Coursera Applied Data Science Capstone

Analyze Starbucks in Toronto

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1. Introduction

1.1 Background

Starbucks Corporation is an American coffee company and coffeehouse chain. Starbucks was founded in Seattle, Washington, in 1971. As of early 2019, the company operates over 30,000 locations worldwide.

Starbucks has been described as the main representative of "second wave coffee," a retrospectively termed movement that popularized artisanal coffee, particularly darkly roasted coffee. Since the 2000s, third wave coffee makers have targeted quality-minded coffee drinkers with hand-made coffee based on lighter roasts, while Starbucks nowadays uses automated espresso machines for efficiency and safety reasons.

Starbucks first became profitable in Seattle in the early 1980s. Despite an initial economic downturn with its expansion into the Midwest and British Columbia in the late 1980s, the company experienced revitalized prosperity with its entry into California in the early 1990s. The first Starbucks location outside North America opened in Tokyo in 1996; overseas properties now constitute almost one-third of its stores. The company opened an average of two new locations daily between 1987 and 2007. In 2010, the company began its Starbucks Reserve program for single-origin coffees and high-end coffee shops. Starbucks operates six roasteries with tasting rooms and 43 coffee bars as part of the program. In November 2019, the world's largest Starbucks opened in Chicago on the Magnificent Mile as the sixth roastery location.

1.2 Business Problem

These days, everyone knows about Starbucks. Also, Starbucks is the largest coffee shop company in the world. Although some people complain that Starbucks

prices are much too high, Starbucks is still becoming more and more popular throughout the world.

Actually, Starbucks was once thought of as a very exclusive brand, but in some cities there are Starbucks on every block. Therefore, People all over the world are getting used to seeing a Starbucks coffee shop just around the corner. According to the Michelli's book, Starbucks may be popular not only for their coffee, but also for their business style.

Because of its popularity, well-developed business districts can be developed after Starbucks coffee shops were created. That is, Starbucks coffee shops are giving positive effects to the market of that region.

1.3   Target Group

Firstly, storekeepers in Toronto who want to open up shops can consider locations of Starbucks coffee shops. Also, House hunters who look for activated commercial and business districts can get information about all the neighborhoods in Toronto.

2. Data Preparation

2.1   Data Information

I used three datasets for this data analysis project. First dataset includes a record for every Starbucks or subsidiary store location currently in operation as of February 2017. This data was scraped from the Starbucks store locator webpage by Github user Chrismeller. I scraped it from Kaggle.

The other two datasets are used in the 3rd project named 'Segmenting and Clustering Neighborhoods in Toronto' as well. These are used for segmenting

and clustering neighborhoods in the city of Toronto, Canada. I scraped the following Wikipedia page'https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M' and downloaded a csv file from 'http://cocl.us/Geospatial_data.'

2.2   Characteristics of 'Starbucks.csv'

Although I already analyzed two datasets relevant to neighborhoods in the city of Toronto, it was my first time to analyze 'starbucks.csv' file. Therefore, I analyzed this dataset before clean these three datasets.
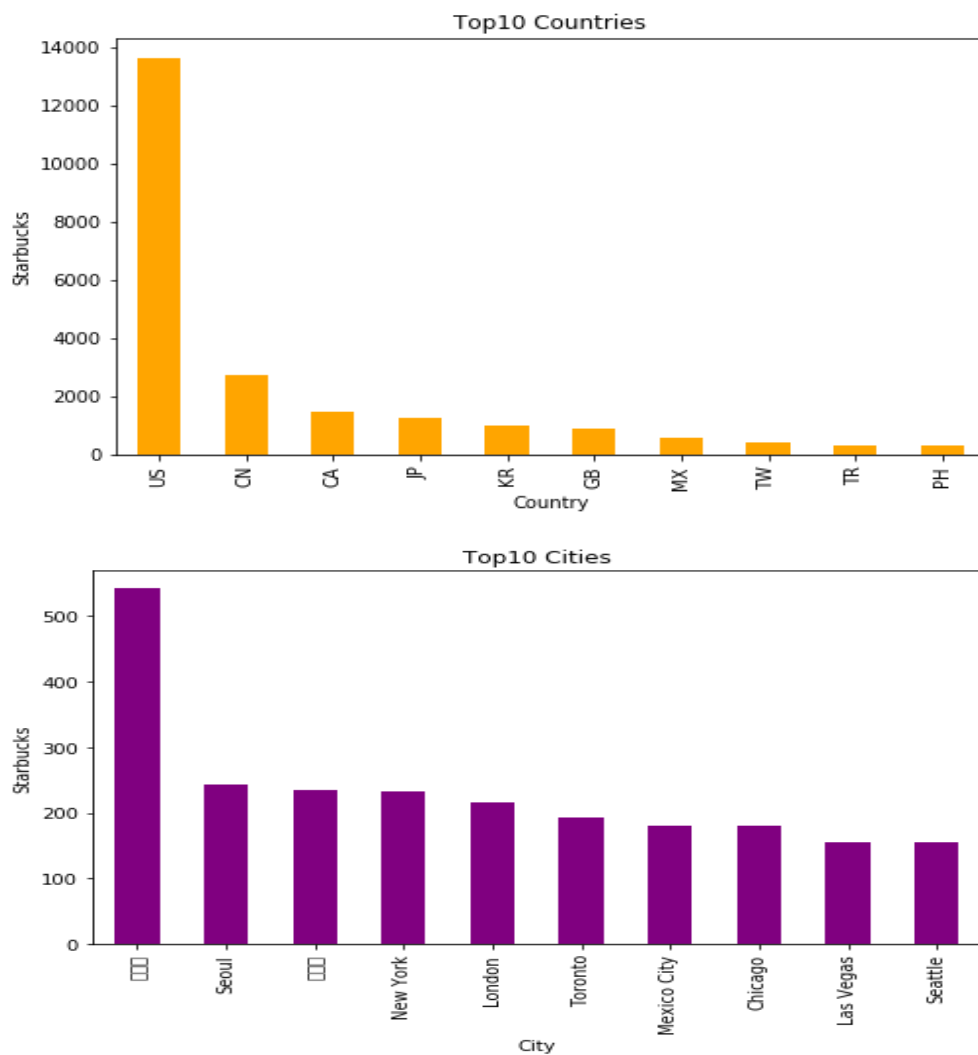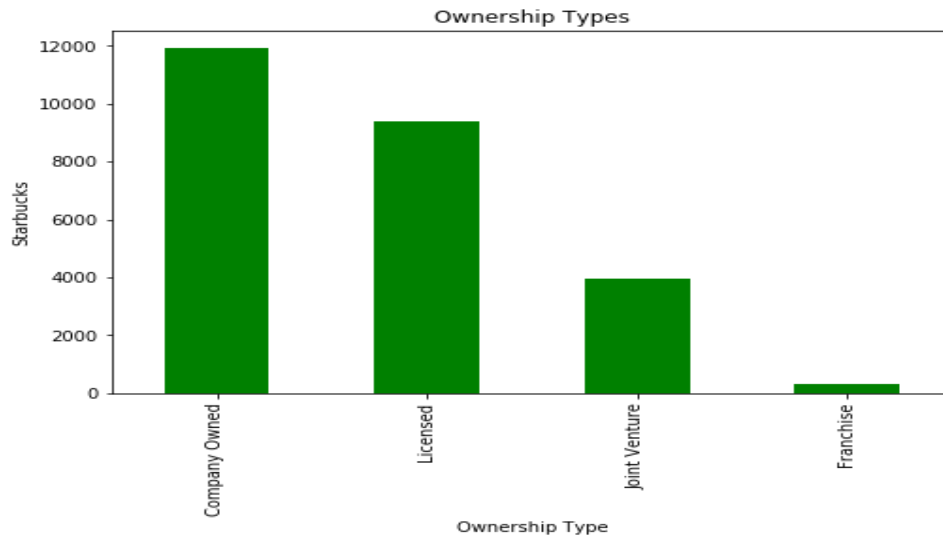
Ownership Types

- ✓ The number of Starbucks coffee shops in the world is 25600.

- ✓ Some columns(such as 'Post code', 'Phone Number', 'City' and so on) have incomplete data.

- ✓ Starbucks cofffee shops are located in 73 countries and 5470 cities.

- ✓ '上海市' city and 'US' country have the greatest number of Starbucks coffee shops.

- ✓ Ownership of the most Starbucks coffee shops is 'Company Owned.'

2.3   Cleaning Data

2.3.1 Startbucks

- -   Drop unnecessary columns.

I will not use specific columns such as 'Store Number', 'Phone Number', 'Timezone.' Therefore, I deleted these three columns for better efficiency by using 'df.drop(['Store Number','Phone Number','Timezone'], axis=1,

inplace=True).'

- <u>Convert NaN to the blank.</u>

There were some columns which have incomplete data. ('Street Address': 2, 'City': 15, 'Postcode': 1522, 'Longitude': 1, 'Latitude': 1) I converted these 'NaN' to the blank by using 'df.fillna(' ').'

- Add country name and country code.

In Starbucks dataset, it had only abbreviation of each country name. Therefore, it was difficult to recognize the name of countries. I wrote every label ["CountryName","Country","CountryCode"] such as '('Malaysia','MY','MYS'). Then, I added them to the original dataframe.

2.3.2 Toronto

- <u>Delete incomplete data and merge cells.</u>

I decided to ignore cells with a borough that is Not assigned by using 'df_table[df_table['Borough']!='Not assigned'].' Then, I merged Neighborhood cells with the same postcodes or boroughs by using 'df_table_clean.groupby(['Postcode', 'Borough'])['Neighbourhood'].apply(', '.join).reset_index().'

- <u>Rename specific columns.</u>

I wanted to rename some columns before merging two different data frames. 'Postal Code' was converted to 'Postcode' by using 'df_coordinates.rename(columns={"Postal Code": "Postcode"}, inplace = True).'

- <u>Merge two data frames.</u>

I merged two data frames by using 'pd.merge(df_table_clean, df_coordinates,

on="Postcode").' Then, I made a merged data named 'final_df.'

3. Data Analysis

3.1 Selection of Toronto datasets

The topic of this capstone project is 'Analyze Starbucks in Tonorto.' Therefore, I selected Starbucks and neighborhoods which are located only in Toronto.

	Brand	Store Name	Ownership Type	Street Address	City	State/Province	Postcode	Longitude	Latitude	CountryName	CountryCode
563	Starbucks	Church & Gerrard	Company Owned	66 Gerrard Street East	Toronto	ON	M5B 1G3	-79.38	43.66	Canada	CAN
564	Starbucks	Dundas & Roncesvalles	Company Owned	2201 Dundas Street West	Toronto	ON	M6R 1X5	-79.45	43.65	Canada	CAN
565	Starbucks	Dundas & Aukland	Company Owned	5251 Dundas Street West	Toronto	ON	M9B 1B2	-79.54	43.64	Canada	CAN
566	Starbucks	University of Toronto/Toronto/Medic	Licensed	1 King's College Circle	Toronto	ON	M5S 1A8	-79.4	43.66	Canada	CAN
567	Starbucks	250 Queen St. W.	Company Owned	250 Queen Street West	Toronto	ON	M5V 1Z7	-79.39	43.65	Canada	CAN

	Postcode	Borough	Neighbourhood	Latitude	Longitude
37	M4E	East Toronto	The Beaches	43.676357	-79.293031
41	M4K	East Toronto	The Danforth West, Riverdale	43.679557	-79.352188
42	M4L	East Toronto	The Beaches West, India Bazaar	43.668999	-79.315572
43	M4M	East Toronto	Studio District	43.659526	-79.340923
44	M4N	Central Toronto	Lawrence Park	43.728020	-79.388790

3.2 Creation of Maps

I set the geographical coordinate of Canada and made a map. Then, I made diverse maps by using 'folium.Map' library and added markers to each map. The sorts of maps are 'Location of Starbucks in Toronto', 'Location of Neighborhoods in Toronto' and 'Location of Clusters of Neighborhoods in Toronto.' Also, I added different markers to a map for comparison.

3.3 Venues

3.3.1 Creation of Venues

Firstly, I defined Foursquare credentials and version before making venues. Then, I created a URL by using this information. I made venue lists by adding names, latitudes and longitudes. Finally, I got the Toronto venues.

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
The Beaches	43.676357	-79.293031	Glen Manor Ravine	43.676821	-79.293942	Trail
The Beaches	43.676357	-79.293031	The Big Carrot Natural Food Market	43.678879	-79.297734	Health Food Store
The Beaches	43.676357	-79.293031	Grover Pub and Grub	43.679181	-79.297215	Pub
The Beaches	43.676357	-79.293031	Upper Beaches	43.680563	-79.292869	Neighborhood
The Danforth West, Riverdale	43.679557	-79.352188	Pantheon	43.677621	-79.351434	Greek Restaurant

3.3.2 Creation of Most Common Venues

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Adelaide, King, Richmond	Coffee Shop	Restaurant	Café	Bar	Bakery	Office	Pizza Place	Clothing Store	Hotel	Sushi Restaurant
1	Berczy Park	Coffee Shop	Cocktail Bar	Cheese Shop	Café	Bakery	Restaurant	Beer Bar	Farmers Market	Seafood Restaurant	Shopping Mall
2	Brockton, Exhibition Place, Parkdale Village	Café	Breakfast Spot	Coffee Shop	Yoga Studio	Grocery Store	Pet Store	Performing Arts Venue	Nightclub	Italian Restaurant	Intersection
3	Business Reply Mail Processing Centre 969 Eastern	Light Rail Station	Auto Workshop	Comic Shop	Pizza Place	Recording Studio	Restaurant	Burrito Place	Brewery	Skate Park	Spa
4	CN Tower, Bathurst Quay, Island airport, Harbo...	Airport Lounge	Airport Terminal	Boat or Ferry	Sculpture Garden	Airport	Airport Food Court	Airport Gate	Airport Service	Coffee Shop	Rental Car Location

3.3.3 Clustering of Venue

|	Postcode	Borough	Neighbourhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue
37	M4E	East Toronto	The Beaches	43.676357	-79.293031	4	Neighborhood	Trail	Pub	Health Food Store	Diner	Discount Store	Distribution Center	Dog Run
41	M4K	East Toronto	The Danforth West, Riverdale	43.679557	-79.352188	9	Greek Restaurant	Coffee Shop	Italian Restaurant	Ice Cream Shop	Bookstore	Furniture / Home Store	Liquor Store	Spa
42	M4L	East Toronto	The Beaches West, India Bazaar	43.668999	-79.315572	1	Sandwich Place	Gym	Park	Brewery	Burrito Place	Restaurant	Pub	Pizza Place
43	M4M	East Toronto	Studio District	43.659526	-79.340923	9	Café	Coffee Shop	Gastropub	Brewery	Bakery	American Restaurant	Yoga Studio	Comfort Food Restaurant
44	M4N	Central Toronto	Lawrence Park	43.728020	-79.388790	7	Photography Studio	Park	Bus Line	Swim School	Diner	Ethiopian Restaurant	Empanada Restaurant	Electronic Store

3.4　Creation of Graphs

I made several graphs to check whether Starbucks coffee shops give positive effect of creating commercial and business districts. The sorts of graphs are 'Graph of 1st Most Common Venues in Toronto', 'Graph of 2nd Most Common Venues in Toronto', 'Graph of 3rd Most Common Venues in Toronto' and 'Graph of top 10 postcodes of Starbucks in Toronto.'

4.　Results

4.1　Characteristics of the 'starbucks.csv'

- The number of Starbucks coffee shops in the world is 25600.
- Some columns(such as 'Post code', 'Phone Number', 'City' and so on) have incomplete data.
- Starbucks cofffee shops are located in 73 countries and 5470 cities.
- '上海市' city and 'US' country have the greatest number of Starbucks coffee shops.
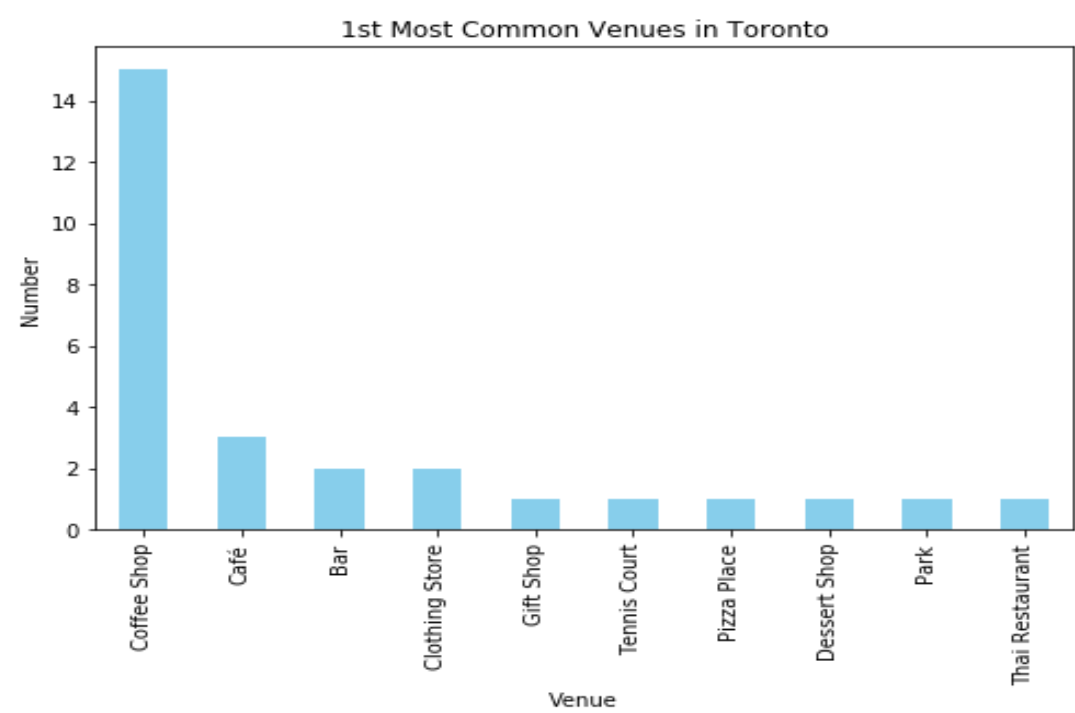- Ownership of the most Starbucks coffee shops is 'Company Owned.'
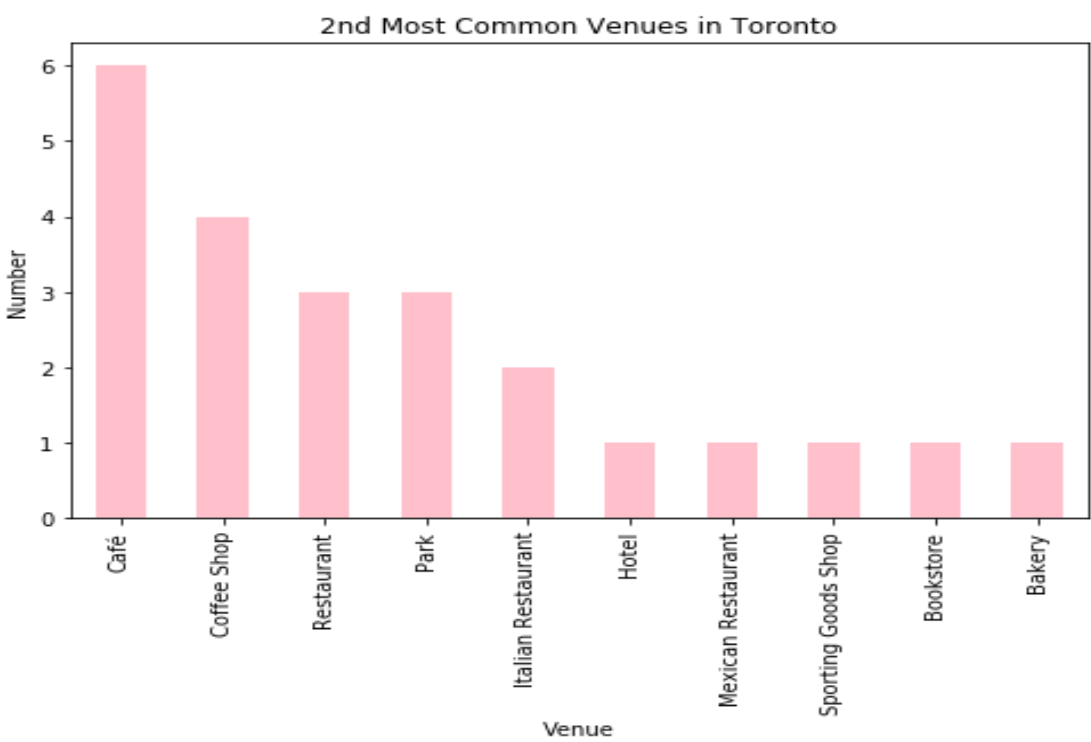
4.2　Location of Starbucks in Toronto
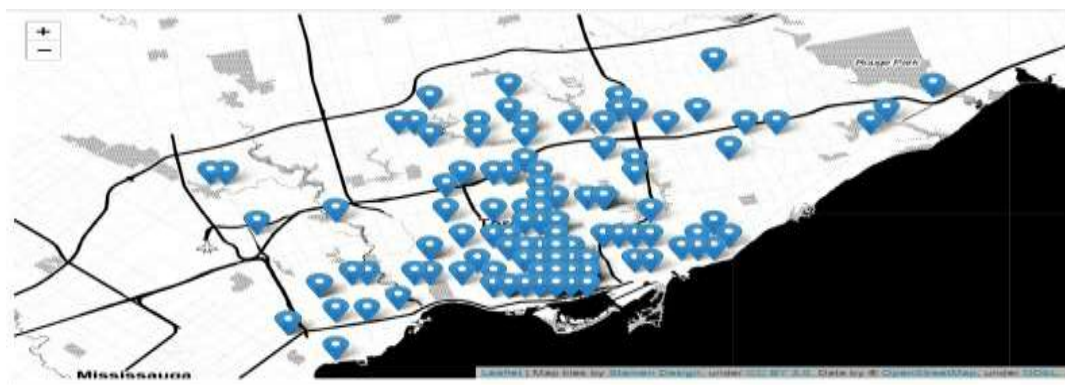
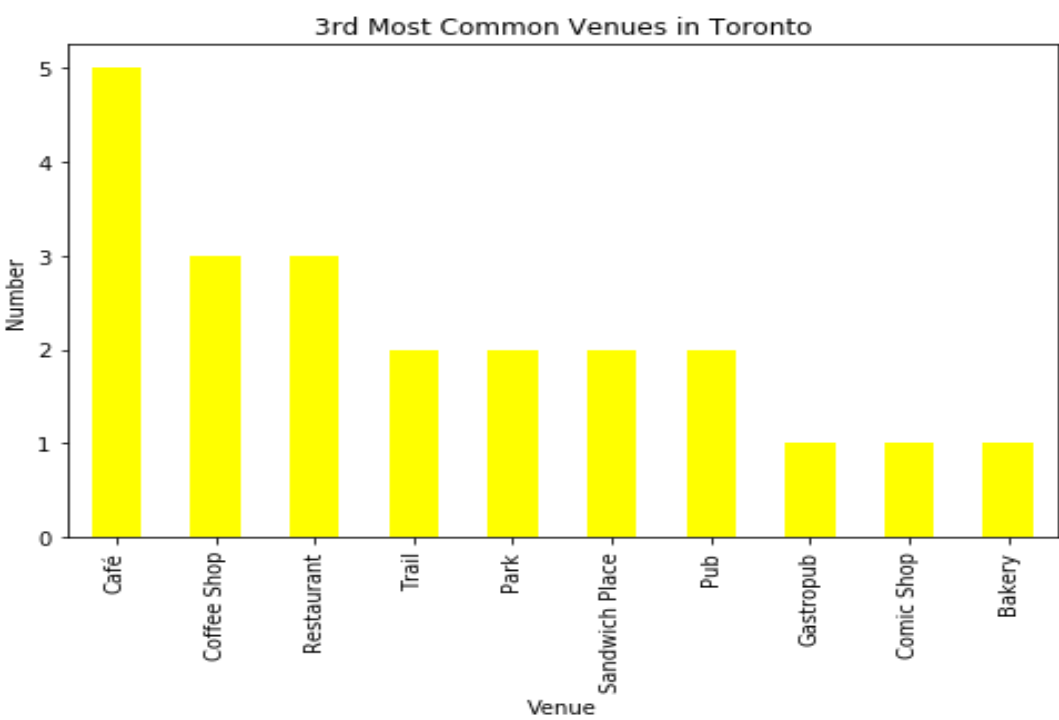## 4.3   Location of Starbucks and neighborhoods in Toronto
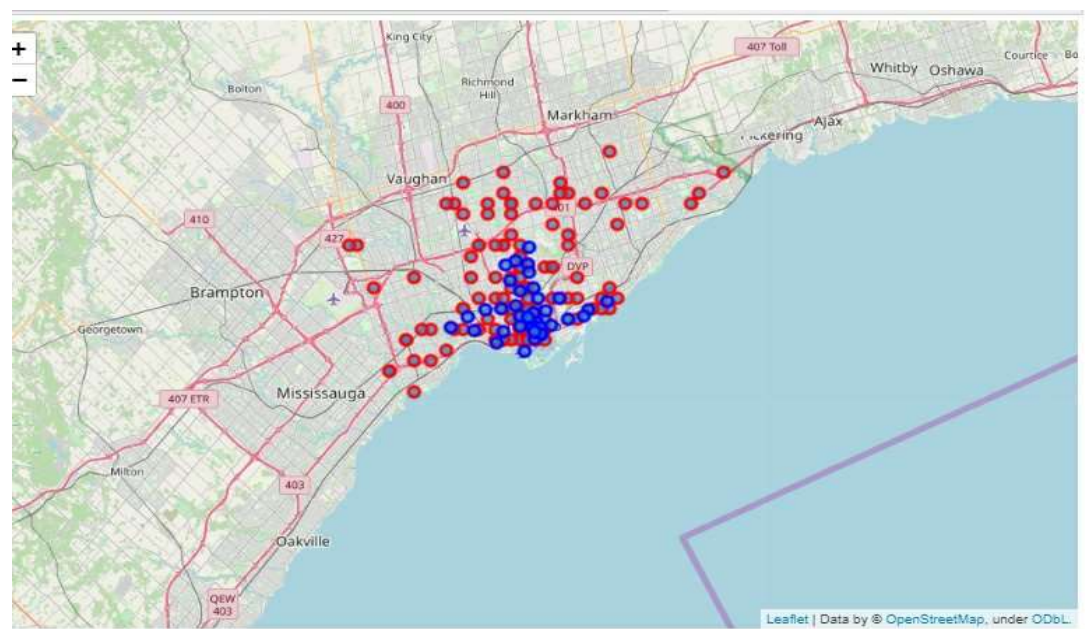
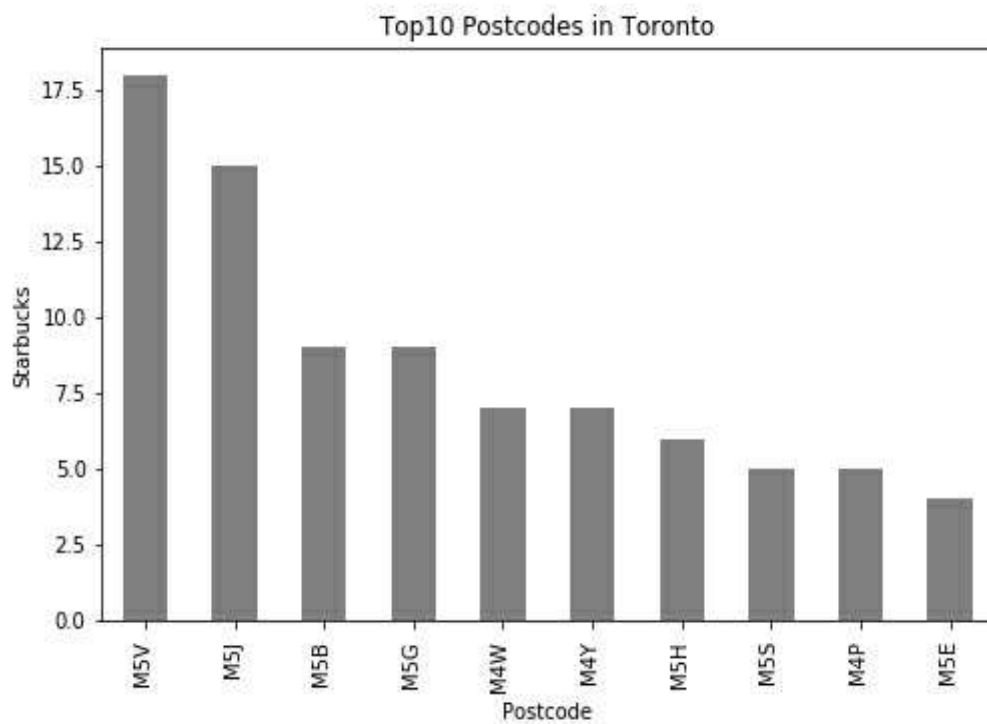## 4.4   Graph of 1st most common venues in Toronto
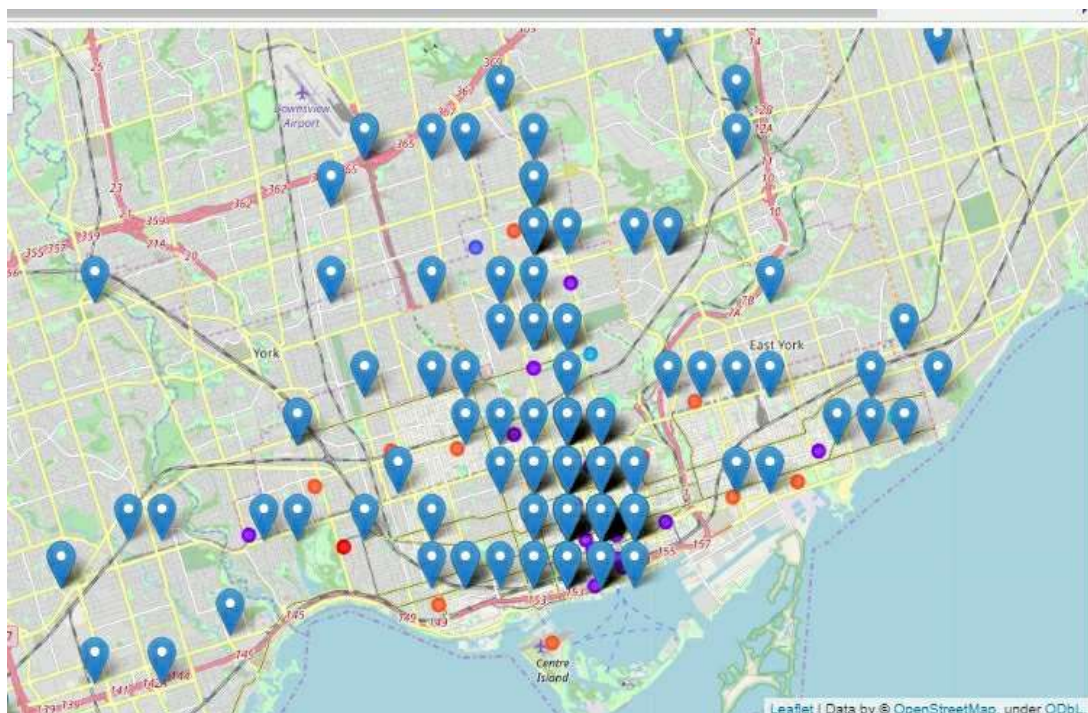
4.5 Graph of 2nd most common venues in Toronto

2nd Most Common Venues in Toronto

4.6 Graph of 3rd most common venues in Toronto

3rd Most Common Venues in Toronto

4.7   Graph of top10 postcodes of Starbucks in Toronto

4.8   Location of Starbucks and clusters of neighborhoods in Toronto

5. Discussion

5.1 What is the most common venue in Toronto?

There are three graphs relevant to most common venues in Toronto. These are 'Graph of 1st Most Common Venues in Toronto', 'Graph of 2nd Most Common Venues in Toronto' and 'Graph of 3rd Most Common Venues in Toronto.'

In the 'Graph of 1st Most Common Venues in Toronto', the number of 'Coffee Shop' is 15, and the number of 'Café' is 3. In the 'Graph of 2nd Most Common Venues in Toronto', the number of 'Café' is 6, and the number of 'Coffee Shop' is 4. In the 'Graph of 3rd Most Common Venues in Toronto', the number of 'Café' is 5, and the number of 'Coffee Shop' is 3.

As a result, according to these three graphs, Coffee shop is the most common venue in Toronto, and second one is Café.

5.2 What are similarities and differences between these locations?

There are three maps relevant locations of Starbucks and neighborhoods in Toronto. These are 'Location of Starbucks in Toronto', 'Location of Neighborhoods in Toronto' and 'Location of Clusters of Neighborhoods in Toronto.'

Starbucks coffee shops are located in Toronto more extensively comparing to locations of neighborhoods. However, locations of Starbucks coffee shops are concentrated in that area where most of neighborhoods

are located in.

In other words, Starbucks coffee shops are generally located in the area where most of neighborhoods are located in.

6. Conclusion

According to the results of data analysis, we can recognize that locations of Starbucks are mostly located in the area where most of neighborhoods are located in. Also, Coffee shop is the most common venue in Toronto, and second one is Café.

That is, coffee shops and Cafés, including Starbucks coffee shops may be located in downtown or crowded district of Toronto. Therefore, house hunters and storekeepers can consider locations of Starbucks coffee shops when they want to get information about all the neighborhoods and commercial districts in Toronto. However, some of Starbucks coffee shops in Toronto are not located in the crowded districts. For these reasons, we should use other figures, such as 'neighborhoods in Toronto', as a reference to get more precise information.