

Coursera Capstone Project

IBM Data Science Certification

FINAL REPORT

Capstone Project -The Battle of Neighborhoods

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Introduction:

Toronto is the capital city of the Canadian province of Ontario. With a recorded population of 2,731,571 in 2016 it is the most populous city in Canada and the fourth most populous city in North America. Toronto is an international center of business, finance, arts, and culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world.

Plenty of entrepreneurs have made their fortunes in restaurant business. However, restaurants can be a tough business, a lack of demand causes many restaurants to close within the first year of opening. There are many different factors that can account for a restaurant's success such as location, competition, type and quality of the food especially in an area like Toronto, Canada. This is an important question that every business owner must face when choosing whether to open a restaurant or not, as well as location of the business.

Problem Statement:

Toronto is a city with a high population and population density, to demonstrate the process of picking a location for the restaurant, the project will focus on answering the following question:

What type of restaurant can we open in a city like Toronto, ? For example if we want to open an international restaurant with a mixed of African, Asian and European food, we will have to choose a place where the population is very diverse and open mind.

What areas are the best options to open that type of restaurant? The location and competition are both determined by where the restaurant is opened.

How many "similar" restaurants are available in that area?

Is the area safe to open a restaurant? Costumer want a safe environment while enjoying their food.

How restaurants are doing in that particular location, is the demand very high? Are others restaurant doing well. How many restaurants fail within one year and close their business? Knowing the failure rate of restaurants will be very helpful for the business. What type of feedback costumers are giving? Whatever we do, be clear about your concept, is very important, in any major city, Toronto included, people are looking for specialty offerings, the best of the best in the food. What people are looking for when they eat outside for example and things they don't like to see in a restaurant can help for choosing a good concept for a restaurant and make some innovations to attract more costumers.

Data Collection

To consider the above problem the data is collected as following:

- I found the List of areas of Toronto with its boroughs and postcodes from Wikipedia.
-
- I used Foursquare API to get the most common venues of given Borough of Toronto.
- You will use the k -means clustering algorithm to complete this task. Finally, you will use the Folium library to visualize the neighborhoods in Toronto and their emerging clusters. .

Data Preprocessing

First I loaded and explored the data from Wikipedia.

Postal Code	Borough	Neighbourhood	
0	M1A	Not assigned	Not assigned
1	M2A	Not assigned	Not assigned
2	M3A	North York	Parkwoods
3	M4A	North York	Victoria Village
4	M5A	Downtown Toronto	Regent Park, Harbourfront
5	M6A	North York	Lawrence Manor, Lawrence Heights
6	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
7	M8A	Not assigned	Not assigned
8	M9A	Etobicoke	Islington Avenue, Humber Valley Village
9	M1B	Scarborough	Malvern, Rouge

This is an unclean data from Wikipedia.

Now I cleaned the data by removing the Not assigned cell for the each Neighborhood, and If a cell has a borough but a Not assigned neighborhood, then the neighborhood will be the same as the borough.

I corrected the name of column.

I removed the column we don't need for this work and grouped Neighborhoods with the same Postal code

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

Let's get the latitude and the longitude coordinates of each neighborhood.

Borough	Neighborhood	Latitude	Longitude	
0	Scarborough	Malvern, Rouge	43.806686	-79.194353
1	Scarborough	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497
2	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711
3	Scarborough	Woburn	43.770992	-79.216917
4	Scarborough	Cedarbrae	43.773136	-79.239476
5	Scarborough	Scarborough Village	43.744734	-79.239476
6	Scarborough	Kennedy Park, Ionview, East Birchmount Park	43.727929	-79.262029
7	Scarborough	Golden Mile, Clairlea, Oakridge	43.711112	-79.284577
8	Scarborough	Cliffside, Cliffcrest, Scarborough Village West	43.716316	-79.239476
9	Scarborough	Birch Cliff, Cliffside West	43.692657	-79.264848
10	Scarborough	Dorset Park, Wexford Heights, Scarborough Town...	43.757410	-79.273304

I utilized the Foursquare API to explore the boroughs and segment them. I designed the limit as 2000 venues and the radius 500 for each borough from their given latitude and longitude information. Here is a head of the list Venues name, category, latitude and longitude information from Foursquare API.

LIMIT = 2000 # limit of number of venues returned by Foursquare API

radius = 500 # define radius

This for the first Location

```
[{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
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    'location': {'lat': 43.65323167517444,
      'lng': -79.38529600606677,
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```

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        'lng': -79.38529600606677}],
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        'shortName': 'Neighborhood',
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        'suffix': '.png' },
        'primary': True } ]],
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        'items': [{ 'summary': 'This spot is popular',
            'type': 'general',
            'reasonName': 'globalInteractionReason' } ] },
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            'lng': -79.38351631164551,
            'labeledLatLngs': [{ 'label': 'display',
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                'lng': -79.38351631164551 } ] },
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            'cc': 'CA',
            'city': 'Toronto',
            'state': 'ON',
            'country': 'Canada',
            'formattedAddress': ['100 Queen St W (at Bay St)',
                'Toronto ON M5H 2N1',
                'Canada' ] },
            'categories': [{ 'id': '4bf58dd8d48988d164941735',
                'name': 'Plaza',
                'pluralName': 'Plazas',
                'shortName': 'Plaza',
                'icon': { 'prefix':
'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/plaza_',
                'suffix': '.png' },
                'primary': True } ] ],
            'photos': { 'count': 0, 'groups': [] },
            'referralId': 'e-0-4ad4c05ef964a520a6f620e3-1' },
            { 'reasons': { 'count': 0,
                'items': [{ 'summary': 'This spot is popular',
                    'type': 'general',
                    'reasonName': 'globalInteractionReason' } ] },

```

I repeat the process for all location and venue count of each locations etc. are:

Finally by using the Foursquare API in conjunction with the created datasets, a table of most common visited venues in London neighborhoods is generated.

---Agincourt----

	venue	freq
0	Lounge	0.25
1	Skating Rink	0.25
2	Latin American Restaurant	0.25
3	Breakfast Spot	0.25
4	Yoga Studio	0.00

----Alderwood, Long Branch----

	venue	freq
0	Pizza Place	0.33
1	Gym	0.17
2	Sandwich Place	0.17
3	Coffee Shop	0.17
4	Pub	0.17

----Bathurst Manor, Wilson Heights, Downsview North----

	venue	freq
0	Bank	0.09
1	Coffee Shop	0.09
2	Pizza Place	0.04
3	Frozen Yogurt Shop	0.04
4	Supermarket	0.04

----Bayview Village----

	venue	freq
0	Café	0.25
1	Japanese Restaurant	0.25
2	Bank	0.25
3	Chinese Restaurant	0.25
4	Movie Theater	0.00

----Bedford Park, Lawrence Manor East----

	venue	freq
0	Coffee Shop	0.09
1	Italian Restaurant	0.09
2	Restaurant	0.09
3	Thai Restaurant	0.09
4	Sandwich Place	0.09

----Berczy Park----

	venue	freq
0	Coffee Shop	0.08
1	Restaurant	0.03
2	Café	0.03
3	Seafood Restaurant	0.03
4	Cheese Shop	0.03

----Birch Cliff, Cliffside West----

	venue	freq
0	College Stadium	0.25
1	General Entertainment	0.25
2	Skating Rink	0.25
3	Café	0.25
4	Park	0.00

----Brockton, Parkdale Village, Exhibition Place----

	venue	freq
0	Café	0.12
1	Performing Arts Venue	0.08
2	Coffee Shop	0.08
3	Breakfast Spot	0.08
4	Bakery	0.08

----Business reply mail Processing Centre, South Central Letter Processing Plant
Toronto----

	venue	freq
0	Light Rail Station	0.11
1	Comic Shop	0.06
2	Recording Studio	0.06
3	Fast Food Restaurant	0.06
4	Skate Park	0.06

----CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay,
South Niagara, Island airport----

	venue	freq
0	Airport Service	0.18
1	Airport Lounge	0.12
2	Boutique	0.06
3	Harbor / Marina	0.06
4	Coffee Shop	0.06

----Caledonia-Fairbanks----

	venue	freq
0	Park	0.50
1	Women's Store	0.25
2	Pool	0.25
3	Metro Station	0.00
4	Modern European Restaurant	0.00

----Canada Post Gateway Processing Centre----

	venue	freq
0	Coffee Shop	0.15
1	Hotel	0.15
2	Burrito Place	0.08
3	Intersection	0.08
4	Mediterranean Restaurant	0.08

Machine Learning

We have some common venue categories in boroughs. In this reason I used unsupervised learning K-means algorithm to cluster the boroughs. K-Means algorithm is one of the most common cluster method of unsupervised learning.

First, I will run K-Means to cluster the boroughs into 5 clusters because when I analyze the K-Means with elbow method it ensured me the 5 degree for optimum k of the K-Means.

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
89	Etobicoke	0.0	Pizza Place	Coffee Shop	Sandwich Place	Pub	Gym	Airport Food Court	Event Space
96	North York	0.0	Pizza Place	Women's Store	Distribution Center	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant
99	Etobicoke	0.0	Pizza Place	Discount Store	Coffee Shop	Middle Eastern Restaurant	Intersection	Sandwich Place	Chinese Restaurant
100	Etobicoke	0.0	Bus Line	Pizza Place	Sandwich Place	Women's Store	Discount Store	Department Store	Dessert Shop

Cluster 2

	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	
1	Scarborough	1.0	Bar	Women's Store	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	D
2	Scarborough	1.0	Electronics Store	Rental Car Location	Breakfast Spot	Medical Center	Bank	Intersection	M
3	Scarborough	1.0	Coffee Shop	Pharmacy	Korean Restaurant	Women's Store	Distribution Center	Department Store	D
4	Scarborough	1.0	Lounge	Gas Station	Bakery	Athletics & Sports	Bank	Caribbean Restaurant	T
5	Scarborough	1.0	Playground	Women's Store	Distribution Center	Deli / Bodega	Department Store	Dessert Shop	D
6	Scarborough	1.0	Bus Station	Chinese Restaurant	Department Store	Coffee Shop	Hobby Shop	Dessert Shop	D
7	Scarborough	1.0	Bus Line	Bakery	Ice Cream Shop	Metro Station	Park	Bus Station	I
8	Scarborough	1.0	Motel	American	Women's Store	Dance Studio	Department	Dessert	D

	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	
				Restaurant			Store	Shop	R
9	Scarborough	1.0	General Entertainment	Skating Rink	College Stadium	Café	Distribution Center	Department Store	D
10	Scarborough	1.0	Indian Restaurant	Vietnamese Restaurant	Pet Store	Chinese Restaurant	Dumpling Restaurant	Eastern European Restaurant	D
11	Scarborough	1.0	Sandwich Place	Breakfast Spot	Smoke Shop	Bakery	Middle Eastern Restaurant	Auto Garage	V R
12	Scarborough	1.0	Lounge	Skating Rink	Breakfast Spot	Latin American Restaurant	Eastern European Restaurant	Dumpling Restaurant	D
13	Scarborough	1.0	Pharmacy	Pizza Place	Fast Food Restaurant	Gas Station	Intersection	Italian Restaurant	F C J
15	Scarborough	1.0	Coffee Shop	Chinese Restaurant	Sandwich Place	Electronics Store	Bank	Grocery Store	P
17	North York	1.0	Athletics & Sports	Golf Course	Mediterranean Restaurant	Dog Run	Pool	Drugstore	D
18	North York	1.0	Clothing Store	Coffee Shop	Fast Food Restaurant	Restaurant	Japanese Restaurant	Cosmetics Shop	J
19	North York	1.0	Chinese Restaurant	Café	Bank	Japanese Restaurant	Department Store	Dim Sum Restaurant	D
22	North York	1.0	Ramen Restaurant	Pizza Place	Coffee Shop	Sandwich Place	Café	Sushi Restaurant	R
24	North York	1.0	Coffee Shop	Bank	Pharmacy	Pizza Place	Butcher	Grocery Store	A
25	North York	1.0	Construction & Landscaping	Park	Food & Drink Shop	Women's Store	Department Store	Dessert Shop	D R
26	North York	1.0	Gym	Restaurant	Coffee Shop	Clothing Store	Japanese Restaurant	Beer Store	A
27	North York	1.0	Gym	Restaurant	Coffee Shop	Clothing Store	Japanese Restaurant	Beer Store	A
28	North York	1.0	Bank	Coffee Shop	Park	Sushi Restaurant	Shopping Mall	Sandwich Place	B
29	North York	1.0	Miscellaneous Shop	Coffee Shop	Metro Station	Massage Studio	Caribbean Restaurant	Bar	W S
30	North York	1.0	Park	Grocery Store	Gym / Fitness Center	Athletics & Sports	Shopping Mall	Discount Store	B S
31	North York	1.0	Park	Grocery Store	Gym / Fitness Center	Athletics & Sports	Shopping Mall	Discount Store	B S
32	North York	1.0	Park	Grocery	Gym / Fitness	Athletics &	Shopping	Discount	B

	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	
				Store	Center	Sports	Mall	Store	S
33	North York	1.0	Park	Grocery Store	Gym / Fitness Center	Athletics & Sports	Shopping Mall	Discount Store	B S
34	North York	1.0	Coffee Shop	Pizza Place	Hockey Arena	Portuguese Restaurant	French Restaurant	Drugstore	D
35	East York	1.0	Pizza Place	Gym / Fitness Center	Bank	Athletics & Sports	Intersection	Gastropub	P
36	East York	1.0	Beer Store	Park	Skating Rink	Spa	Athletics & Sports	Curling Ice	D C
37	East Toronto	1.0	Trail	Health Food Store	Pub	Distribution Center	Deli / Bodega	Department Store	D
38	East York	1.0	Coffee Shop	Sporting Goods Shop	Bank	Burger Joint	Furniture / Home Store	Department Store	S
39	East York	1.0	Indian Restaurant	Yoga Studio	Sandwich Place	Supermarket	Restaurant	Fast Food Restaurant	B
41	East Toronto	1.0	Greek Restaurant	Coffee Shop	Italian Restaurant	Furniture / Home Store	Ice Cream Shop	Restaurant	C S
42	East Toronto	1.0	Sandwich Place	Pizza Place	Park	Pub	Brewery	Burrito Place	It R
43	East Toronto	1.0	Café	Coffee Shop	American Restaurant	Bakery	Brewery	Gastropub	G F C
44	Central Toronto	1.0	Park	Bus Line	Swim School	Dim Sum Restaurant	Discount Store	Department Store	D
45	Central Toronto	1.0	Gym / Fitness Center	Breakfast Spot	Hotel	Food & Drink Shop	Department Store	Dance Studio	P
46	Central Toronto	1.0	Clothing Store	Coffee Shop	Yoga Studio	Salon / Barbershop	Mexican Restaurant	Park	D
47	Central Toronto	1.0	Pizza Place	Dessert Shop	Sandwich Place	Coffee Shop	Sushi Restaurant	Café	G
48	Central Toronto	1.0	Trail	Summer Camp	Playground	Restaurant	Diner	Dance Studio	D B
49	Central Toronto	1.0	Coffee Shop	Pub	Pizza Place	American Restaurant	Sushi Restaurant	Bank	F C Jo
51	Downtown Toronto	1.0	Coffee Shop	Restaurant	Bakery	Italian Restaurant	Café	Pizza Place	P
52	Downtown Toronto	1.0	Coffee Shop	Japanese Restaurant	Gay Bar	Sushi Restaurant	Restaurant	Yoga Studio	C
53	Downtown Toronto	1.0	Coffee Shop	Bakery	Pub	Café	Park	Restaurant	B S

	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	
54	Downtown Toronto	1.0	Clothing Store	Coffee Shop	Café	Japanese Restaurant	Cosmetics Shop	Bubble Tea Shop	P
55	Downtown Toronto	1.0	Café	Coffee Shop	Restaurant	Clothing Store	American Restaurant	Cosmetics Shop	C
56	Downtown Toronto	1.0	Coffee Shop	Seafood Restaurant	Farmers Market	Beer Bar	Bakery	Café	C
57	Downtown Toronto	1.0	Coffee Shop	Sandwich Place	Café	Italian Restaurant	Department Store	Japanese Restaurant	B
58	Downtown Toronto	1.0	Coffee Shop	Café	Restaurant	Hotel	Gym	Clothing Store	T R
59	Downtown Toronto	1.0	Coffee Shop	Aquarium	Café	Hotel	Fried Chicken Joint	Scenic Lookout	It R
60	Downtown Toronto	1.0	Coffee Shop	Hotel	Café	Restaurant	Seafood Restaurant	Salad Place	Ja R
61	Downtown Toronto	1.0	Coffee Shop	Restaurant	Café	Hotel	Gym	American Restaurant	S R
62	North York	1.0	Thai Restaurant	Coffee Shop	Restaurant	Italian Restaurant	Sandwich Place	Pharmacy	P
64	Central Toronto	1.0	Park	Jewelry Store	Sushi Restaurant	Trail	Drugstore	Donut Shop	D R
65	Central Toronto	1.0	Sandwich Place	Café	Coffee Shop	Pizza Place	BBQ Joint	Donut Shop	B
66	Downtown Toronto	1.0	Café	Restaurant	Bar	Japanese Restaurant	Bookstore	Sandwich Place	B
67	Downtown Toronto	1.0	Café	Coffee Shop	Vietnamese Restaurant	Vegetarian / Vegan Restaurant	Mexican Restaurant	Bakery	G
68	Downtown Toronto	1.0	Airport Service	Airport Lounge	Coffee Shop	Harbor / Marina	Plane	Rental Car Location	S G
69	Downtown Toronto	1.0	Coffee Shop	Café	Japanese Restaurant	Italian Restaurant	Pub	Hotel	G
70	Downtown Toronto	1.0	Coffee Shop	Café	Hotel	Gym	Japanese Restaurant	Restaurant	S R
71	North York	1.0	Clothing Store	Furniture / Home Store	Coffee Shop	Boutique	Event Space	Vietnamese Restaurant	A S
72	North York	1.0	Park	Pub	Metro Station	Japanese Restaurant	Donut Shop	Doner Restaurant	D
73	York	1.0	Trail	Field	Tennis Court	Hockey Arena	Distribution Center	Department Store	D
75	Downtown	1.0	Grocery Store	Café	Park	Restaurant	Italian	Baby Store	C

	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	
	Toronto						Restaurant		
76	West Toronto	1.0	Pharmacy	Bakery	Gym / Fitness Center	Art Gallery	Middle Eastern Restaurant	Music Venue	P
77	West Toronto	1.0	Bar	Coffee Shop	Asian Restaurant	Restaurant	Vietnamese Restaurant	Men's Store	C
78	West Toronto	1.0	Café	Bakery	Breakfast Spot	Performing Arts Venue	Coffee Shop	Gym / Fitness Center	G
79	North York	1.0	Construction & Landscaping	Park	Bakery	Basketball Court	Doner Restaurant	Dim Sum Restaurant	D
80	York	1.0	Bar	Sandwich Place	Discount Store	Convenience Store	Women's Store	Dessert Shop	D R
81	York	1.0	Grocery Store	Bus Line	Pizza Place	Convenience Store	Discount Store	Department Store	D
82	West Toronto	1.0	Mexican Restaurant	Thai Restaurant	Café	Bar	Bakery	Cajun / Creole Restaurant	F C J
83	West Toronto	1.0	Gift Shop	Breakfast Spot	Bookstore	Movie Theater	Restaurant	Eastern European Restaurant	It R
84	West Toronto	1.0	Coffee Shop	Café	Pizza Place	Pub	Sushi Restaurant	Italian Restaurant	Y
85	Downtown Toronto	1.0	Coffee Shop	Yoga Studio	College Cafeteria	Beer Bar	Smoothie Shop	Sandwich Place	C
86	Mississauga	1.0	Coffee Shop	Hotel	Sandwich Place	Burrito Place	Gym	Fried Chicken Joint	M E R
87	East Toronto	1.0	Light Rail Station	Gym / Fitness Center	Auto Workshop	Brewery	Spa	Farmers Market	F R
88	Etobicoke	1.0	Fried Chicken Joint	Pizza Place	Café	Liquor Store	Fast Food Restaurant	Bakery	A R
90	Etobicoke	1.0	Park	Smoke Shop	River	College Gym	Dance Studio	Dumpling Restaurant	C C
92	Etobicoke	1.0	Kids Store	Sandwich Place	Bakery	Burger Joint	Tanning Salon	Discount Store	C S
95	Etobicoke	1.0	Liquor Store	Coffee Shop	Pet Store	Pharmacy	Pizza Place	Beer Store	C
101	Etobicoke	1.0	Grocery Store	Sandwich Place	Fried Chicken Joint	Beer Store	Video Store	Pharmacy	P
102	Etobicoke	1.0	Bar	Rental Car	Drugstore	Garden	Women's	Department	D

	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	
				Location		Center	Store	Store	

Cluster 3

	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
14	Scarborough	2.0	Park	Playground	Women's Store	Distribution Center	Deli / Bodega	Department Store	Dessert Shop
21	North York	2.0	Park	Women's Store	Distribution Center	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant
23	North York	2.0	Park	Convenience Store	Women's Store	Distribution Center	Department Store	Dessert Shop	Dim Sum Restaurant
40	East York	2.0	Park	Convenience Store	Intersection	Women's Store	Dessert Shop	Dim Sum Restaurant	Diner
50	Downtown Toronto	2.0	Park	Playground	Trail	Drugstore	Donut Shop	Dumpling Restaurant	Doner Restaurant
74	York	2.0	Park	Women's Store	Pool	Distribution Center	Deli / Bodega	Department Store	Dessert Shop
98	York	2.0	Park	Women's Store	Distribution Center	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant

Cluster 4

	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
0	Scarborough	3.0	Fast Food Restaurant	Women's Store	Dog Run	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store

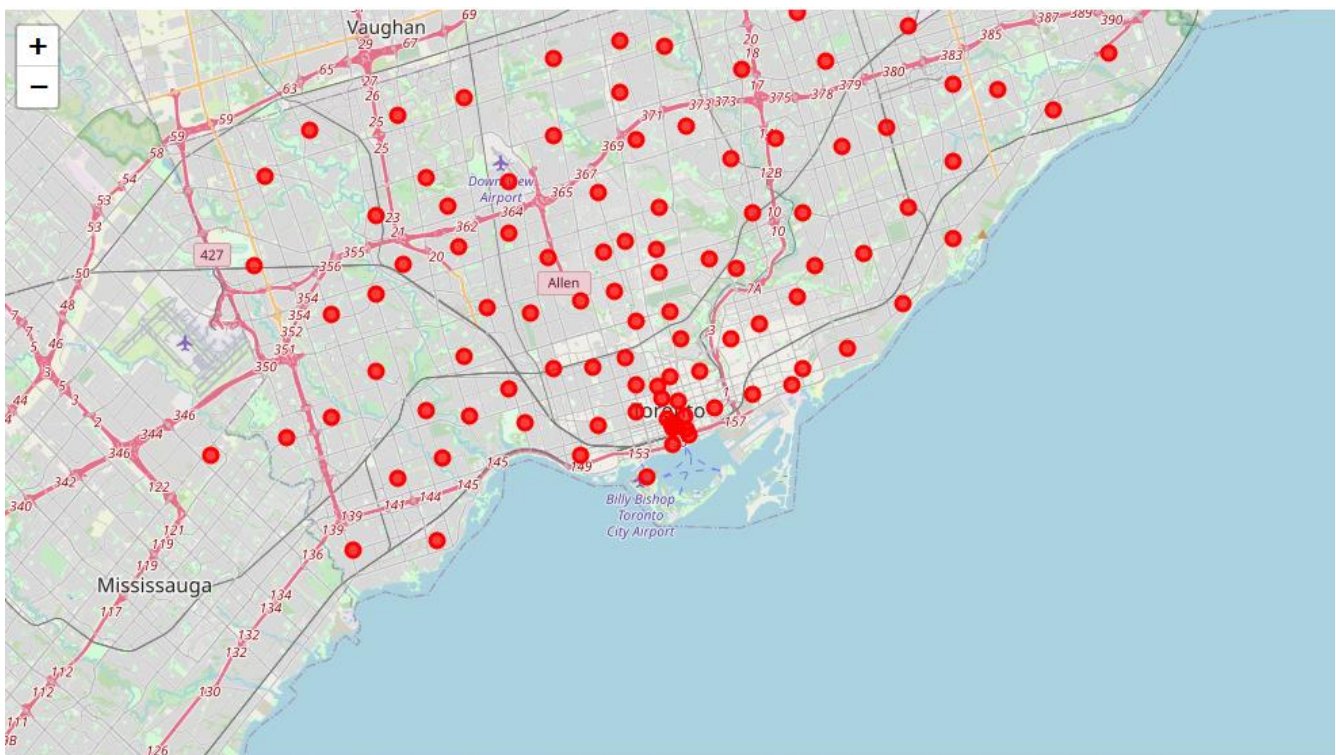
Cluster 5

	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
63	Central Toronto	4.0	Garden	Home Service	Women's Store	Curling Ice	Deli / Bodega	Department Store	Dessert Shop	Dim Sum Restaurant
91	Etobicoke	4.0	Baseball Field	Home Service	Dog Run	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center

	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
97	North York	4.0	Baseball Field	Doner Restaurant	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog R

Visualization

First I visualize the cluster and you can see the clustered map below:



Result

I came to the result that opening an international restaurant in the Downtown Toronto, Scarborough, West Toronto near to Hotels and Social venues nearby is better and also you on these places we have more diverse restaurants like Chinese, Japanese, Mexican restaurants.

This analysis shows that we must consider other criteria such as stores, sports facilities etc than just number of restaurant.

Also, I was able to discover that there are not a lot of competitor on this business area, which is very good.

Conclusion

This project can be reused for other cities, just think about changing clustering size to adapt to your city.

Also, I have created/modify a huge quantity of function in order to adapt.

It's very far from being perfect, a lot of work can be done, other source of data can be found, but in the end the result seems to correlate with the real world, when we know the city, the area predicted seems correct.

References

1. https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
2. http://cocl.us/Geospatial_data