

Neighborhood Final Project

Introduction/Business Problem

Toronto is a diversified and multi-culture city. There are lots of business potentials regarding different culture background and traditions. In order to open a new business successfully, we need to explore the neighborhood and have some insight about the target area and people.

To open a restaurant in Toronto. The first few questions are: Where is the location? What kind of restaurant is the best fit for this selected location? To find the answer for those questions, we need to use related data and map to explore Toronto's neighborhood.

Data

I use the Wikipedia page of Canada's postal code list to create a Toronto neighborhood dataframe. Then use the latitude and longitude of given borough or neighborhood to explore the most common venues in Foursquare API.

Methodology

I first scrape a Wikipedia page to get the postcode, borough and neighborhood of Toronto. With some data cleaning work such as replacing 'Not assigned' value and combine data rows of the same post code in one row separated by comma, I have created a dataframe consists of 103 rows Toronto neighborhood with postcode, borough and neighborhood columns.

	Postcode	Borough	Neighbourhood
0	M1B	Scarborough	Rouge,Malvern
1	M1C	Scarborough	Highland Creek,Rouge Hill,Port Union
2	M1E	Scarborough	Guildwood,Morningside,West Hill
3	M1G	Scarborough	Woburn
4	M1H	Scarborough	Cedarbrae

Then I read the geographical coordinates csv file into pandas and create a new dataframe. Merge this geo dataframe with Toronto neighborhood dataframe by the common column of post code to generate a new dataframe (103 rows, 5 columns) of Toronto neighborhood with postcode, borough, neighborhood, latitude and longitude.

(103, 5)

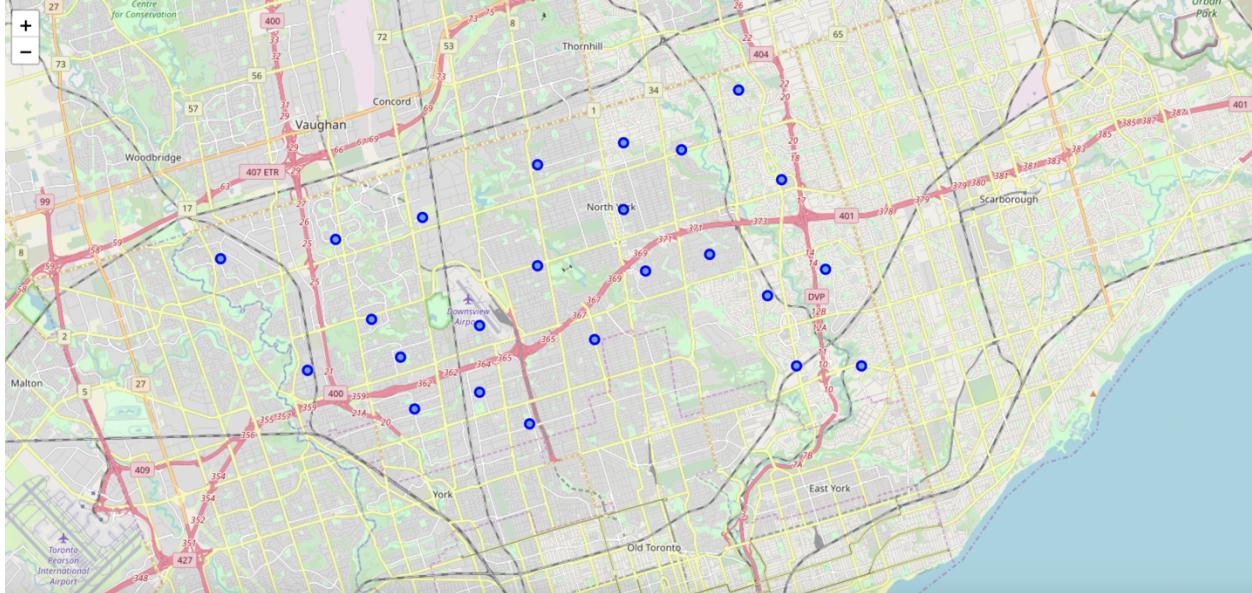
Out[60]:

	PostalCode	Borough	Neighbourhood	Latitude	Longitude
0	M1B	Scarborough	Rouge,Malvern	43.806686	-79.194353
1	M1C	Scarborough	Highland Creek,Rouge Hill,Port Union	43.784535	-79.160497
2	M1E	Scarborough	Guildwood,Morningside,West Hill	43.763573	-79.188711
3	M1G	Scarborough	Woburn	43.770992	-79.216917
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476

I used folium to create a map of Toronto using latitude and longitude values.



Then from the list of boroughs, North York is my target area for further exploration. I created a North York folium map for visualization.



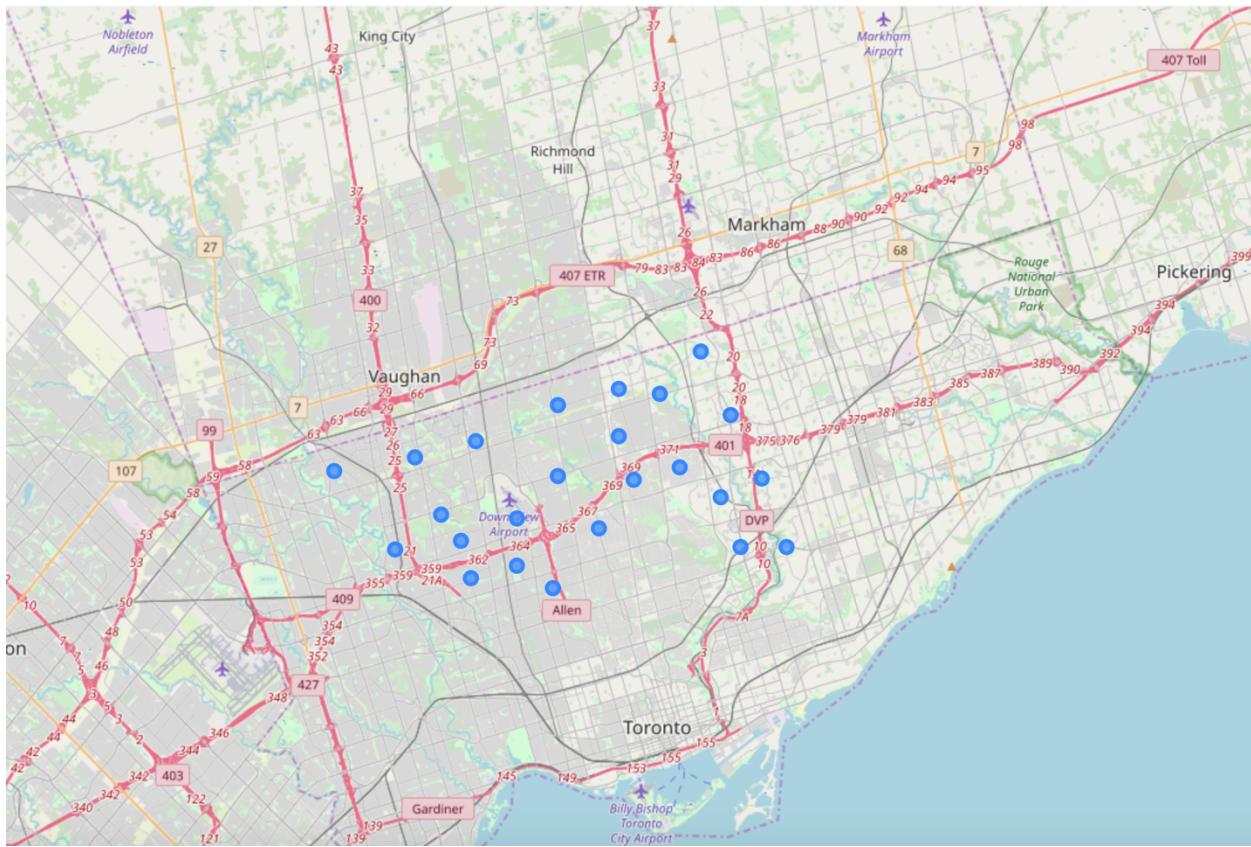
Use Foursquare API to get the top venues of all neighborhoods in North York borough and check how many venues were returned for each neighborhood:

Neighbourhood	Latitude	Neighbourhood	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighbourhood							
Bathurst Manor,Downsview North,Wilson Heights	18		18	18	18	18	18
Bayview Village	4		4	4	4	4	4
Bedford Park,Lawrence Manor East	25		25	25	25	25	25
CFB Toronto,Downsview East	3		3	3	3	3	3
Don Mills North	5		5	5	5	5	5
Downsview Central	4		4	4	4	4	4
Downsview Northwest	5		5	5	5	5	5
Downsview West	3		3	3	3	3	3
Downsview,North Park,Upwood Park	5		5	5	5	5	5
Emery,Humberlea	1		1	1	1	1	1
Fairview,Henry Farm,Oriole	66		66	66	66	66	66
Flemington Park,Don Mills South	23		23	23	23	23	23
Glencairn	4		4	4	4	4	4
Hillcrest Village	4		4	4	4	4	4
Humber Summit	3		3	3	3	3	3
Lawrence Heights,Lawrence Manor	16		16	16	16	16	16
Northwood Park,York University	7		7	7	7	7	7
Parkwoods	3		3	3	3	3	3
Silver Hills,York Mills	1		1	1	1	1	1
Victoria Village	4		4	4	4	4	4
Willowdale South	37		37	37	37	37	37
Willowdale West	5		5	5	5	5	5
York Mills West	5		5	5	5	5	5

Based on the results, create a new dataframe and display the top 10 venues for each neighborhood:

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 Bathurst Manor,Downsview North,Wilson Heights	Coffee Shop	Supermarket	Middle Eastern Restaurant	Frozen Yogurt Shop	Pharmacy	Pizza Place	Deli / Bodega	Restaurant	Bridal Shop	Sandwich Place
1 Bayview Village	Chinese Restaurant	Café	Bank	Japanese Restaurant	Women's Store	Electronics Store	Cosmetics Shop	Cupcake Shop	Deli / Bodega	Department Store
2 Bedford Park,Lawrence Manor East	Coffee Shop	Fast Food Restaurant	Italian Restaurant	Grocery Store	Indian Restaurant	Liquor Store	Cupcake Shop	Café	Pharmacy	Pizza Place
3 CFB Toronto,Downsview East	Park	Airport	Other Repair Shop	Dog Run	Construction & Landscaping	Convenience Store	Cosmetics Shop	Cupcake Shop	Deli / Bodega	Department Store
4 Don Mills North	Gym / Fitness Center	Caribbean Restaurant	Café	Baseball Field	Japanese Restaurant	Women's Store	Electronics Store	Cosmetics Shop	Cupcake Shop	Deli / Bodega

Run k-means to cluster the neighborhood into 5 clusters and use the folium map to visualize the clusters:



Results

Let's look at those 5 clusters individually:

Cluster 1:

Borough	Clusters	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	North York	0	Golf Course	Athletics & Sports	Pool	Mediterranean Restaurant	Dog Run	Women's Store	Empanada Restaurant	Convenience Store	Cosmetics Shop
1	North York	0	Clothing Store	Coffee Shop	Fast Food Restaurant	Restaurant	Women's Store	Bakery	Gift Shop	Department Store	Cosmetics Shop
2	North York	0	Chinese Restaurant	Café	Bank	Japanese Restaurant	Women's Store	Event Space	Cosmetics Shop	Deli / Bodega	Department Store
5	North York	0	Ramen Restaurant	Coffee Shop	Sandwich Place	Shopping Mall	Café	Vietnamese Restaurant	Pharmacy	Bubble Tea Shop	Plaza
7	North York	0	Coffee Shop	Discount Store	Grocery Store	Pizza Place	Butcher	Pharmacy	Frozen Yogurt Shop	Diner	Golf Course
8	North York	0	Park	Food & Drink Shop	Fast Food Restaurant	Women's Store	Empanada Restaurant	Convenience Store	Cosmetics Shop	Deli / Bodega	Department Store
9	North York	0	Gym / Fitness Center	Caribbean Restaurant	Café	Japanese Restaurant	Basketball Court	Women's Store	Event Space	Deli / Bodega	Department Store
10	North York	0	Gym	Asian Restaurant	Coffee Shop	Beer Store	Shopping Mall	Grocery Store	Fast Food Restaurant	Italian Restaurant	Japanese Restaurant
11	North York	0	Coffee Shop	Pharmacy	Bank	Pizza Place	Deli / Bodega	Diner	Bridal Shop	Restaurant	Sandwich Place
12	North York	0	Coffee Shop	Furniture / Home Store	Bar	Metro Station	Falafel Restaurant	Massage Studio	Women's Store	Electronics Store	Cosmetics Shop
13	North York	0	Airport	Park	Other Repair Shop	Women's Store	Event Space	Cosmetics Shop	Deli / Bodega	Department Store	Dim Sum Restaurant
14	North York	0	Grocery Store	Park	Hotel	Bank	Event Space	Convenience Store	Cosmetics Shop	Deli / Bodega	Department Store
15	North York	0	Korean Restaurant	Home Service	Food Truck	Baseball Field	Falafel Restaurant	Cosmetics Shop	Deli / Bodega	Department Store	Dim Sum Restaurant
16	North York	0	Coffee Shop	Athletics & Sports	Liquor Store	Grocery Store	General Entertainment	Convenience Store	Cosmetics Shop	Deli / Bodega	Department Store

Cluster 2:

Borough	Clusters	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
3	North York	1	Park	Women's Store	Comfort Food Restaurant	Convenience Store	Cosmetics Shop	Deli / Bodega	Department Store	Dim Sum Restaurant	Diner
6	North York	1	Park	Convenience Store	Bank	Women's Store	Event Space	Cosmetics Shop	Deli / Bodega	Department Store	Dim Sum Restaurant

Cluster 3:

Borough	Clusters	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	
4	North York	2	Piano Bar	Women's Store	Construction & Landscaping	Convenience Store	Cosmetics Shop	Deli / Bodega	Department Store	Dim Sum Restaurant	Diner	Discount Store

Cluster 4:

Borough	Clusters	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	
23	North York	3	Baseball Field	Women's Store	Falafel Restaurant	Convenience Store	Cosmetics Shop	Deli / Bodega	Department Store	Dim Sum Restaurant	Diner	Discount Store

Cluster 5:

Borough	Clusters	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	
22	North York	4	Pizza Place	Empanada Restaurant	Coffee Shop	Construction & Landscaping	Convenience Store	Cosmetics Shop	Deli / Bodega	Department Store	Dim Sum Restaurant	Diner

Discussion

In comparing of these 5 clusters, cluster 1 has more venues. This cluster has all kinds of venues such as bank, shopping mall, fitness, supermarket. Various restaurants are among those most common venues as well. It seems like a multicultural community and with mature community infrastructure and facilities, which also provide more business opportunity.

Conclusion

In this project, I explored the Toronto borough and further looked at North York neighborhoods with most common venues via Foursquare API. And then cluster this area into 5 clusters. The result indicates that cluster 1 is a mature multicultural community which is more active and vibrant. It also provides more opportunity if you want to open a new business.