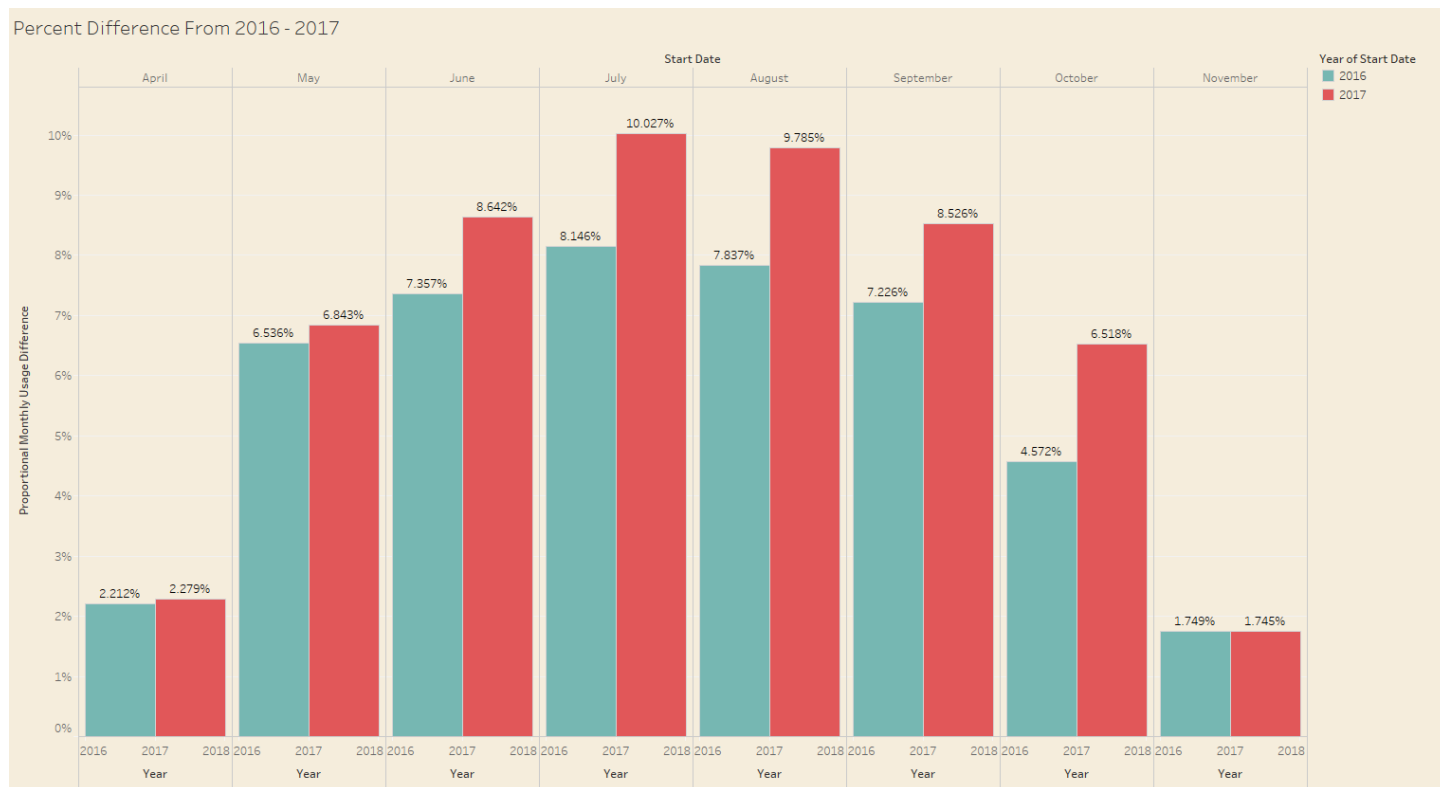


Figure 2: Percent Difference From (2016 - 2017)

By counting all of the 2016 and 2017 trips, we were able to use a quick table calculation to find the present total by each month for each year. When we look at the data from 2016, and 2017 we see a monthly increase in monthly rentals as expected from Figure 2. While using a quick table calculation to find the proportional monthly usage difference, we saw our biggest difference in July of 2017 (an increase of bike rentals by 10.027%). This is to be expected because this follows the trend of our annual bike rental growth as seen in Figure 1.

Question 1.3

Make a calculated field to calculate the percentage of trips that were done by members, and using this, visualize what percentage of trips per month were member trips for the year 2017.

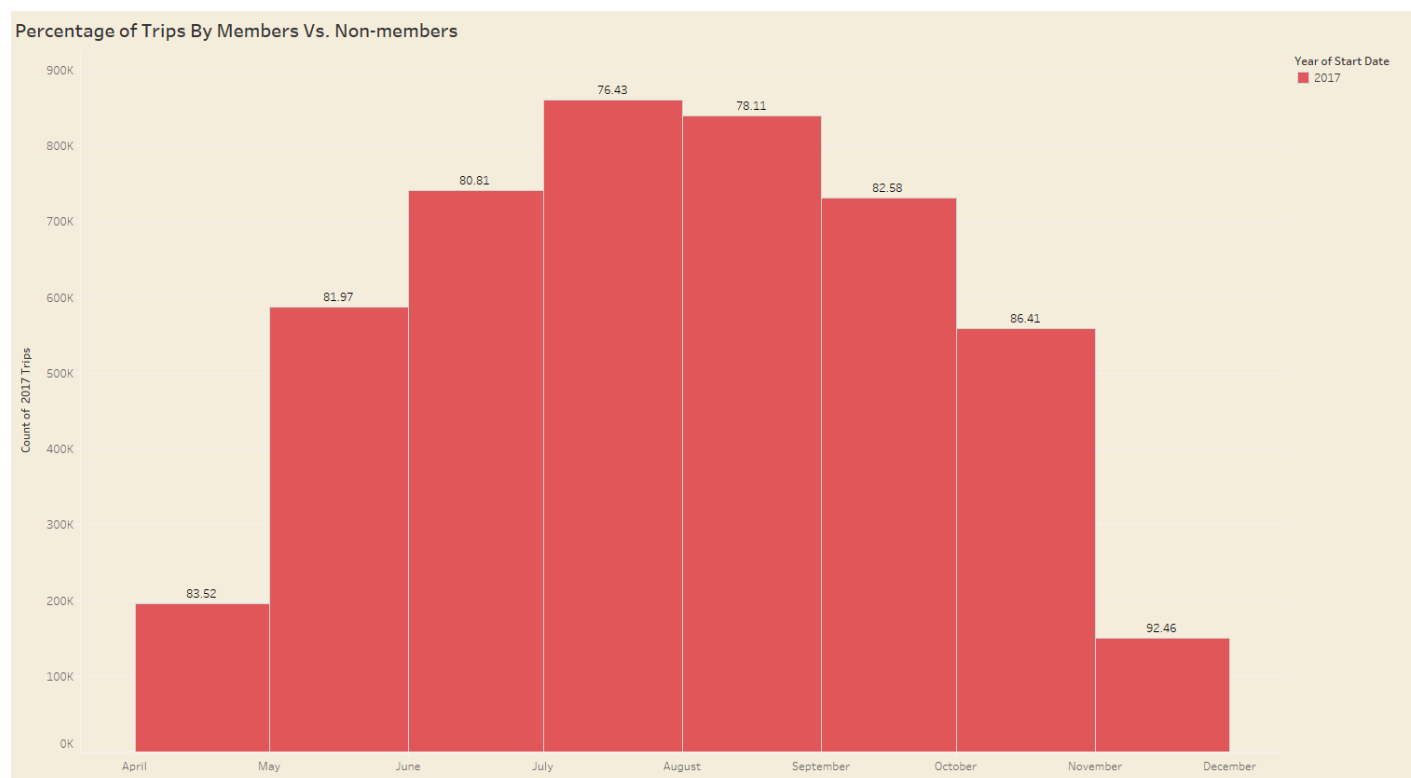


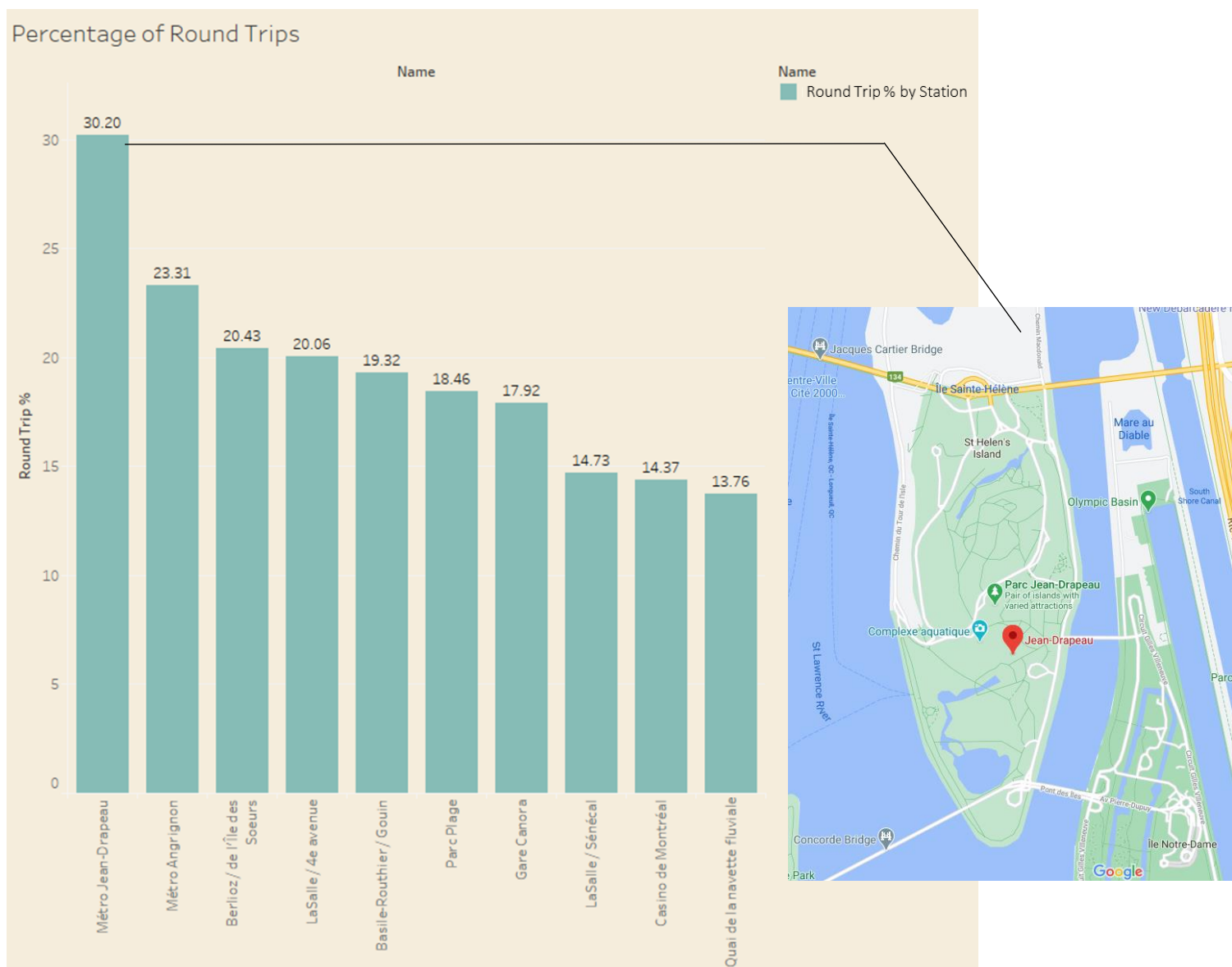
Figure 3: Percentage of 2017 Trips by Members

Figure 3 illustrates the relationship between the number of trips that were done in 2017 by members. Additionally, we have a calculated field in Tableau that tells us the percent of customers that were members versus non-members. While using this information we were able to look at the distribution and see that we have the least number of members renting bikes in the summer months. When we look at the July distribution between Members and Non-Members, we see that only 76.43% of trips are completed by a Member. The warmer months in 2017 have similar ratios of Members to Non-Members likely because Non-Members are renting bikes for leisure purposes more so than Members.

When we look at the colder months like April and November, we see that the ratio of Members to Non-Members increases significantly (83.5% in April, and 92.4% in November). This proves that less Non-Members are renting bikes because cycling in these months is more dangerous, cold, and less desirable versus our warmer months. We are likely seeing more transit uses from the members versus the Non-Members in the colder months like April and November.

Question 1.4

Create a calculated field for identifying round trips (hint: you will need to use a calculated field with conditionals). Create a visualization showing the top 10 stations by percentage of round trips.



By tracking where a Bike rental starts, and ends, we are able to determine when a customer has completed a round trip. By using this information, we created a calculated field to determine where the top 10 most used stations are. Figure 4 illustrates the top 10 stations that had the most percentage of

Round Trips. A Round Trip would qualify if the bike rental left the station and returns to the same station in a single given trip.

By looking at our top 10 stations we see that Metro Jean-Drapeau has the most Round Trips at (30.2%). When we see such a high percentage, we need to investigate why such a high number exists. Upon further investigation we see that the Metro Jean-Drapeau station exists in the Jean Drapeau park. The Google Image snapshot shows the location of the station with respect to the city of Montreal. With the station being placed on an island, it makes sense that approximately 1/3rd of trips are round trips. Especially since Jean Drapeau Park has a total of 3 Bixi stations. When we look at the other 2 stations, we also see a comparable round-trip percentage.

Question 2.1

Build a visualization for marketing showing the relationship between percentage of round trips and percentage of member trips by station. Comment upon/interpret any interesting patterns you see.

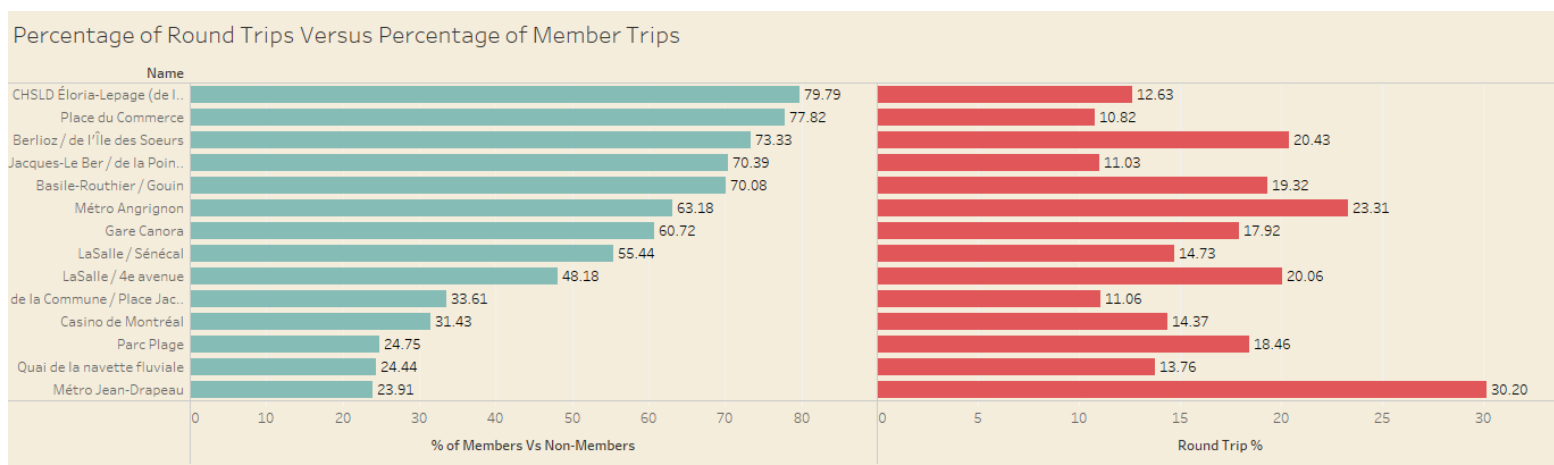


Figure 5: Percentage of Round Trips Versus Percentage of Member Trips

Figure 5 compares two bar charts of trips against each other. The green bar chart on the left shows the percent of trips completed by members. And the red bar chart on the left shows the percent of Round Trips completed by each station.

The green bar graph on Figure 5 is telling us two things. One, it's saying that the highest percentage of member trips are at the stations CHSLD Éloria-Lepage, and Place du Commerce. And two, that these had a Member to Non-Member Ratio of 79.79% and 77.82%. And when we Google the locations of each, we find that they both have high density commercial uses in close proximity of the station's locations. Facilities like malls, businesses, and high schools have a large influence on member trips as they are being used for more transit use, versus leisure use.

The assumption that these transit destinations are true, are further backed up by the low percentage of round trips we see in the red bar graph showing us Round Trip percentage on Figure 5. To look deeper to identify if a pattern exists in our data, we plotted a large view of Round Trip percentage vs. Percentage of Member trips in Figure 6 to see if the relationship is as expected.

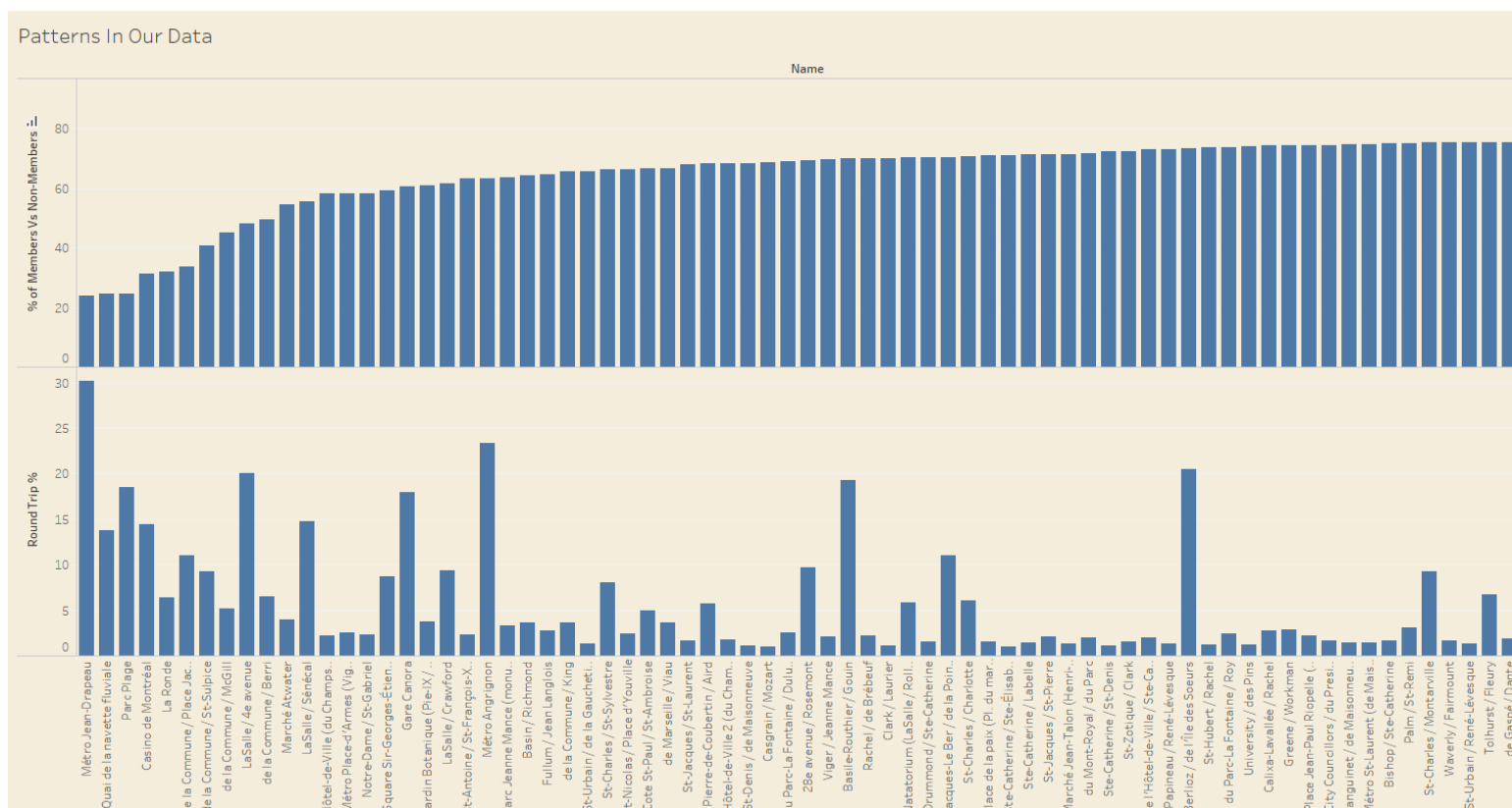


Figure 6: Patterns in (Figure 5: Percentage of Round Trips Versus Percentage of Member Trips)

Figure 6 backs up our predictions that the locations with a high round trip percentage mostly have a low member count. Alternatively, the locations with a low round trip percentage, have higher member count as they are mostly transit locations for members traveling to and from school or work. Though we have outliers that may contradict this argument, most of our data set follows this trend making it a safe assumption to make. The higher the Round Trip percentage, the lower the percentage of member count.

Question 2.2

Make a histogram (or histograms) to visualize the distribution of all trips by duration in minutes, and contrast this between member and non-member trips. What can be said about the behavior of members vs. non-members in terms of trip length?

Trips Lengths by Members Vs. Non-Members

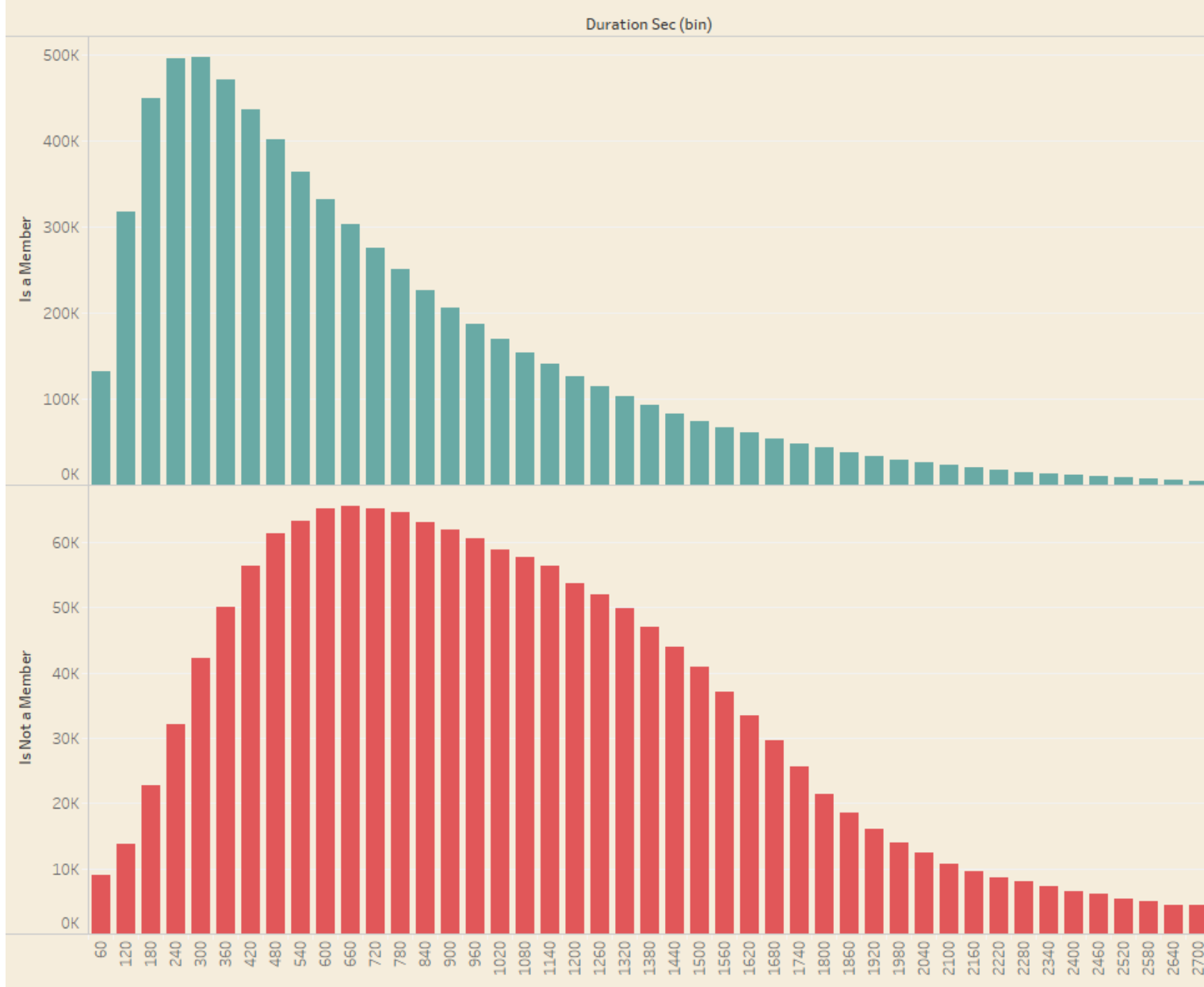


Figure 7: Member Vs. Non-Member Trip Lengths

Figure 7 shows us the histograms distribution of Non-Members (in red), and the distribution of Members (In green) and their relative rental times in seconds. What we see by looking at the Members is that the majority of the trips are short. The majority of them fall between 180-420 seconds or (3-7 minutes).



When we compare this data to the red histogram we see that the majority of the Non-Members are making longer trips. Typically, a Non-Member trip will last between 540 – 1080 seconds, or (9 – 18 minutes).

Why are Members taking short trips?

This is a question that needs to be addressed. Though the shorter trips are going to be beneficial for Bixi, we need to ask ourselves why non-members are taking shorter trips. By looking at our Data we see that the majority of the trips are quite short, and primarily in downtown Montreal.

So let's think about who the Members may consist of. A Member could be a local, it could be someone new to biking, or it could be someone seeking an alternative transit than an Uber or a Bus. Now when a Member rents a bike, they are likely making individual trips, (not Round Trips) to get to a destination. Due to the close proximity of everything in downtown Montreal. It's to no surprise that the trip durations are short. When a Member gets to their location, whether it's work, school, or area of attraction. The thing on their mind is to end the trip immediately so they can get on with their schedule. So we believe that Member trips are ended much faster than Non-Member trips because they want to get to their destination and carry on with their schedule. Members are likely locals, and not doing as much sight seeing as Non-Members are.

This may not stand true for all cases, but majority of cases in the downtown may follow this pattern. This relationship does not stand true for the Non-Members as seen in Figure 7. The Non-Members seem to take their time and enjoy their bike rides since they are prepaying for their rental. The average rental time for a Non-Member is between 9 – 18 minutes.

Question 2.3

Create a map to visualize the average trip duration per station across the city. Are there any interesting geographic patterns you notice? Why do you think this might be?

Map of Station Locations and Popularity

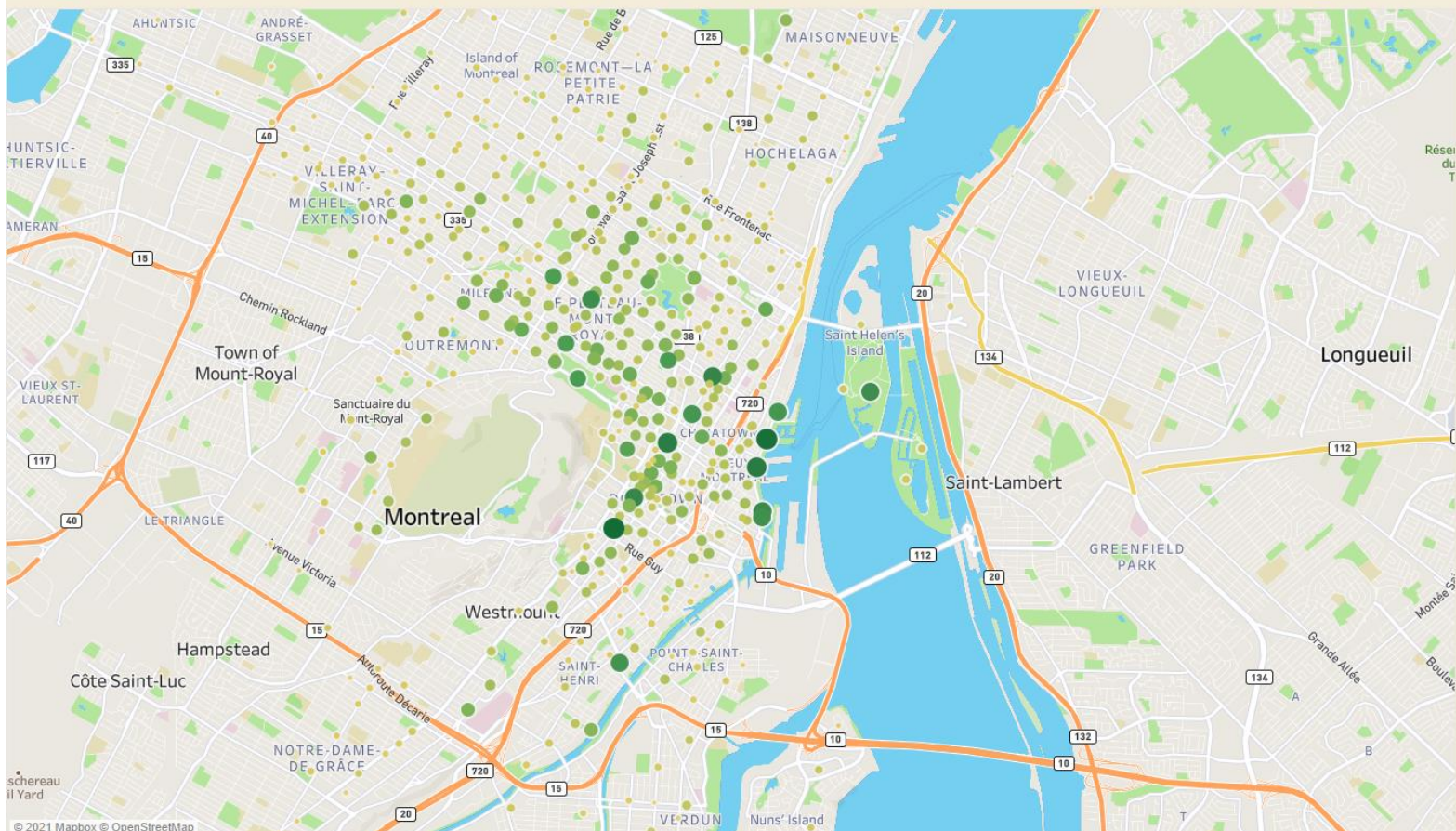


Figure 8: Map of Station Locations by Popularity

Figure 8 illustrates a map of the city Montreal and where all their Bixi bike share stations are located. By looking at the map we see an array of colors ranging from gold to green in ascending circle size. (gold being less popular by minutes rented, and green being most popular by minutes rented).

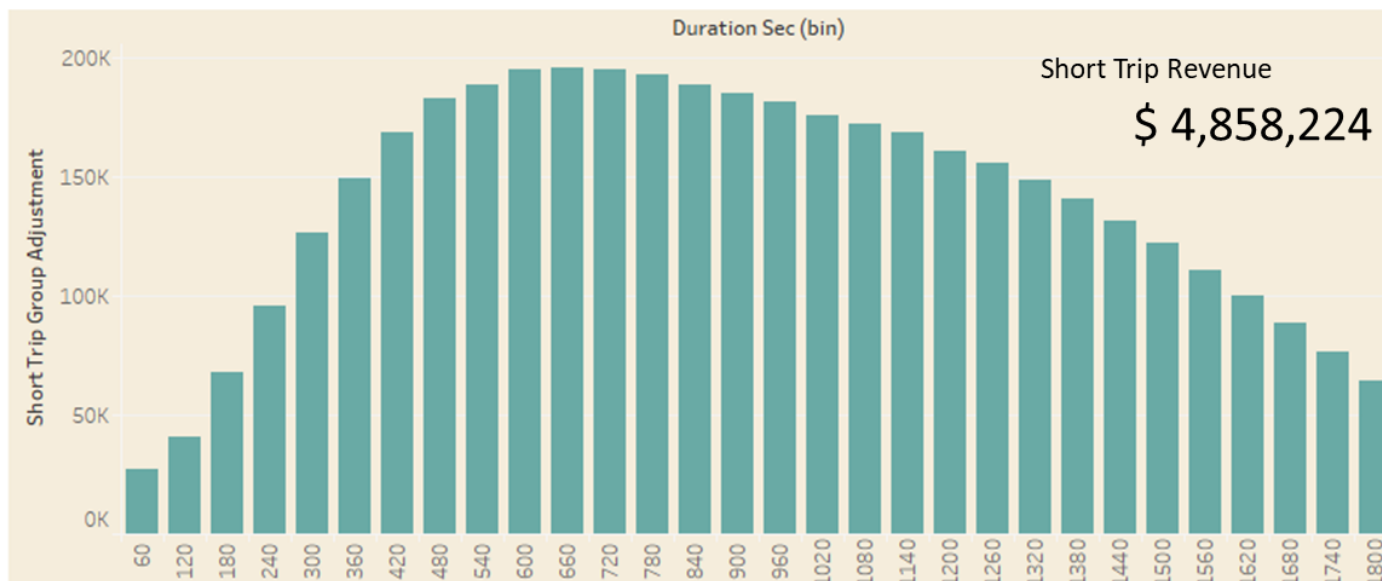
The outskirts of Montreal have the least rentals due to the nature of their location. Typically, the gold locations are in residential areas where we have a moderate to high population density, but primarily residential use. As we come closer to Montreal's city center, we begin to see a more concentrated use of the stations. We see this the most in the heart of the downtown by Montreal City Hall. In this region we have a high population density with plenty of neighbouring parks, waterfront, high density residential and commercial towers, restaurants, and bars. Its here where see lots of action in both the round trips and in the individual trips. Stations that proved to be near places of work with high population density, and / or places of entertainment seem to have the most attention and should have the most concentration of bikes from departures of neighbouring stations.



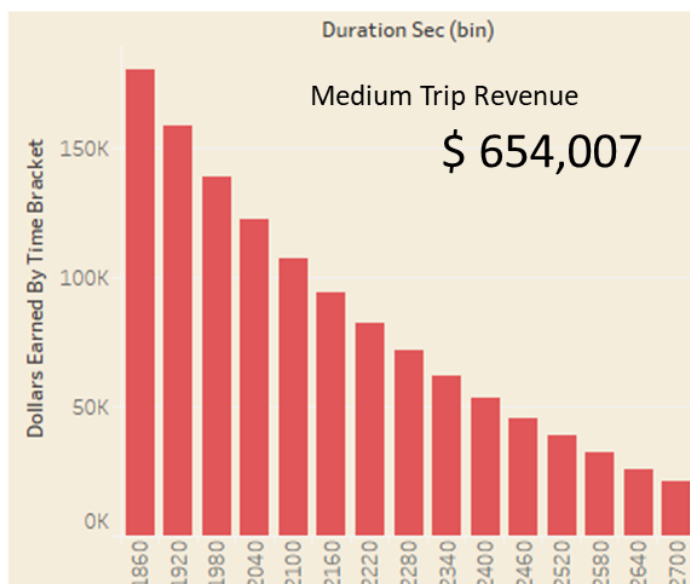
Question 3.1

Create a calculated field (or fields) to calculate the revenue generated by this pricing model.

Short Trips Between 0 - 30 minutes



Medium Trips Between 30 - 45 minutes



Long Trips Between 45 - 60 Minutes

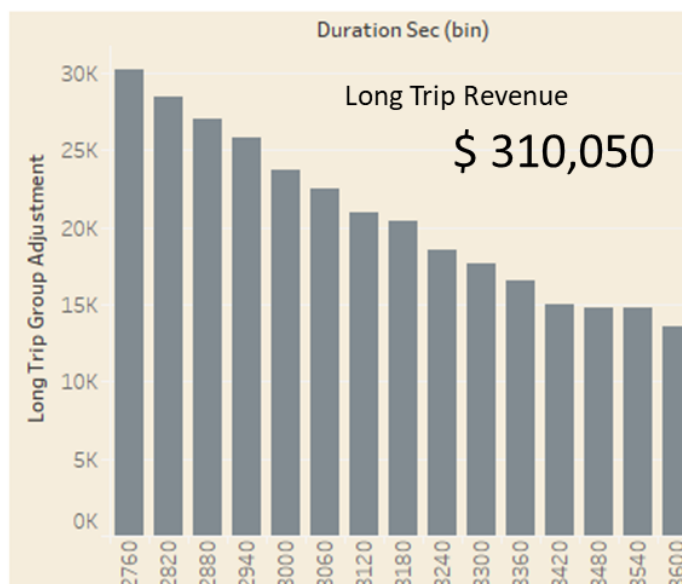


Figure 9: Trip Revenues Based on Trip Duration

Above in Figure 9 illustrates a dashboard of revenue calculations based on our flat line pricing model. By identifying at our stations whether a user is a member or not, we are able to determine how long they rented a bike for, and charge them appropriately by the length of their bike rental.

For instances where bikes were rented for 30 minutes or less, they were to be charged \$2.99 to their credit card. (Total of \$2.99)

For instances where they rented a bike between 31 minutes and 45 minutes, they were charged \$2.99 for the first 30 minutes of their trip, and \$1.80 for the extra 15 minutes whether they choose to use it or not. (Total of \$4.79)

For instances where they rented a bike between 46 minutes and 60 minutes, they were charged \$2.99 for the first 30 minutes of their trip, and \$1.80 for the extra 15 minutes whether they choose to use it or not, and an additional \$3.00 for the additional 15 minutes whether they choose to use it or not. (Total of \$7.79)

Instances where a bike was rented for longer than 60 minutes was not recorded for this dashboard as the numbers were small enough to be considered negligible.

By multiplying the flat rate by the number of Non-Members that rented bikes for each given time interval, we found that the short trips made the most revenue of \$ 4,858,224, then medium trips made up for \$654,007 and long trips made up for \$310,050.

Question 3.2

What are the total dollar amounts and relative percentage of revenue from single trips up to an hour in length for each of the three different pricing buckets above?

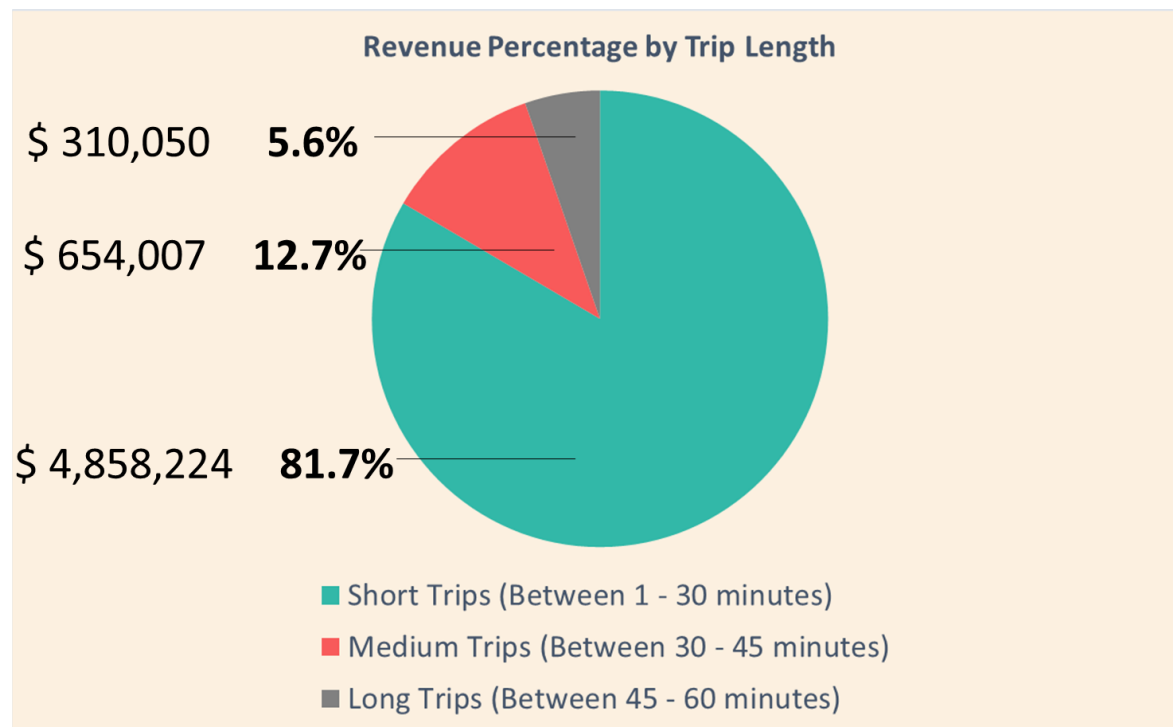


Figure 10: Revenue Distribution Between Trip Durations

Figure 10 displays a Pie Chart of the Revenue Generated from the Flat Rate pricing model for Bixi's Non-Members. The green section highlights our short trips which proved to be the most effective. The red section highlights our medium trips. And the gray sliver represents our long trips. Since the majority of our data falls into the short trip category, there is no surprise as to why we have such a higher percentage. Short trips made up 81.7% of our Non-Member revenue. Medium trips made up for 12.7% of our Non-Member revenue. And Long trips made up for 5.6% of our Non-Member revenue. In this Pie Chart, all trips that were greater than 60 minutes were neglected.

Question 3.3

The Director of Finance is not satisfied with the above insights, and wants very detailed information on exactly when they are seeing the most revenue from single trips 30 minutes or less. Create a visualization to show the total amount of flat rate revenue in the data for each hour and each day of week (Monday, Tuesday, Wednesday, etc.). At which days/times is Bixi generating the most revenue from their flat rate charge? You may use a new calculated field for this question

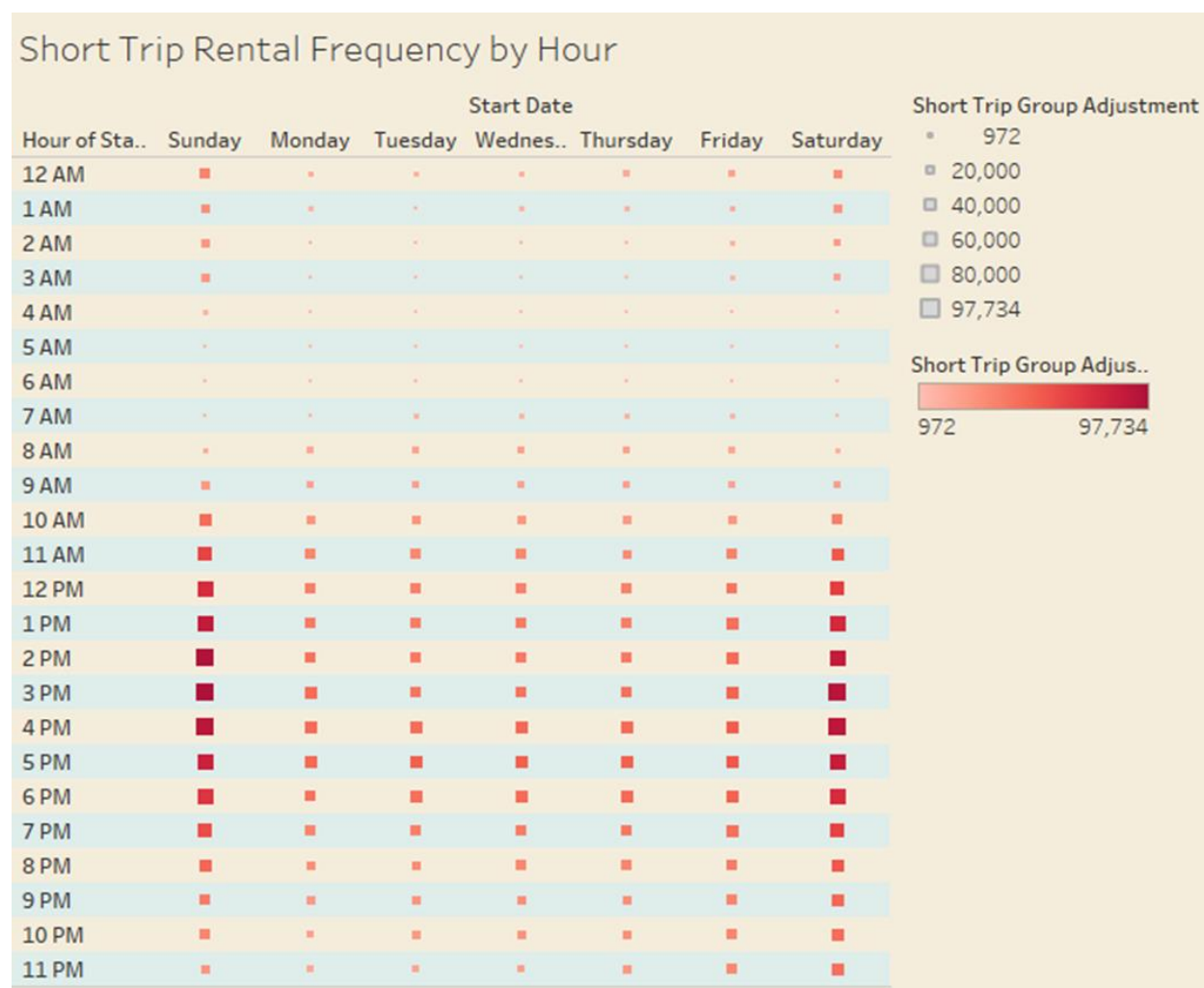


Figure 11: Short Trip Rental Frequency



Figure 11 shows a distribution of our Non-Member Short Trips and when the busiest time of days are for the stations. Above we have days of the week in our columns, and hours of the day in rows. When the red boxes gain size and color the stations are being more used, and more revenue is being generated.

So, when we look at our Non-Member Short Trip Data, we see the majority of our rentals are happening on the weekends and during daylight hours.

What correlation do we see with Non-Members and wanting to rent bikes between the hours of 11am and 7pm on the weekends?

When we dive deeper into our Non-Member short trips, we can conclude that the majority of the activity is happening during the weekends because the bikes are being used for leisure use. Non-Members are not likely using Bixi as means of transportation to their Monday-Friday job, but in fact using the bikes on the weekend as a means of entertainment. So, seeing an influx of bike rentals on the weekends should be no surprise when analyzing our data.

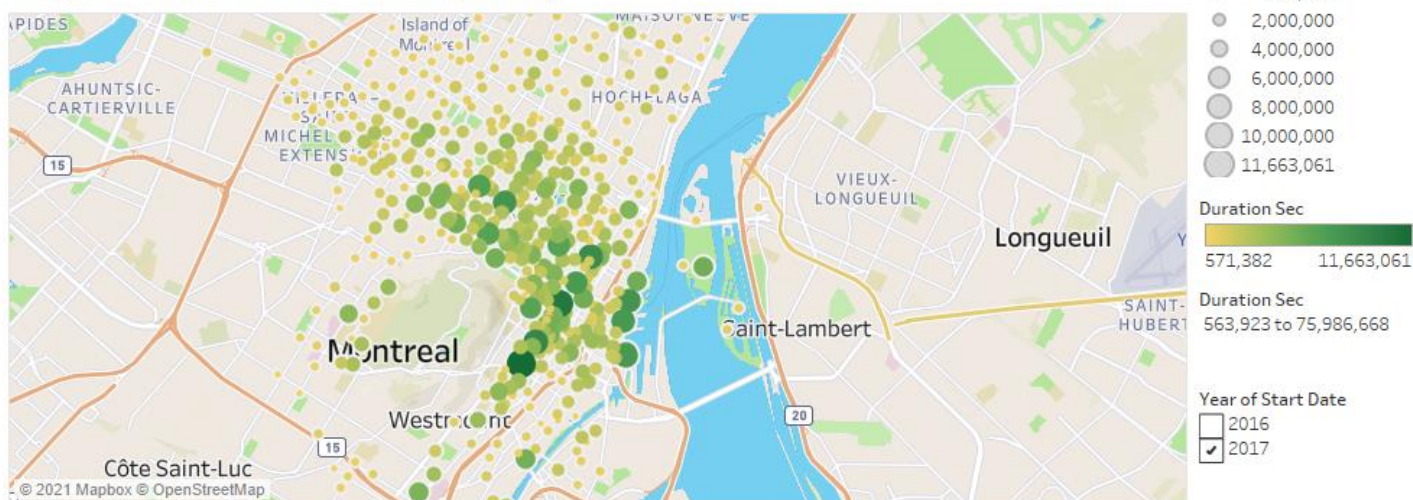
The peak of Bixi's Non-Member rental attention is found to be on Sunday's at 2 - 3pm, and Saturday from 3 – 4 pm. This typically will be the hottest time of day, and in most cases the more desirable time to ride a bike. Though Bixi's bikes are equipped with lights for nighttime use, the appeal isn't quite there as much as in the daytime hours of the weekend.

Question 4

Finally, the operations team wants an interactive reporting dashboard they can use to drill into the data and get out insights as required, as well as fulfill lots of ad hoc data requests for data that they receive.

Create a dashboard containing at least 3 visualizations, using two you've already created thus far as well as one additional new one of your choosing.

Map of Station Locations and Popularity



Percentage of One Way Member Trips

Name	
Boyer / Bélanger	98.87
St-Dominique / Jean-Talon	98.86
Casgrain / Mozart	98.86
Garnier / du Mont-Royal	98.86
Milton / du Parc	98.85
Metcalfe / de Maisonneuve	98.85
Ste-Catherine / St-Denis	98.85
de Bordeaux / Marie-Anne	98.84
Chambord / Laurier	98.83
Berri / Jean-Talon	98.82
Tupper / Atwater	98.82
de Bellechasse / de St-Vall.	98.82
du Président-Kennedy / M..	98.81

Percentage of Trips By Members Vs. Non-members



Year of Start Date

☒ 2017

Month of Start Date

- ☐ April
- ☐ May
- ☒ June
- ☒ July
- ☒ August
- ☐ September
- ☐ October
- ☐ November

Figure 12: Interactive Dashboard

Figure 12 is a snapshot of our Dashboard outline three important areas of focus. When tasked with making a Dashboard with essential Bixi Insights we found that some crucial information that needed to be displayed. The Map of Station Locations and Popularity illustrates where our most popular destinations are by duration of seconds. As this map can be adjusted to see where the popular trips in Montreal reside versus some of the less popular stations are. This should be monitored as stations may increase in popularity resulting in the need for more Stations to be installed.

In the Bottom left we have the Percentage of One-Way Member Trips outlying which stations have the highest one-way percentages. This information is valuable to monitor to understand how the bikes should be redistributed to ensure that no stations are left without a bike to rent. We can adjust this by month to evaluate where demand may be heading at any given time.



In the bottom right we have a bar graph telling us the ratio of Members vs. Non-Members by year. We can adjust this to see how 2016 differs from 2017. This information is valuable as we can gauge how effective our marketing strategies are at converting non-members to members.

Attached to this project is the Tableau file with comments on the tabs to walk you through on how to repeat this project. Should you have any questions or reasons for clarification I am always available on my personal Slack or by email at RandyMiskuski@gmail.com

Thank you for your time and attention, and I hope you enjoyed this report.

Randy Miskuski