Opening a Coffee Shop in Toronto, Canada

Capstone final project

Context and business problem

- Toronto is the provincial capital of Ontario and the most populous city in Canada, with a population of 2,731,571 in 2016. Current to 2016, the Toronto census metropolitan area (CMA), of which the majority is within the Greater Toronto Area (GTA), held a population of 5,928,040, making it Canada's most populous CMA.
- The client wants to open a new Coffee Shop in Toronto, so I've focused on Toronto for my analysis. The objective is to locate and recommend to the management which neighbourhood of Toronto will be best choice to start a restaurant. The Management also expects to understand the rationale of the recommendations made.

Data Selection

- To identify the characteristics of our competitors' venues in Toronto, we would first need to find out the number of Coffee Shops in Toronto currently and their location.
- We then found their geographic coordinates based on their postal code addresses.

Data Selection

Next, we find the geographic coordinates of the 5 locations shortlisted for the Coffee Shops:

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	The Beaches	43.676357	-79.293031	Tori's Bakeshop	43.672114	-79.290331	Vegetarian / Vegan Restaurant
1	The Beaches	43.676357	-79.293031	Starbucks	43.680806	-79.285137	Coffee Shop
2	The Beaches	43.676357	-79.293031	Starbucks	43.669564	-79.301969	Coffee Shop
3	The Beaches	43.676357	-79.293031	Grinder	43.683073	-79.299875	Coffee Shop
4	The Beaches	43.676357	-79.293031	Tim Hortons	43.680799	-79.282907	Coffee Shop

Table 2: Data frame containing geographic coordinates of our 5 shortlisted locations

Methodology

- Addresses are converted into their equivalent latitude and longitude values.
- Foursquare API is used to explore neighborhoods in Toronto, Canada.
- After that, explore function to get Coffee Shop categories in each neighborhood.

Methodology

	Neighbourhood	Bakery	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café	Chinese Restaurant	Coffee Shop	...	Gaming Cafe	Gas Station	Grocery Store	Ice Cream Shop	Marijuana Dispensary
0	The Beaches	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0
1	The Beaches	0	0	0	0	0	0	0	0	1	...	0	0	0	0	0
2	The Beaches	0	0	0	0	0	0	0	0	1	...	0	0	0	0	0
3	The Beaches	0	0	0	0	0	0	0	0	1	...	0	0	0	0	0
4	The Beaches	0	0	0	0	0	0	0	0	1	...	0	0	0	0	0

Methodology

- Then using this feature to group the neighborhoods into clusters. The K- means clustering algorithm will be use to complete this task. And also, the Folium library to visualize the neighborhoods in Toronto and its emerging clusters.

	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	Café	Bar	Ice Cream Shop	Chinese Restaurant	Vegetarian / Vegan Restaurant	Dessert Shop	Bike Shop	Bookstore	Boutique
1	Berczy Park	Coffee Shop	Café	Bar	Vegetarian / Vegan Restaurant	Tea Room	Bike Shop	Bookstore	Boutique	Cafeteria	Chinese Restaurant
2	Brockton,Exhibition Place,Parkdale Village	Coffee Shop	Bakery	Bike Shop	Café	Food Truck	Tea Room	Dessert Shop	Bar	Bookstore	Boutique
3	Business Reply Mail Processing Centre 969 Eastern	Coffee Shop	Bakery	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café	Chinese Restaurant
4	CN Tower,Bathurst Quay,Island airport,Harbourf...	Coffee Shop	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café	Chinese Restaurant

Results

- Using K-mean to clustering data area with less number of Coffee Shops

Cluster 0

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 0, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Neighbourhood Latitude	Venue Longitude	Venue Category	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	9th Cor
0	43.676357	-79.290331	Vegetarian / Vegan Restaurant	0	Coffee Shop	Vegetarian / Vegan Restaurant	Café	French Restaurant	Dessert Shop	Bar	Bike Shop	Bookstore	Bou
1	43.676357	-79.285137	Coffee Shop	0	Coffee Shop	Vegetarian / Vegan Restaurant	Café	French Restaurant	Dessert Shop	Bar	Bike Shop	Bookstore	Bou
2	43.676357	-79.301969	Coffee Shop	0	Coffee Shop	Vegetarian / Vegan Restaurant	Café	French Restaurant	Dessert Shop	Bar	Bike Shop	Bookstore	Bou
3	43.676357	-79.299875	Coffee Shop	0	Coffee Shop	Vegetarian / Vegan Restaurant	Café	French Restaurant	Dessert Shop	Bar	Bike Shop	Bookstore	Bou
4	43.676357	-79.282907	Coffee Shop	0	Coffee Shop	Vegetarian / Vegan Restaurant	Café	French Restaurant	Dessert Shop	Bar	Bike Shop	Bookstore	Bou
5	43.676357	-79.302124	Coffee Shop	0	Coffee Shop	Vegetarian / Vegan Restaurant	Café	French Restaurant	Dessert Shop	Bar	Bike Shop	Bookstore	Bou

Result

Cluster 1

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 1, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Neighbourhood Latitude	Venue Longitude	Venue Category	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	9th Mo Comm Venu
49	43.659526	-79.342565	Café	1	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
50	43.659526	-79.342461	Coffee Shop	1	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
51	43.659526	-79.341241	Coffee Shop	1	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
52	43.659526	-79.341510	Coffee Shop	1	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
53	43.659526	-79.342295	Coffee Shop	1	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
54	43.659526	-79.338577	Coffee Shop	1	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteri

Result

Cluster 2

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 2, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Neighbourhood Latitude	Venue Longitude	Venue Category	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	9th Co
175	43.686412	-79.398612	Coffee Shop	2	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cat
176	43.686412	-79.392148	Coffee Shop	2	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cat
177	43.686412	-79.395570	Coffee Shop	2	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cat
178	43.686412	-79.393281	Coffee Shop	2	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cat
179	43.686412	-79.394475	Coffee Shop	2	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cat
180	43.686412	-79.396840	Coffee Shop	2	Coffee Shop	Café	Vegetarian / Vegan Restaurant	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cat

Result

Cluster 3

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 3, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Neighbourhood Latitude	Venue Longitude	Venue Category	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	9th Most Common Venue
749	43.711695	-79.413698	Coffee Shop	3	Coffee Shop	Tea Room	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café
750	43.711695	-79.411762	Coffee Shop	3	Coffee Shop	Tea Room	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café
751	43.711695	-79.413824	Coffee Shop	3	Coffee Shop	Tea Room	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café
752	43.711695	-79.409193	Coffee Shop	3	Coffee Shop	Tea Room	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café
753	43.711695	-79.430534	Coffee Shop	3	Coffee Shop	Tea Room	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café
754	43.711695	-79.405920	Coffee Shop	3	Coffee Shop	Tea Room	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteria	Café

Result

Cluster 4

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 4, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Neighbourhood Latitude	Venue Longitude	Venue Category	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	9th M Comm Ver
756	43.696948	-79.413698	Coffee Shop	4	Coffee Shop	Tea Room	Café	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
757	43.696948	-79.411762	Coffee Shop	4	Coffee Shop	Tea Room	Café	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
758	43.696948	-79.412803	Coffee Shop	4	Coffee Shop	Tea Room	Café	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
759	43.696948	-79.409193	Coffee Shop	4	Coffee Shop	Tea Room	Café	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
760	43.696948	-79.413824	Coffee Shop	4	Coffee Shop	Tea Room	Café	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteri
761	43.696948	-79.412601	Café	4	Coffee Shop	Tea Room	Café	Vegetarian / Vegan Restaurant	Bar	Bike Shop	Bookstore	Boutique	Cafeteri

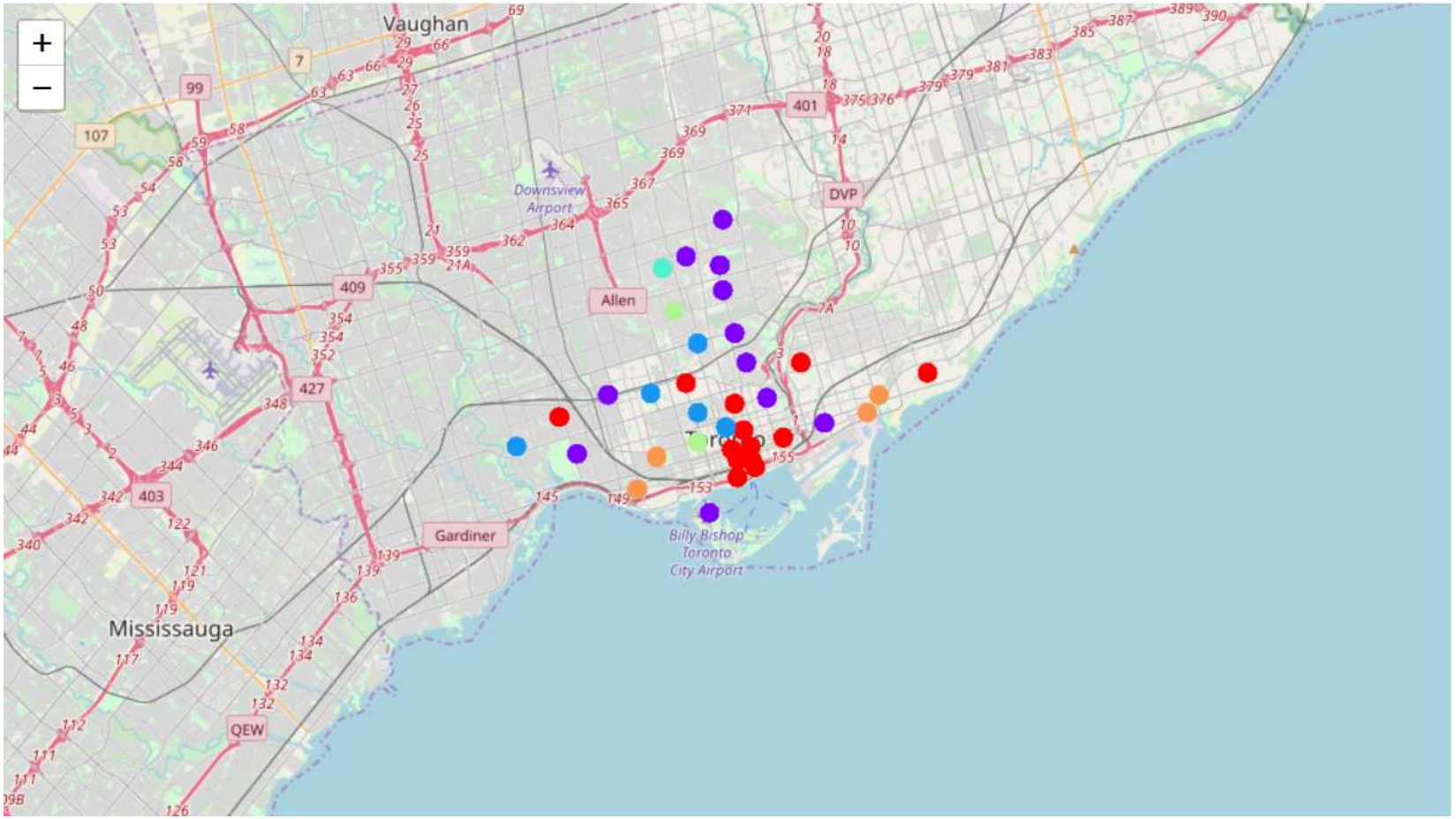
Result

Cluster 5

```
toronto_merged.loc[toronto_merged['Cluster Labels'] == 5, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
```

	Neighbourhood Latitude	Venue Longitude	Venue Category	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	9th Most Common Venue
38	43.668999	-79.312404	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
39	43.668999	-79.308015	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
40	43.668999	-79.308204	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
41	43.668999	-79.309945	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
42	43.668999	-79.301969	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
43	43.668999	-79.302124	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
44	43.668999	-79.328110	Bakery	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
45	43.668999	-79.306890	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria
46	43.668999	-79.320412	Coffee Shop	5	Coffee Shop	Bakery	Café	Tea Room	Bar	Bike Shop	Bookstore	Boutique	Cafeteria

Result



Based on the Analysis Clusters 3(Light Blue) and 5(Orange) are the best places to open a Coffee Shop

Discussion

- This analysis is performed on limited data. This may be right or may be wrong. But if good amount of data is available there is scope to come up with better results.
- There is high competition in The Beaches, The Danforth West and Riverdale so it is very risky to open business in these areas.
- Forest Hill North and Forest Hill West also have potential.
- It can be done more detailed analysis by adding other factors such as transportation, demographics of inhabitants.

Conclusion

- Although all of the goals of this project were met there is definitely room for further improvement and development as noted above. However, the goals of the project were met and, with some more work, could easily be developed into a reliable application that could be used by businesses to decide on a location.