Capstone Project - The Battle of Neighborhoods

1. Introduction

1.1 Background

Toronto is the fourth largest city in North America and the (multi)cultural centre of Canada. The city has become an incredibly diverse melting pot for food and drink culture driven by individuals inspired to share their traditions and ideas. But in a city that prides itself on its eclectic offerings, there is one industry that has been a bit late to the party: coffee. In a province that is dominated by large coffee chains, enforcing notions of convenience over quality, it has been difficult to convert this coffee-drinking populace into specialty coffee consumers. The average customer has no problem spending a premium on a higher quality meal or a higher quality beer but has hesitated to try out the shop around the corner serving single-origin espressos and handmade pour-overs.

1.2 Problem

So as part of this project, we will list and visualize all major parts of Toronto that has great Coffee shops.

1.3 Interest

This project aims to target people who are passionate about having coffee to find the best establishments in the city of Toronto and for those who are interested in opening a coffee shop know the best regions to open your business.

Questions that can be answered with the project

- What is the best location in Toronto for have a coffee?
- Which areas have potential Coffee Shop Market?
- Which areas lack Coffee Shops?
- Which is the best borough to stay if I want have a coffee?
- Which is the best Coffee Shop in Toronto?
- Which Coffee Shop is rated highest in Toronto?

Foursquare API:

This project would use Foursquare API as its prime data gathering source as it has a database of millions of places, especially their places API which provides the ability to perform location search, location sharing and details about a business.

Approach:

We will web scraping the Toronto data from Wikipedia and using FourSquare API we will find all venues for each neighborhood. Next step is filter out all venues that are Coffee Shops and find rating, tips and like count for each Coffee Shop using FourSquare API. Using rating for each Coffee Shop, we will sort that data and visualize the Ranking of neighborhoods using folium library.

2. Data acquisition and cleaning

2.1 Data sources

We will web scraping the Toronto data from Wikipedia and using Foursquare API we will find all venues for each neighborhood. From Toronto data that contains list of Boroughs, Neighborhoods the link is: https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M.

From the geospatial data we use the following link: http://cocl.us/Geospatial_data.

2.2 Data cleaning

The Data scraped is combined in one table with the following steps. We copy the link in the above section, read the file, call the position where the table is stored, rename the columns, drop the first row, the table contain not assigned values from borough column that need to be discarded and then transform in a data frame. We merge the rows with the same postcode and then save the file for future analyses.
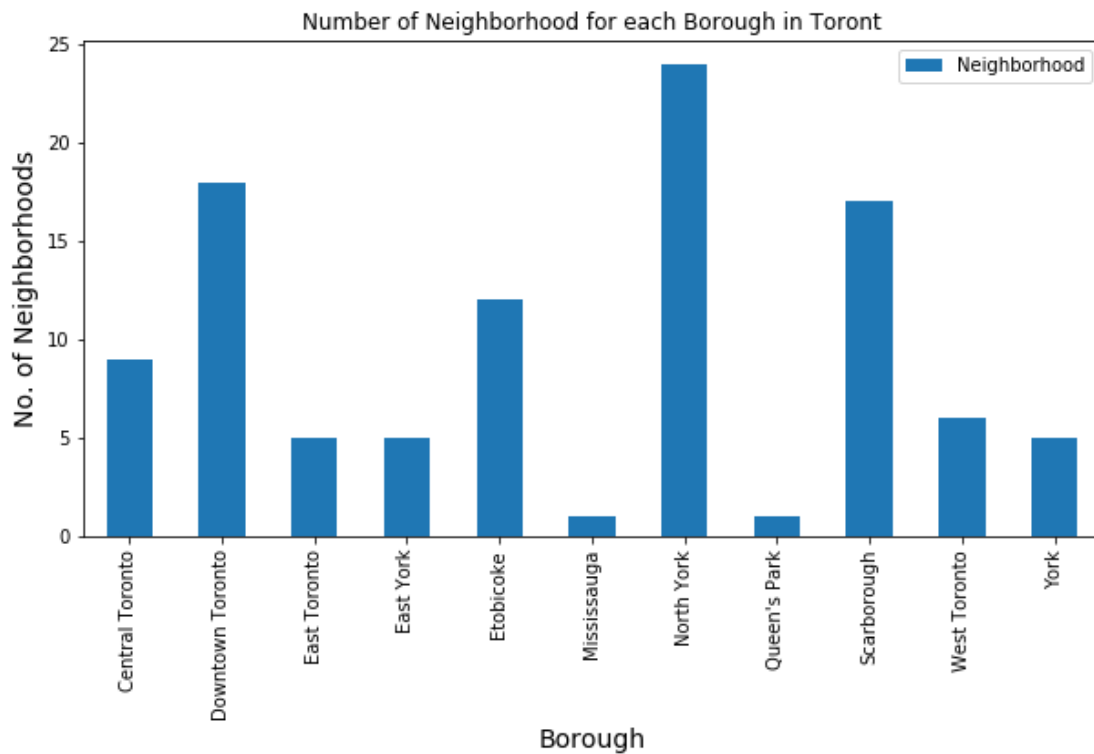
	Postcode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Harbourfront,Regent Park
3	M6A	North York	Lawrence Heights,Lawrence Manor
4	M7A	Queen's Park	Queen's Park

With the Geospatial data we merge the latitude and longitude with the previous table and drop the Postcode column.

	Borough	Neighborhood	Latitude	Longitude
0	North York	Parkwoods	43.753259	-79.329656
1	North York	Victoria Village	43.725882	-79.315572
2	Downtown Toronto	Harbourfront,Regent Park	43.654260	-79.360636
3	North York	Lawrence Heights,Lawrence Manor	43.718518	-79.464763
4	Queen's Park	Queen's Park	43.662301	-79.389494
5	Etobicoke	Islington Avenue	43.667856	-79.532242
6	Scarborough	Rouge,Malvern	43.806686	-79.194353
7	North York	Don Mills North	43.745906	-79.352188
8	East York	Woodbine Gardens,Parkview Hill	43.706397	-79.309937
9	Downtown Toronto	Ryerson,Garden District	43.657162	-79.378937
10	North York	Glencairn	43.709577	-79.445073
11	Etobicoke	Cloverdale,Islington,Martin Grove,Princess Gar...	43.650943	-79.554724

2.3 Feature selection

After the data cleaning, the data frame has 11 boroughs and 103 neighborhoods in the city of Toronto. Making a bar chart we can visualize the differences of each neighborhood and the number of Coffee Shops.

Number of Neighborhood for each Borough in Toront

We see that the three biggest boroughs are Scarborough, Downtown Toronto and North York. And the last one is the borough with the most neighborhoods.

3. Results and Discussions

3.1 Creation of functions

For collecting the data from the Foursquare API, we created three functions. The first one is for get geo location of address in Toronto using geopy-Nominatim (convert an address into latitude and longitude values). The second one is to get the venues data from Foursquare API, due to http request limitations the number of places per neighborhood parameter would reasonably be set to 100 and the radius parameter would be set to 1000. And the last one is to fetch venue details from Foursquare API and find the rating, tips and like count for each Coffee Shop.

3.2 Filtering Coffee Shops

We prepared a neighborhood list that contains Coffee Shops with the second function describe above. We created a table with name of the Coffee Shops and the unique id.
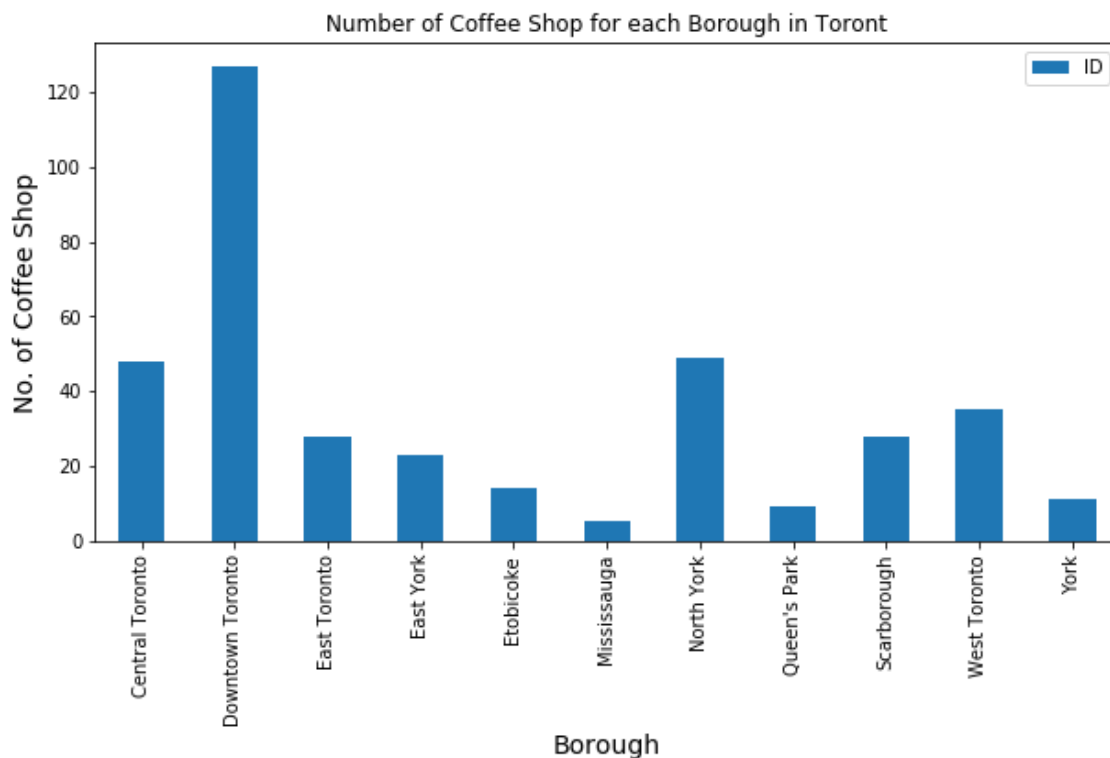
	Borough	Neighborhood	ID	Name
0	North York	Parkwoods	4b87107cf964a5207fae31e3	La Notre
1	North York	Victoria Village	4bbe904a85fbb713420d7167	Tim Hortons
2	North York	Victoria Village	4b609d8df964a52068f029e3	Tim Hortons
3	Downtown Toronto	Harbourfront,Regent Park	53b8466a498e83df908c3f21	Tandem Coffee
4	Downtown Toronto	Harbourfront,Regent Park	57cd9d20498e6ab8342980e2	Arvo

With the third function we created a table that contains names, id, number of likes, rating and tips.
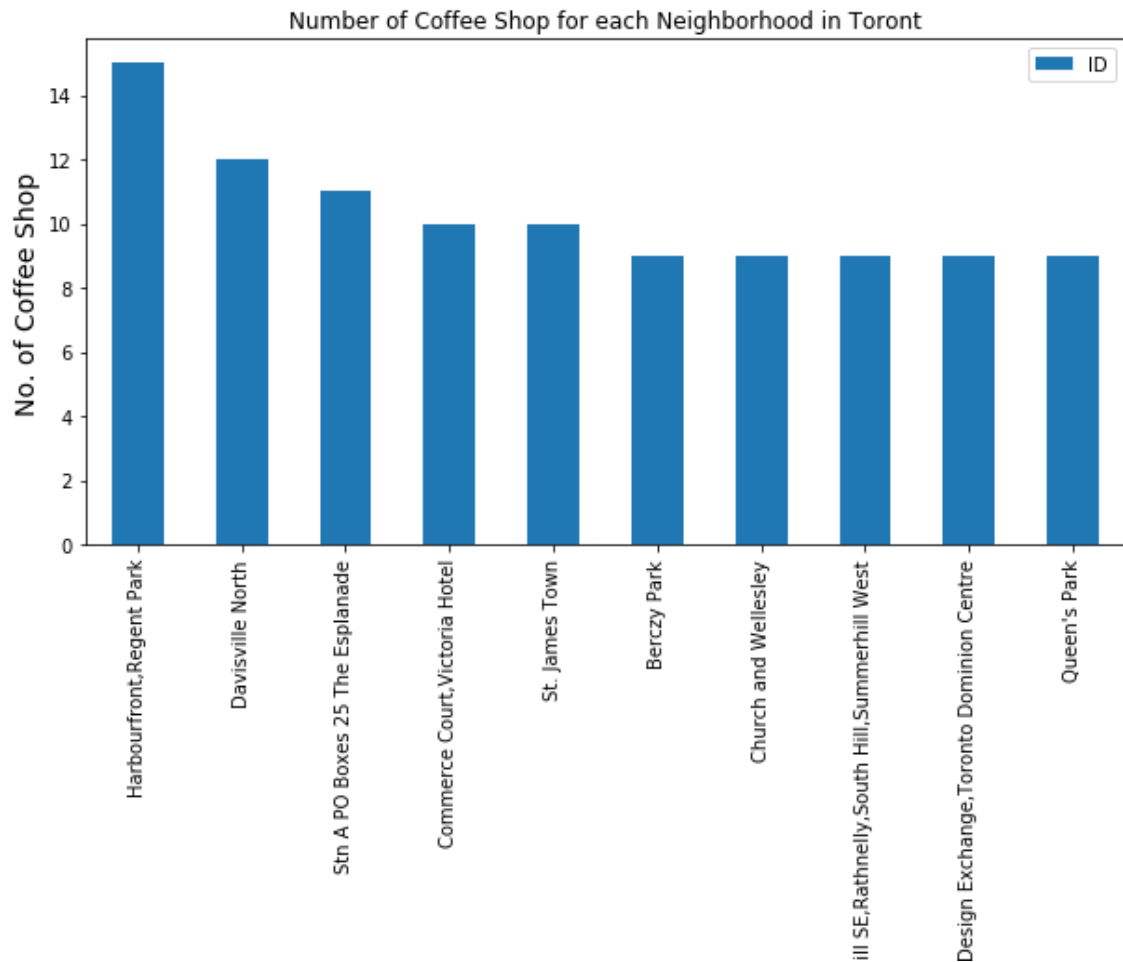
	Borough	Neighborhood	ID	Name	Likes	Rating	Tips
0	North York	Parkwoods	0	0	0	0	0
1	North York	Victoria Village	4bbe904a85fbb713420d7167	Tim Hortons	21	6.4	7
2	North York	Victoria Village	4b609d8df964a52068f029e3	Tim Hortons	23	6.1	13
3	Downtown Toronto	Harbourfront,Regent Park	53b8466a498e83df908c3f21	Tandem Coffee	47	8.7	20
4	Downtown Toronto	Harbourfront,Regent Park	57cd9d20498e6ab8342980e2	Arvo	53	9.2	10

3.3 Analyzing the data

With both tables we create different analyzes so we can discriminate and answer the questions described in the Business Problem section. The first was determinate the number of Coffee Shops for each borough and neighborhood in Toronto city.

We see that Downtown Toronto has the largest number of Coffee Shop.

Number of Coffee Shop for each Neighborhood in Toront

And now we can see that together Harbourfront and Regent Park have the largest number of Coffee Shop. However, Davisville North alone has twelve Coffee Shops.

Further analysis is to know which Coffee shop that has the maximum rating and the maximum number of likes and tips.

- Coffee shops with maximum likes

```
Borough                               Downtown Toronto
Neighborhood       Chinatown,Grange Park,Kensington Market
ID                              4ad76dadf964a520530a21e3
Name                             Dark Horse Espresso Bar
Likes                                              355
Rating                                             8.4
Tips                                               169
Name: 313, dtype: object
```

- Coffee shops with maximum Rating

```
Borough                  Downtown Toronto
Neighborhood     Harbourfront,Regent Park
ID                57cd9d20498e6ab8342980e2
Name                                  Arvo
Likes                                   53
Rating                                 9.2
Tips                                    10
Name: 4, dtype: object
```

- Coffee shops with maximum Tips

```
Borough                              Downtown Toronto
Neighborhood     Chinatown,Grange Park,Kensington Market
ID                       4ad76dadf964a520530a21e3
Name                     Dark Horse Espresso Bar
Likes                                        355
Rating                                       8.4
Tips                                         169
Name: 313, dtype: object
```
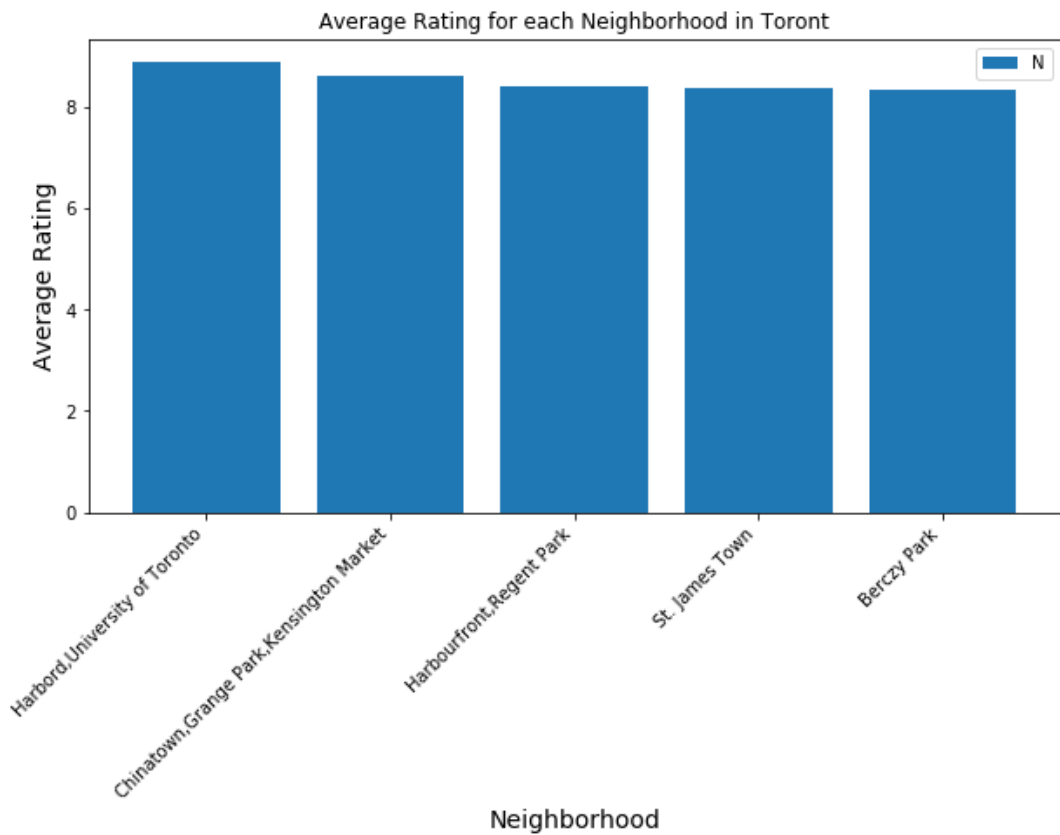
The next analysis is to know average rating of each neighborhood and borough. For this we create a table with the average rating and then make a bar chart.

	Neighborhood	Average Rating
43	Harbord,University of Toronto	8.900000
18	Chinatown,Grange Park,Kensington Market	8.633333
45	Harbourfront,Regent Park	8.420000
71	St. James Town	8.370000
7	Berczy Park	8.355556
72	Stn A PO Boxes 25 The Esplanade	8.290909
59	North Toronto West	8.266667
69	Ryerson,Garden District	8.257143
0	Adelaide,King,Richmond	8.257143
12	CN Tower,Bathurst Quay,Island airport,Harbourf...	8.250000
64	Queen's Park	8.211111
38	First Canadian Place,Underground city	8.200000
13	Cabbagetown,St. James Town	8.200000
55	Little Portugal,Trinity	8.200000
23	Commerce Court,Victoria Hotel	8.190000

The table above shows the ranking of neighborhood and their respective average ratings. With this table we create the following bar chart.

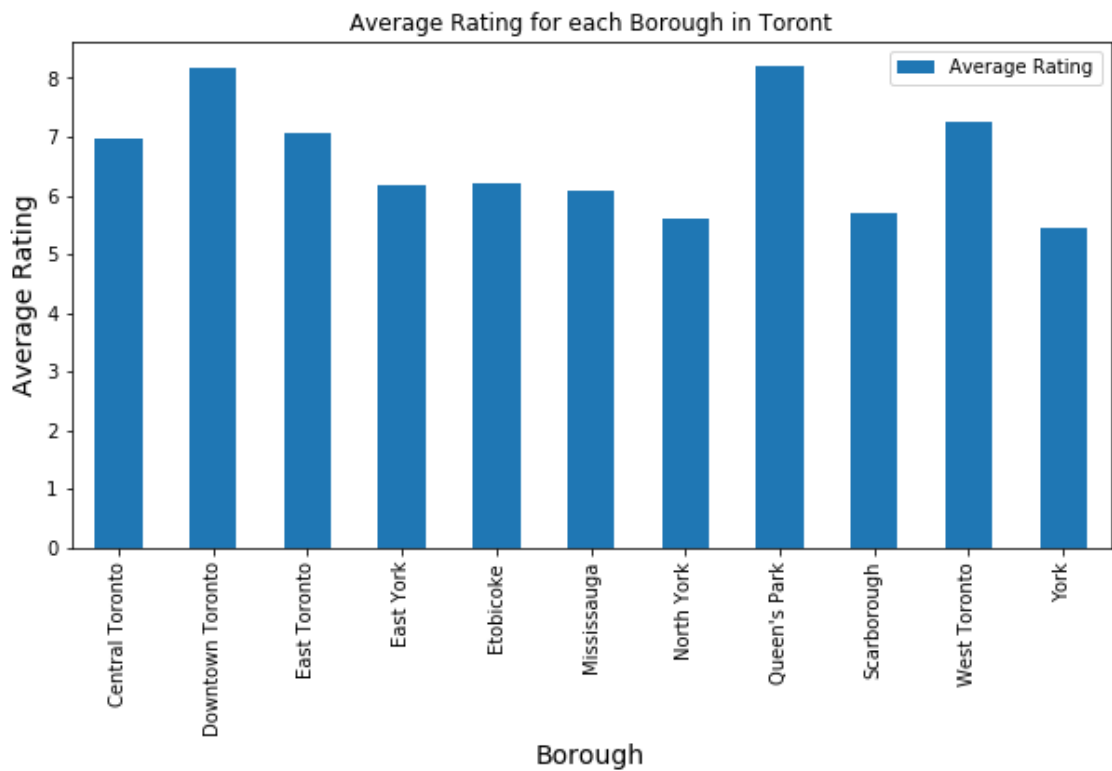Average Rating for each Neighborhood in Toront

The top-ranked neighborhood in Toronto is Harbord and University of Toronto.

Similarly, we created a table with boroughs and their respective average rating. And then we make another bar chart.

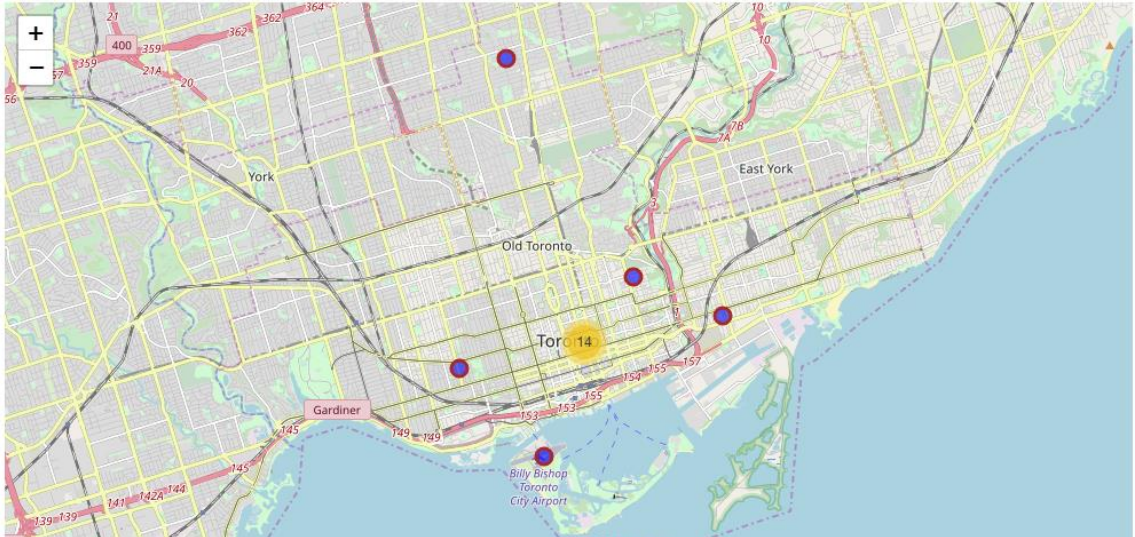|	Borough	Average Rating
7	Queen's Park	8.211111
1	Downtown Toronto	8.185827
9	West Toronto	7.254286
2	East Toronto	7.064286
0	Central Toronto	6.981250
4	Etobicoke	6.221429
3	East York	6.165217
5	Mississauga	6.080000
8	Scarborough	5.692857
6	North York	5.608163
10	York	5.454545

Average Rating for each Borough in Toront

And like the neighborhood analysis, we came to the conclusion that Queen's Park and Downtown Toronto have the same average rating, so the two districts are tied for the best borough position.

3.4 Creating maps

The ultimate goal of our project is to build maps that can help analyze coffee shops in Toronto. And the first one of them we built to show the coffee shops in each neighborhood with an average rating above 8.0.

For a better view, we built a map with plugins.

4. Conclusion

After all the analysis, we can now answer the questions from stakeholders.

1. **What is the best location in Toronto for have a coffee?**

   ➢ The Adelaide, King, Richmond and Berczy Park are some of the best neighborhoods for have a coffee in Toronto.

2. **Which areas have potential Coffee Shop Market?**

   ➢ Queen's Park is the best borough for have a coffee. The average rating for this borough is around 8.21.

3. **Which areas lack Coffee Shops?**

   ➢ The area that lacks good Coffee Shops is York with an average rating of 5.45.

4. **Which is the best borough to stay if I want have a coffee?**

   ➢ For this matter, we need to do additional analysis that encompasses other features to make a better decision. These analyzes are complementary goals for this project. But answering the question with the data in hand, the best neighborhood is the one with the highest average rating, hence Queen's park.

5. **Which is the best Coffee Shop in Toronto?**

   ➢ This question we will answer based on maximum likes, hence Dark Horse Espresso Bar.

6. **Which Coffee Shop is rated highest in Toronto?**
   ➢ The Coffee Shop in Toronto with the highest rating is Arvo.