Business Report: Bixi Project - Part 1 - Data Analysis in SQL

by Mehrnoosh Behzadi

May 23rd, 2023

Introduction

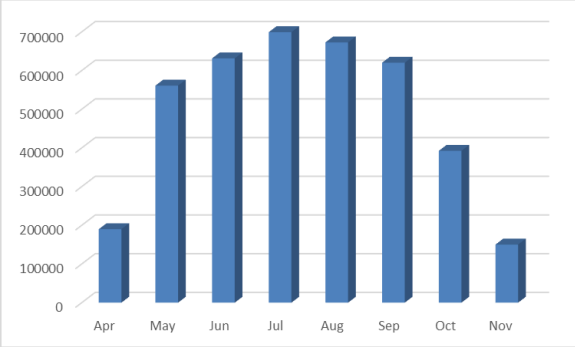
The purpose of this report is to present insights into how people use Bixi bikes in Montreal and identify factors influencing usage volume, popular stations, and overall business growth. The analysis is performed on a SQL dataset obtained from the open data portal of Bixi Montreal.

1 Volume of Bixi bikes usage and relevant factors

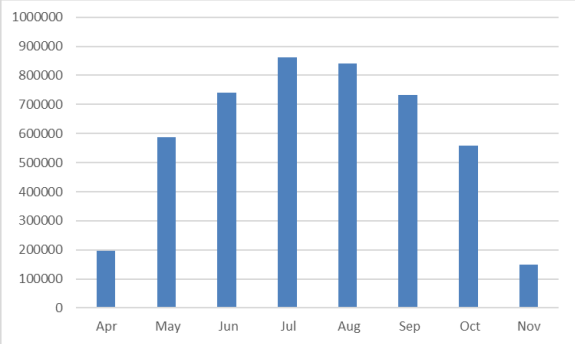
1.1 The overall usage volume for the year 2016: The total number of trips recorded for the year 2016 was 3917401.

1.2 The overall usage volume for the year 2017: The total number of trips recorded for the year 2017 was 4666765. This shows a significant increase in the volume of bike usage.

1.3 Monthly usage volume for the year 2016: As shown in the following graph, the number of trips varies across the months. Months between June to September hold the highest rate of usage.



1.4 Monthly usage volume for the year 2017: The number of trips in 2017 also demonstrates monthly variations, pretty similar to the previous year. The monthly breakdown is as follows.



1.5 Average number of trips daily made in each year-month: The average number of trips per day for each year-month combination follows the same pattern. The following table gives a better understanding of the average usage pattern.

year	month	avg_daily_trips
2016	4	11870
2016	5	18099
2016	6	21050
2016	7	22556
2016	8	21703
2016	9	20675
2016	10	12661
2016	11	10009
2017	4	12229
2017	5	18950
2017	6	24728
2017	7	27766
2017	8	27095
2017	9	24395
2017	10	18049
2017	11	9986

2 Overview of the membership status in 2017

2.1 Total trips in 2017 based on membership status: From the total number of trips in 2017, 3784682 of them were made by members.

2.2 The percentage of total trips by members per month: Determination of the percentage of trips by month in 2017, shows that about 81 percent of total trips are made by members. This indicates the higher involvement of members in using Bixi bikes.

3 Demand pattern

3.1 Peak demand time in the year: As mentioned before, summer and fall, months between June and September, show the highest trip counts. This could be due to the best weather condition to ride a bike.

3.2 Special promotion: As seen in the results, summer would be the best time of the year to attract new clients, as it experiences high overall demand, including both members and non-members. By offering free trial periods, or discounts on membership costs etc. the company could encourage non-members to buy membership.

4 The overview of station usage

4.1 Five most popular stations: Five most popular stations with the highest number of trips are shown in the following table.

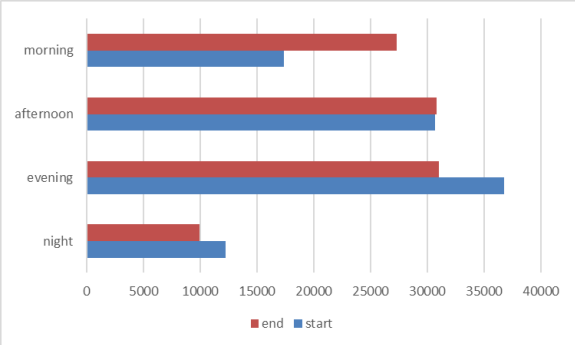
code	name	num_trips
6100	Mackay / de Maisonneuve	97150
6184	Métro Mont-Royal (Rivard / du Mont-Royal)	81279

6078	Métro Place-des-Arts (de Maisonneuve / de Bleury)	78848
6136	Métro Laurier (Rivard / Laurier)	76813
6064	Métro Peel (de Maisonneuve / Stanley)	72298

4.2 Comparison of Query Run Time: Using a subquery, when determining the most popular stations, decreased the query run time from 24s to 2s. Both approaches provide similar results in a reasonable time frame.

5 Mackay / de Maisonneuve station's usage distribution:

The distribution of Bixi bikes usage at the Mackay / de Maisonneuve station is as follows:

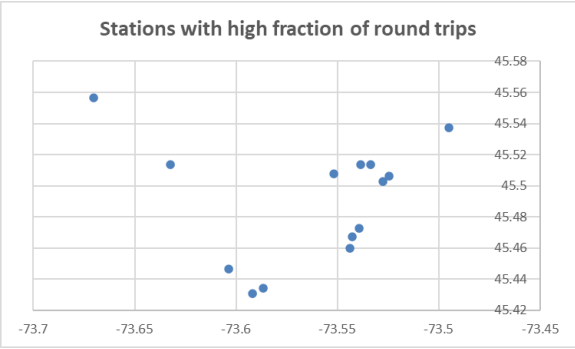


The pattern shows a higher number of starts in the afternoon and evening.

Mackay / de Maisonneuve station is situated in the downtown core of Montreal. Some reasons for peak usage in the afternoon and evening could include exploring the downtown area, attending cultural events, shopping, or enjoying the vibrant urban atmosphere.

6 Identifying the stations with a high fraction of round trips

Based on the analysis, the following graph represents the distribution of stations that have at least 10% of their trips as round trips and a minimum of 500 starting trips.



The proximity of these stations suggests that the surrounding area experiences a high demand for bike renting services. Identifying these stations could suggest the high demand and a potential opportunity for expanding Bixi's bike network.

Conclusion

The data analysis conducted using SQL provided valuable insights into Bixi bike usage within the period of 2016-2017, in regard to factors influencing volume, e.g. high demand season, station popularity, and membership. Understanding these patterns can aid in making smart decisions regarding resource allocation, promotional strategies, and operational and network expansion planning. Some of the suggestions are as follows.

As the high-demand season, summer would be the best time for the company to attract new clients, by offering free trial periods, discounts on membership costs etc.

Considering the peak rental hours per day, ensuring the availability of a sufficient number of bikes, or adjusting pricing could be another potential strategy to increase the revenue.

The proximity of high-demand stations suggests that the surrounding area experiences a high demand for bike renting services. Identifying these stations could suggest a potential opportunity for expanding Bixi's bike network.