

Introduction

My friend is considering to open a restaurant in Toronto, Canada. However, she could not decide which type of the restaurant and also which neighborhood she should place the investment. To deal with this problem, she needs some relevant analysis about the characteristics, trends in different boroughs of the area.

Data Sources

The data used in the analysis are a list of Toronto's boroughs, Toronto's coordinate, and Foursquare platform, including location, local search, and venue ratings.

- https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M%22
- http://cocl.us/Geospatial_data
- <https://developer.foursquare.com/>

In order to create a full dataframe with the name of locations and its geographical information, I need to merge the cleaned list of Toronto's boroughs and its coordinates.

Finally, we will use Foursquare platform to identify the nearby venues in each area.

Data Cleaning

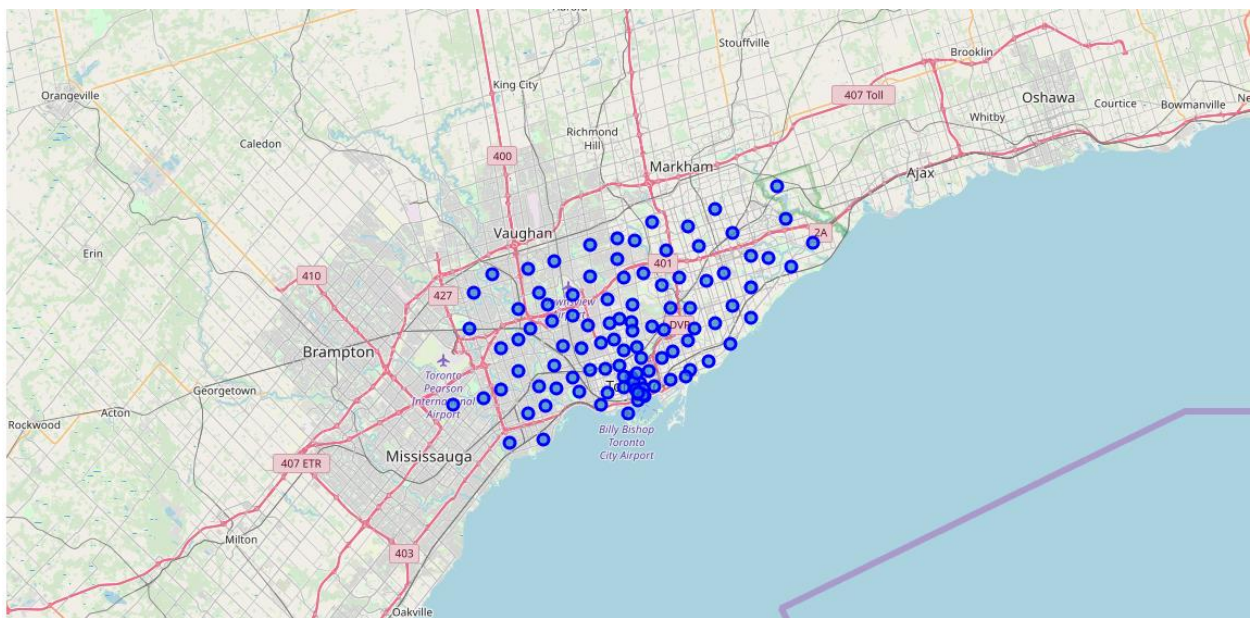
I dropped all the cells which is **Not Assigned**. For some cells, there is existence of borough but its name of neighborhood is Not Assigned, then the name of its borough is applied for the name of neighborhood. Moreover, some neighborhoods can contain one same postal code. Then we need to combine them into one line of borough.

	Postalcode	Borough	Neighbourhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Harbourfront, Regent Park	43.654260	-79.360636
3	M6A	North York	Lawrence Heights, Lawrence Manor	43.718518	-79.464763
4	M7A	Queen's Park	Queen's Park	43.662301	-79.389494
5	M9A	Etobicoke	Islington Avenue	43.667856	-79.532242
6	M1B	Scarborough	Rouge, Malvern	43.806686	-79.194353
7	M3B	North York	Don Mills North	43.745906	-79.352188
8	M4B	East York	Woodbine Gardens, Parkview Hill	43.706397	-79.309937
9	M5B	Downtown Toronto	Ryerson, Garden District	43.657162	-79.378937
10	M6B	North York	Glencairn	43.709577	-79.445073

Methodology

Explore the data

To make a clearer view of geographical characteristics of Toronto, we need a map with all markers of neighborhoods added. Folium is a great choice for the purpose of mapping in this analysis.



I used Foursquare to get the information of nearby venues including the name, its coordinate, and the category.

In [16]:

toronto_venues.head(10)

Out[16]:

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Parkwoods	43.753259	-79.329656	Brookbanks Park	43.751976	-79.332140	Park
1	Parkwoods	43.753259	-79.329656	KFC	43.754387	-79.333021	Fast Food Restaurant
2	Parkwoods	43.753259	-79.329656	Variety Store	43.751974	-79.333114	Food & Drink Shop
3	Victoria Village	43.725882	-79.315572	Victoria Village Arena	43.723481	-79.315635	Hockey Arena
4	Victoria Village	43.725882	-79.315572	Tim Hortons	43.725517	-79.313103	Coffee Shop
5	Victoria Village	43.725882	-79.315572	Portugril	43.725819	-79.312785	Portuguese Restaurant
6	Victoria Village	43.725882	-79.315572	Eglinton Ave E & Sloane Ave/Bermondsey Rd	43.726086	-79.313620	Intersection
7	Harbourfront, Regent Park	43.654260	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
8	Harbourfront, Regent Park	43.654260	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
9	Harbourfront, Regent Park	43.654260	-79.360636	Toronto Cooper Koo Family Cherry St YMCA Centre	43.653191	-79.357947	Gym / Fitness Center

I tried to get the crowded level of each area by looking for the venues near each area in radius of 500 meters, and limit of 100 places.

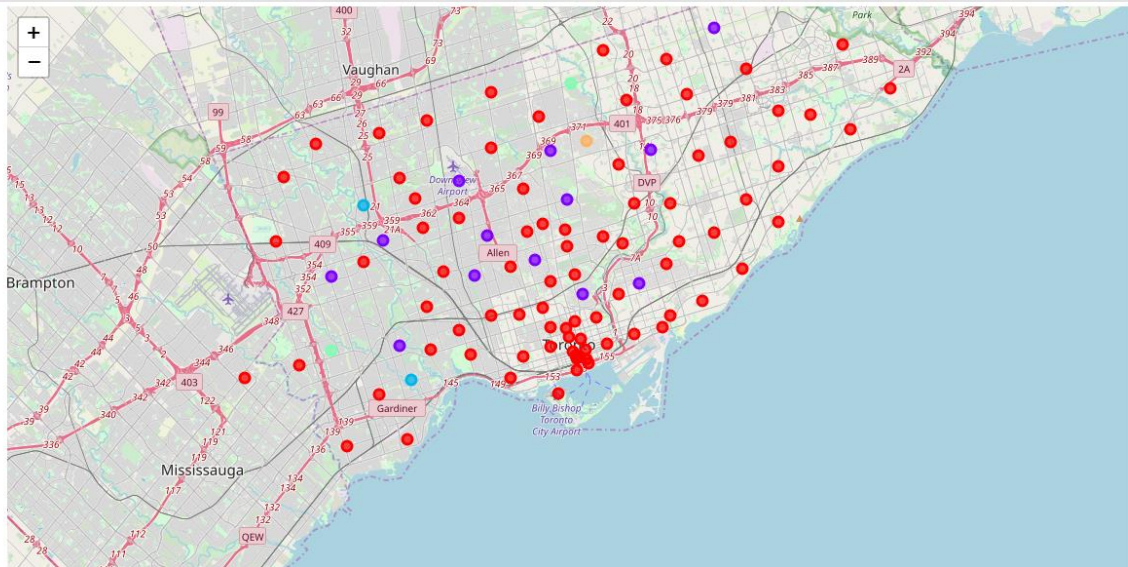
Next we get the top 10 most common venues of each area

Out[23]:

	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	American Restaurant	Steakhouse	Thai Restaurant	Bakery	Cosmetics Shop	Burger Joint	Restaurant
1	Agincourt	Lounge	Breakfast Spot	Sandwich Place	Chinese Restaurant	Yoga Studio	Dumpling Restaurant	Dog Run	Doner Restaurant	Donut Shop	Drugstore
2	Agincourt North, L'Amoreaux East, Milliken, St...	Park	Playground	Asian Restaurant	Yoga Studio	Dumpling Restaurant	Discount Store	Dog Run	Doner Restaurant	Donut Shop	Drugstore
3	Albion Gardens, Beaumont Heights, Humbergate, ...	Grocery Store	Fast Food Restaurant	Pizza Place	Sandwich Place	Beer Store	Coffee Shop	Liquor Store	Fried Chicken Joint	Video Store	Pharmacy
4	Alderwood, Long Branch	Pizza Place	Coffee Shop	Pub	Sandwich Place	Pool	Skating Rink	Dance Studio	Pharmacy	Gym	Dumpling Restaurant

Finally, I have tried to examine clusters in these neighborhoods to see how similar objects are grouped in one cluster.

Out[90]:



Results

We see the most crowded area in Toronto belongs to the neighborhood of Downtown in Old Toronto. In which, restaurant, coffee shop are the most common.

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In [26]: toronto_merged.loc[toronto_merged['Cluster_Labels'] == 0, toronto_merged.columns[[1] + list(range(5, toronto_merged.shape[1]))]]
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Out[26]:

	Borough	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	10th Most Common Venue
1	North York	0	Intersection	Hockey Arena	Coffee Shop	Portuguese Restaurant	Ethiopian Restaurant	Event Space	Falafel Restaurant	Empanada Restaurant	Electronics Store	Dessert Shop
2	Downtown Toronto	0	Coffee Shop	Pub	Bakery	Park	Theater	Restaurant	Breakfast Spot	Mexican Restaurant	Café	Farmers Market
3	North York	0	Clothing Store	Furniture / Home Store	Women's Store	Boutique	Fraternity House	Event Space	Miscellaneous Shop	Coffee Shop	Accessories Store	Vietnamese Restaurant
4	Queen's Park	0	Coffee Shop	Park	Gym	Japanese Restaurant	Sushi Restaurant	Persian Restaurant	Smoothie Shop	Seafood Restaurant	Sandwich Place	Burger Joint
6	Scarborough	0	Fast Food Restaurant	Print Shop	Dessert Shop	Diner	Discount Store	Dog Run	Doner Restaurant	Donut Shop	Drugstore	Dumpling Restaurant
7	North York	0	Café	Gym / Fitness Center	Caribbean Restaurant	Baseball Field	Japanese Restaurant	Drugstore	Discount Store	Dog Run	Doner Restaurant	Donut Shop
8	East York	0	Fast Food	Pizza Place	Pet Store	Gastronub	Café	Rank	Athletics &	Intersection	Breakfast	Gym / Fitness

Discussions

Although there is a problem of being a free user of Foursquare, it is still a good tool getting geographical information for my projects. The question at the beginning has been answered.

Conclusions

So with this short report, my friend has received of where she should place her business. At the downtown should be a good choice.