

# Bixi Project Part 1 – Data Analysis in SQL

## Introduction

Bixi is a public bicycle sharing system located in Montreal, Canada. The Bixi database contains two tables, which are trips and stations. The trips table summarizes the trips taken in the year 2016 and 2017 and contains 8,584,166 entries. The categories include start date, end date, duration, membership status and the start and ending stations. The stations table contains the name and locations of the stations where each trip was taken. There are 540 stations in this database.

## Preliminary Trip Analysis

The total number of trips for the year 2016 was 3,917,401 and for 2017 was 4,666,765 for a growth of 9.3% July was the most popular month in 2016 with 699,135 trips taken followed by August at 672,986 trips. The year 2017 paints a similar picture with 860,807 trips in July and 839,938 trips in August. This is not surprising, as summer is prime cycling weather with people soaking up the sun while commuting and exercising outside. Tourists can also contribute to these numbers as they have a chance to explore the city by bike.

Figure 1: Average Number of Trips for Each Year by Month

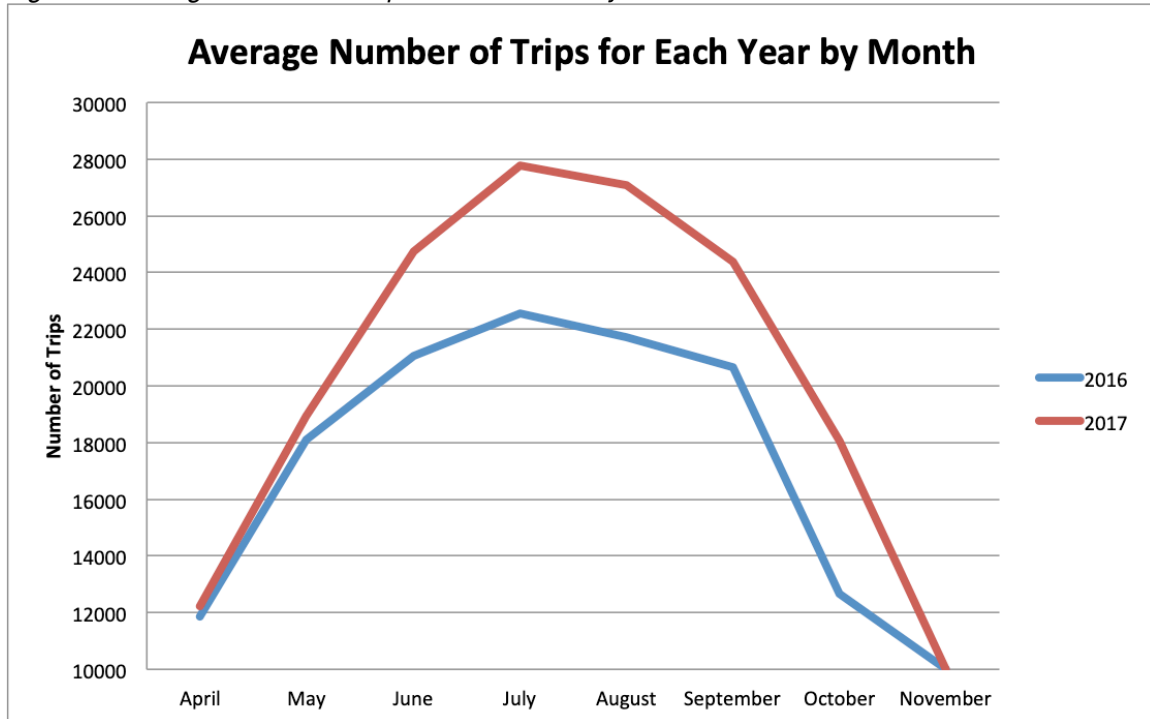


Figure 1: The summer months contribute to significantly more trips due to warmer weather and higher numbers of tourists.

When considering average trip per day for each year-month combination, July is the busiest month with 22,556 and 27,765 trips each day for 2016 and 2017 respectively, followed by August with 21,702 and 27,094 trips (Figure 1). Surprisingly July and August numbers are closer together in 2017 than 2016. Perhaps this is due to Bixi gaining more popularity in the latter year and more locals and tourists becoming familiar with the service. The year 2017 outperformed 2016 in every month except for November where 2016 had 10,008 trips per day and 2017 had only 9,986. Taking into account the growth in popularity of Bixi, we can conclude that the low rate in 2017 was probably due to weather. According to [timeanddate.com](http://timeanddate.com), November 2016 had an average temperature of 4C with a high of 15C and low of -3<sup>1</sup>. On the other hand, November 2017 had an average of 2C with a high of 17C but a low of -11C.<sup>2</sup> Those cold nights may have prevented riders from using Bixi and incentivized them in taking public transit or Uber instead.

## **Analysing Membership Data**

When breaking down the dates by members and non-members, the numbers are heavily in favour of members. In 2017, a total, 3,784,642 (81%) trips were taken by members and only 882,083 (19%) by those without memberships. The majority of members preferred the summer months with July and August contributing to 17.4% and 17.3% of all trips by members respectively. September was close behind with 16% of trips and June had 15.8%. The stand out month was April, which only contributed to 4.3% of trips in 2017. Perhaps Bixi should offer members a membership discount in April to boost trip frequency and get them on board for the coming season.

Considering that non-members represent only 19% of all trips, a promotion could be offered to them in terms of a discounted membership for the months of April and May. This would lock them in as members and boost up the low numbers during spring. The promotion can be a an early-bird price of 20% off for an annual or 6-month membership which would help beef up April numbers and collect extra revenue. Another idea is to offer a Free Ride day to attract and convert casual users into members once they see the convenience of bike share systems.

---

<sup>1</sup><https://www.timeanddate.com/weather/canada/montreal/historic?month=11&year=2016>

<sup>2</sup><https://www.timeanddate.com/weather/canada/montreal/historic?month=11&year=2017>

## Examining Station Data

Figure 2: Number of Trips Per Station

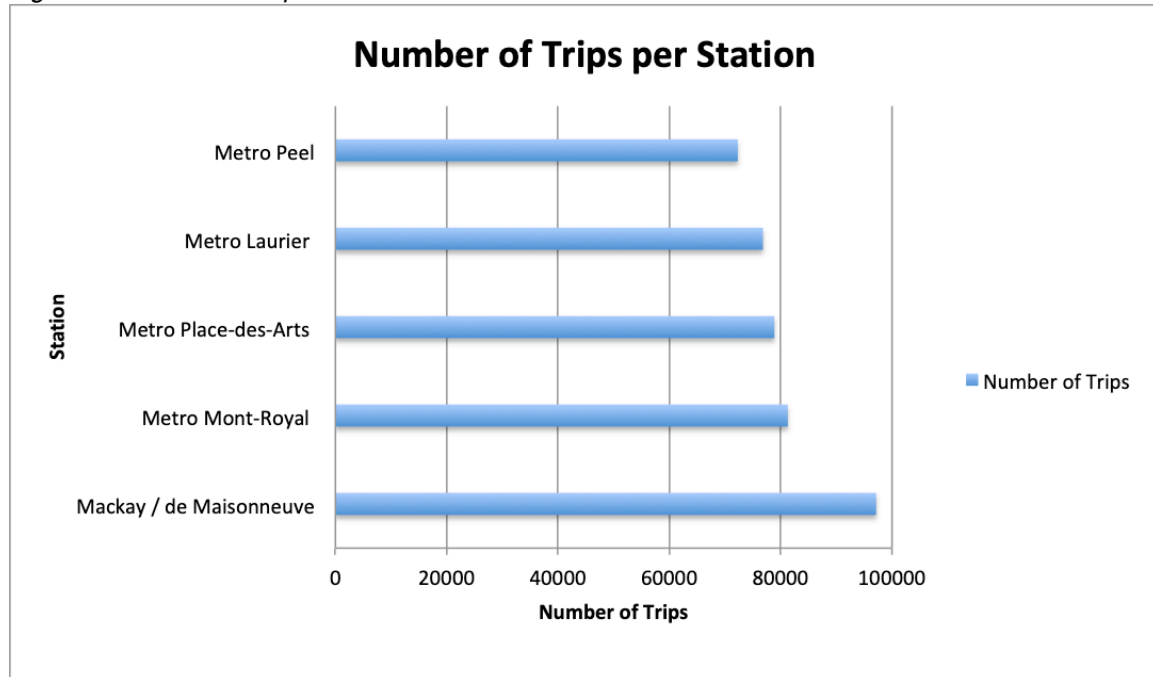


Figure 2: Mackay / de Maisonneuve is the most popular station in the database due to its central location and proximity to Concordia University

The 5 most popular starting stations were Mackay / de Maisonneuve with 97,150 trips. Métro Mont-Royal (Rivard / du Mont-Royal) with 81,279 trips, Métro Place-des-Arts (de Maisonneuve de Bleury) with 78,848 trips, Métro Laurier (Rivard / Laurier) with 76,813, and Métro Peel (de Maisonneuve / Stanley) with 72,298 trips (Figure 2). Mackay / de Maisonneuve had over 16,000 more trips over the second place station, perhaps because of its proximity to Concordia University and the Montreal Museum of Fine Arts.

As previously mentioned, Mackay / de Maisonneuve was the most popular station with 97,150 total start trips. Referring to Figure 3, 36,781 trips started in the evening followed by 30,718 in the afternoon. The end trips are similar with 31,011 in the evening and 30,817 in the afternoon. Interestingly enough, 27,351 morning trips ended at Mackay compared to 17,384 starts. As previously mentioned, Mackay is in close proximity to Concordia University, so perhaps a lot of the end trips are students commuting to campus in the morning and the afternoon/evening starts are students cycling back home. The Bell Centre is also close by and may have riders ending their trips at Mackay before catching a concert or musical. Perhaps Bixi should target a promotion at students at Concordia University as the station is close to campus and is the highest in terms of popularity.

Figure 3: All trips at Mackay / de Maisonneuve station broken down by time of day

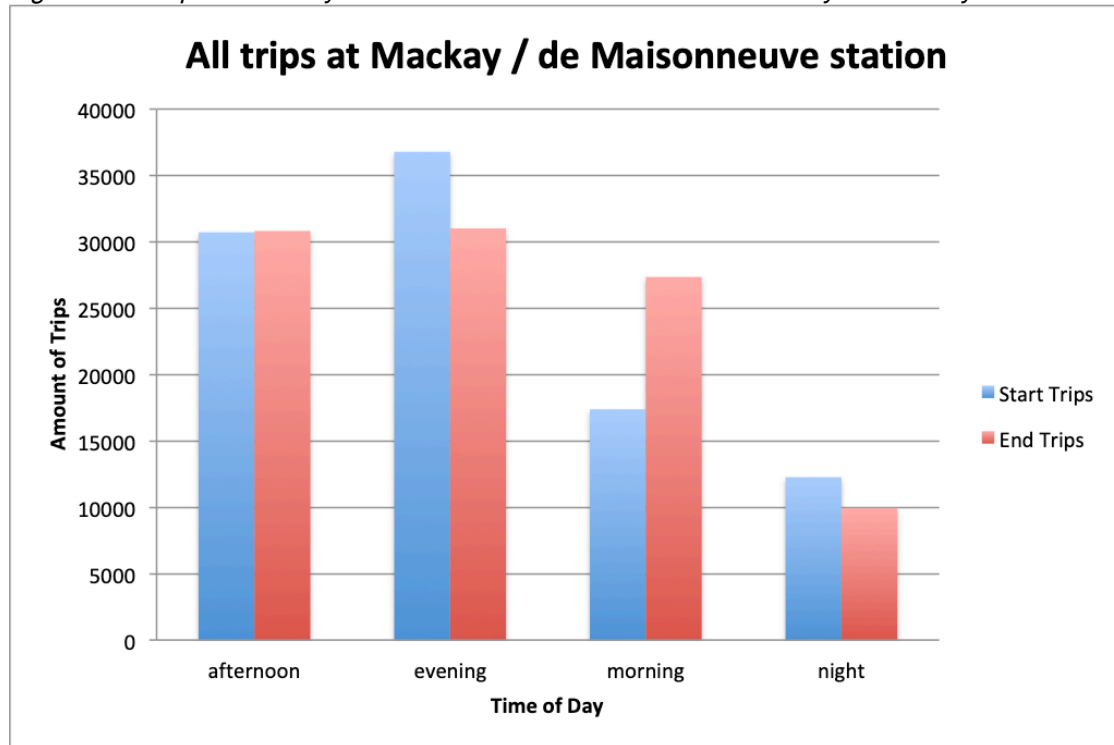


Figure 3: Most trips at Mackay station occurred in the evening with the majority being start trips. Students potentially contributed to high amount of end trips in the morning and start trips in the afternoon.

The station with the most round trips is Métro Jean-Drapeau, which is not surprising as it is located on St Helen's Island where visitors enjoy a ride on the island before jumping on the metro when they're finished. When it comes to the ratio of round trips to starting trips, 55% of Mackay De Maisonneuve's trips are round trips. This is probably due to the fact that it's the most popular station in a central location. The next 4 stations are all located in the metro stations, which may mean that those users are taking casual trips around the neighborhood before hopping back on the metro. When filtering by 500 or more trips originating from the station with at least 10% being round trips, 4 of the top 5 are de la Commune stations, which are located by the river with the top being Métro Jean-Drapeau on the island.

## Conclusion

It is safe to conclude that Bixi is a growing company that will gain more popularity as commuters switch to a convenient mode of transportation that is located in most neighborhoods. Bixi should try to convert more locals into members by offering discounted memberships in the spring and a day where potential customers can get a free ride. These two promotions can be paired

together with a user getting an email for a discounted membership after concluding their trip. Bixi should continue fostering the popularity of the Mackay station and potentially do advertising campaigns on and around Concordia campus. Offering students free rides on Monday or Friday can be a good way to convert them into members. They should also incorporate advertising in metro stations to convert commuters into rideshare users, especially at Métro Jean-Drapeau, which has the highest amount of round trips. Tourists can be greatly influenced by the river stations (de la Commune), as cycling by the waterfront can provide a satisfying experience for them and casual users.