

BIXI Project  
Part 2 – Visual Analytics on Tableau  
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## Introduction

BIXI Montréal is a non-profit organization founded in 2014 by the city of Montreal. The mission of BIXI Montréal is to provide accessible transportation and to contribute to the well-being and health of Montrealers and aims to manage its bike-sharing system. The BIXI program analyses was analyzed in two parts. In the first part of the BIXI program analyses, data was extracted, cleaned, and analyzed. From the previous analyses, it was concluded that the BIXI program is a program that is growing and is becoming more popular over time and has more popularity during the summer; this conclusion applies to BIXI members and non-BIXI members. Another conclusion is that the most popular stations are in parks, universities, and shopping centers. The objective of the second analysis is to further explore our data from our previous dataset by providing visualizations to understand and predict the behavior between non-BIXI members and BIXI members, number of round trips, and round-trip duration. Along with the revenue that is created throughout the day.

## Overview

This second of the BIXI project part provides visualizations to further explore and understand the data. In addition, the second part of this project aims to further understand the data from our previous dataset. These visualizations provide the following:

- The top ten stations that have the highest percentage of round trips.
- The number of BIXI trips and the percentage of trips done in 2016 and 2017.
- The percentage of round trip by members in 2017.
- The relationship between percentage of round trips and percentage of member trips by station.
- A visualization of the average trip duration per station across the city.
- The revenue that is generated by infrequent users (non-BIXI members) who make single and shorter trips that is an hour long or less.

This study aims to understand the relationship between round trips done by non-BIXI members and BIXI members, along with the revenue that infrequent users generate, the stations that have the most round trips, and the relationship of round trips between non-BIXI members and BIXI members. Additionally, the BIXI program's growth is analyzed between 2016 and 2017.

## Results

Number and Percentage of BIXI Trips in 2016 and 2017

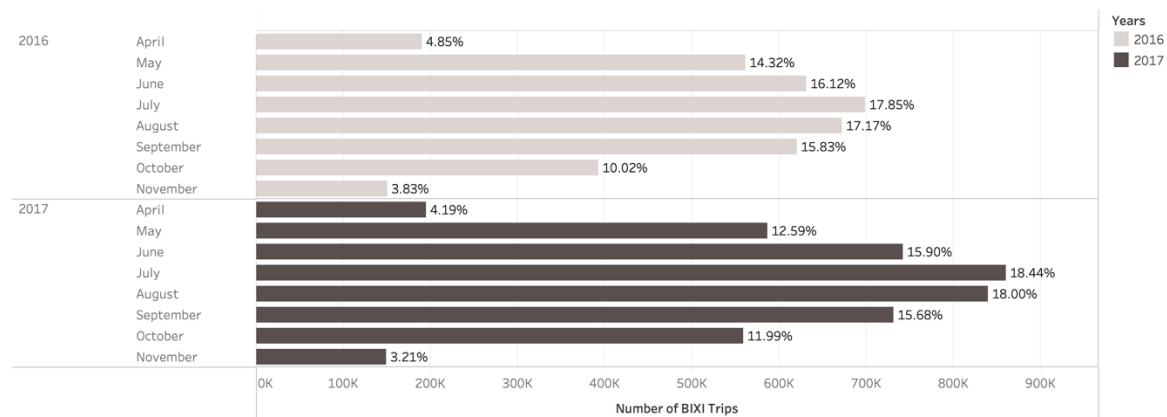


Figure 1.1

The figure above demonstrates the number of BIXI trips done throughout 2016 and 2017 and the percentage of trips that occurred each month. The graph indicates that the BIXI service between 2016 and 2017 is that BIXI trips increased in June, July, and August of 2017. However, the number of BIXI trips in 2017 slightly decreased during spring and fall. The same trend can be observed with the percentage of trips in 2016 and 2017; the summer months show the highest percentage of trips, and early spring and late fall show the lowest percentage of trips.

Percentage of Round Trips by Members in 2017

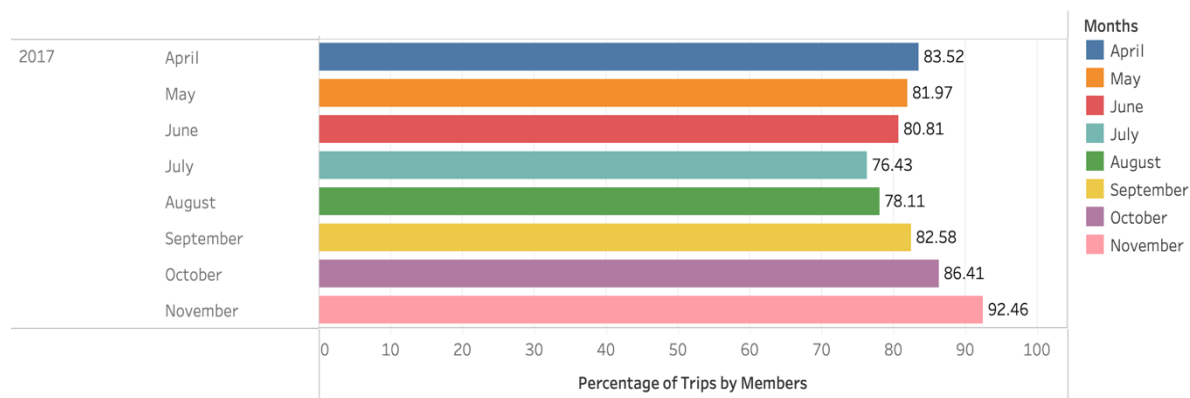


Figure 1.2

Figure 1.2 demonstrates the percentage of round trips that members did. This figure shows that the highest percentage of round trips by members are during spring and fall. Conversely, the number of round trips decreases during summertime.

### Stations with the Highest Percentage of Round Trips

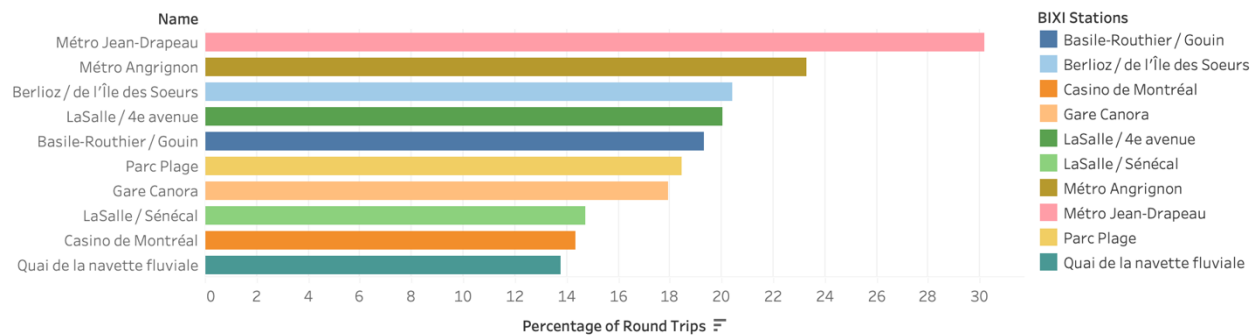


Figure 1.3

Figure 1.3 demonstrates the top ten BIXI stations with the highest percentage of round trips. Métro Jean-Drapeau has the highest percentage of round trips, whereas Quai de la navette fluviale has the lowest percentage of round trips. However, this station is also located within Jean Drapeau Park. The rest of the stations share proximity with Jean-Drapeau Park and the Saint Lawrence River.

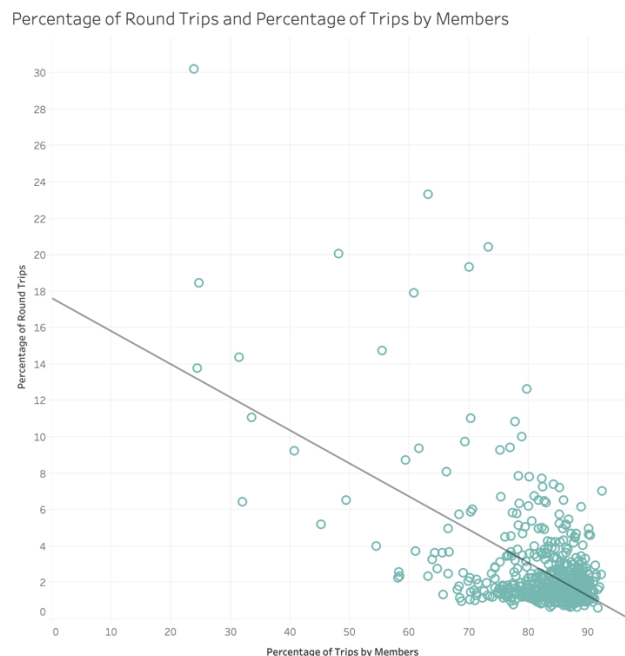


Figure 1.4

Figure 1.4 Demonstrates the relationship between the percentage of round trips done and the percentage of round trips done by BIXI members. It can be observed that members' trips have a low percentage of round trips; the trips with a high percentage of round trips are stations located in parks. The stations that share a low percentage of round trips are spread throughout the city.

Figure 1.5 shows the distribution of all BIXI and non-BIXI members' trips. BIXI members show the highest number of trips when the trip length is short. However, non-BIXI and BIXI members have a decrease in the number of trips when the trip duration exceeds 20 minutes. The longer the trip is for non-BIXI members and BIXI members, the fewer trips are made.

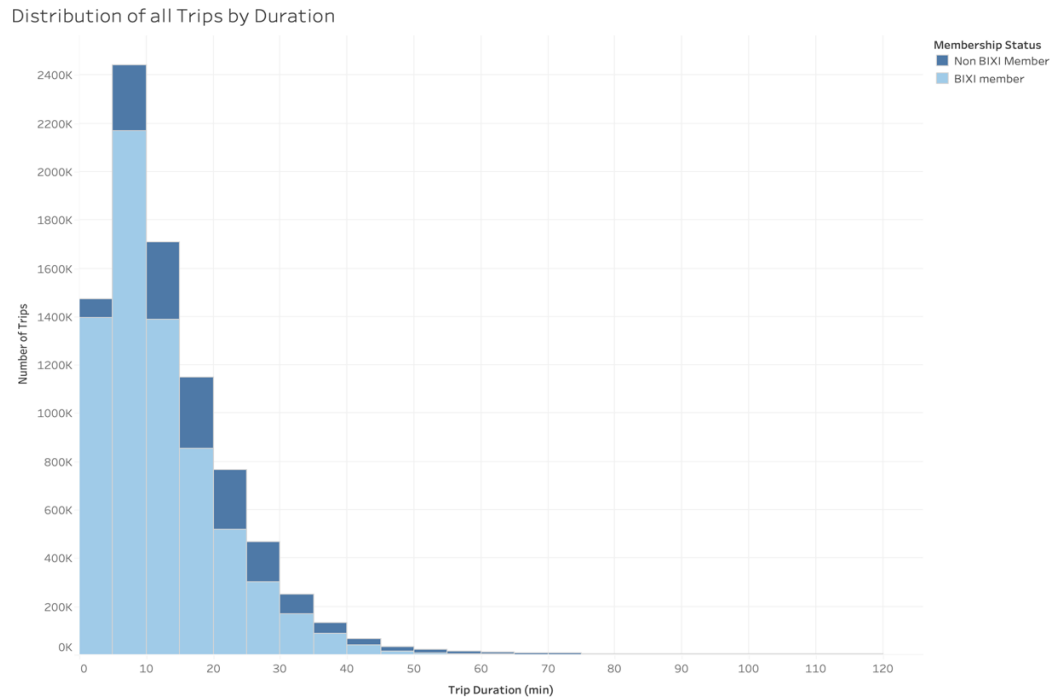


Figure 1.5

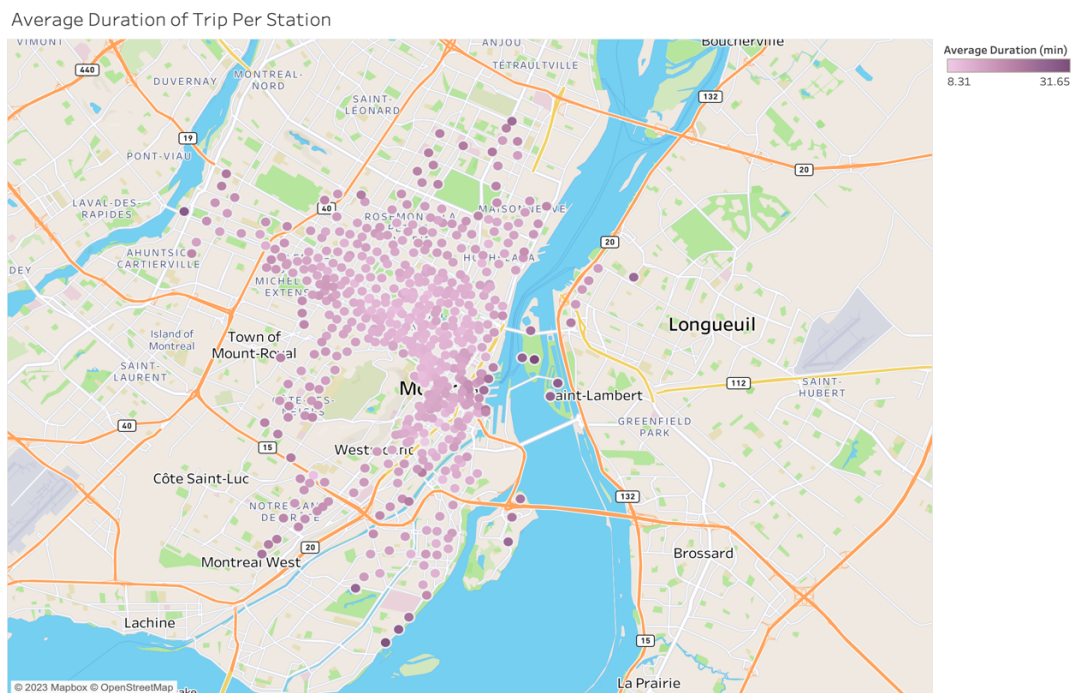


Figure 1.6

Figure 1.5 demonstrates the average trip duration, where 31.65 minutes is the highest average duration, and the lowest average duration is 8.31 minutes. This map illustrates a pattern with the highest average trip duration located in the Old Port of Montreal. Within this area, there is a long strip and restaurants and parks. This area is also connected to the Saint Lawrence River and Jean-Drapeau Park.

## Revenue of BIXI Bikes by Trip Duration

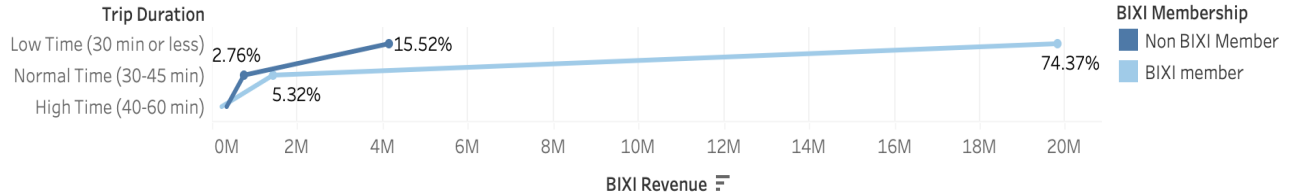


Figure 1.4

The figure shown above demonstrates the revenue that is generated by members and trip duration. BIXI members generate a revenue of 74.37% for trips that are 30 minutes or less that is during “Low Time” whereas non-BIXI members generate 15.52% of revenue. However, trips that last between 40 to 60 minutes non-BIXI members generate a 1.24% of revenue and BIXI members only generate 0.80%

Table 1.1

Demand of BIXI Bikes Throughout the Time of Day and Week

Hour of Start Date	Start Date							BIXI Sales
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
0	28,546	10,558	7,639	9,496	11,144	14,496	24,297	894 80,296
1	23,457	6,521	4,321	6,058	7,050	10,321	20,840	
2	18,870	4,069	2,832	3,746	4,162	6,671	16,636	
3	18,418	3,489	2,111	2,592	2,972	5,469	14,989	
4	6,258	1,363	897	1,044	1,229	2,078	4,661	
5	2,915	1,145	894	942	972	1,292	2,180	
6	2,416	1,896	2,111	2,159	2,150	2,030	1,908	
7	3,385	5,484	6,446	6,730	6,994	5,974	3,274	
8	8,279	12,684	14,711	16,732	16,197	13,464	7,355	
9	17,961	14,454	15,318	15,769	15,527	14,454	15,396	
10	35,518	19,076	18,792	18,574	17,483	18,559	27,131	
11	51,533	25,131	24,874	25,011	24,105	26,943	43,149	
12	62,380	28,486	27,954	28,082	27,660	32,256	53,363	
13	71,772	30,184	29,628	30,067	29,155	34,508	62,207	
14	78,990	32,609	30,743	30,872	30,307	36,024	69,329	
15	80,296	35,423	32,062	33,889	33,835	39,567	74,257	
16	76,380	36,044	36,466	38,595	37,372	42,901	73,449	
17	70,011	38,152	42,742	42,763	43,068	45,774	71,383	
18	60,165	35,291	36,083	38,296	39,017	42,024	65,003	
19	50,379	27,977	30,976	32,184	33,757	36,971	55,139	
20	40,455	23,403	24,981	26,210	27,840	31,900	46,058	
21	32,241	18,915	21,480	23,014	24,476	28,662	38,694	
22	27,266	15,542	18,634	21,307	23,477	27,200	37,025	
23	20,470	11,398	13,778	16,977	19,151	26,581	36,278	

Table 1.1 describes the BIXI sales made throughout the day and week from single trips that last thirty minutes or less done by non-BIXI members, where hour zero is the hour twenty-four or midnight. BIXI rides generate the most revenue Saturday and Sunday between eleven a.m. and eight p.m. During the weekdays, BIXI sales increase between 4 p.m. and 7 p.m.

## Discussion and Conclusion

The BIXI program grew in 2017. There were more BIXI rides during the summer of 2017 than the previous year. However, there was a slight decrease in rides during fall and spring. Round trips done by members show an increase in November, but it is also important to note that BIXI members have the highest percentage of trips but a low percentage of round trips, as shown in Figure 1.4. In contrast, non-BIXI members show an increase in revenue when rides last thirty minutes or less. During the weekends, between 11 a.m. and 8 p.m., there is an increase in BIXI sales; this also applies to the weekdays, but most revenue is generated in late afternoons.

The stations with the highest duration of trips are in Old Montreal, Saint Lawrence Bay, and parks. These spots are popular for tourists and Montréalers who wish to go on a bike ride in the late afternoon or during the weekends. The BIXI program could offer potential growth by promoting special programs during the summer since summer is the most popular season. These programs could be provided by creating promotions or discounts on routes that go through Saint Lawrence Bay and Old Montreal. This program could generate more revenue and growth for the BIXI program; this program would target non-members since non-members tend to generate the most revenue during the weekends. However, a special promotion could be offered for BIXI members since members generate the most revenue during weekdays and are generated during rush hour. Additionally, more bikes could be added to the stations with the most round trips since these stations are located in popular areas such as parks, universities, and tourist areas.

## References

*Location de Vélo à Montréal*. BIXI Montréal. (n.d.). Retrieved February 1<sup>st</sup>, 2023, from <https://www.bixi.com/fr>