

# Best location to open the restaurant In Toronto, Canada

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For graduate the Professional certificate in data science  
From IBM

## **Introduction and Business Problem**

From the question of "If we want to open the restaurant in Toronto, Canada. Where should we open?". Toronto is the biggest city and have most population in the Canada country. Then the restaurant or food is important to keep the city moving. From many factors that affect the revenue of restaurant more than a test of food, restaurant decorate atmosphere and how clean of restaurant. It is a "Location", yes! location is one of many reasons to concern about how we can open the restaurant?

### **From the problem of location to open the restaurant,**

- the density of another restaurants in that location is important to make a decision to open the restaurant.
- the atmosphere around that place should be nice and attracted the people such as park or shopping store. Because when they done from activity, they might be visiting our restaurant.

Additional: Method and analytic approach should be built under the problem factors that shown in previous lines. The best way to visualize all data is show on the mapping form. All data will be import from Foursquare.

**Data section:**

The data should have including:

Nearby restaurant and attraction place (with category) around the place.

Then the density of restaurant will be show with the nearby place data.

All of data should be place on the Foursquare system and public data on Wikipedia website.

## Methodology section:

The Methodology should go in the same way with analytic approach and data requirement.

First step:

extract the table from Wikipedia by Beautiful Soup

	Postal Code	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park, Harbourfront
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
...	...	...	...
98	M8X	Etobicoke	The Kingsway, Montgomery Road, Old Mill North
99	M4Y	Downtown Toronto	Church and Wellesley
100	M7Y	East Toronto	Business reply mail Processing Centre
101	M8Y	Etobicoke	Old Mill South, King's Mill Park, Sunnylea, Hu...
102	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...

## Second step:

extract the .csv file and use merge DataFrame to combined between table from wikipedia and location data from .csv file

```
import geocoder
from geopy.geocoders import Nominatim
```

Read csv file and use astype change the type of value in both columns become the same type.

make sure the value in two first columns is same by .str.rstrip, this function will delete all 'whitespace' in string.

```
lat_lng = pd.read_csv('Geospatial_Coordinates.csv')
df['Postal Code'] = df['Postal Code'].astype(str)
lat_lng['Postal Code'] = lat_lng['Postal Code'].astype(str)

df['Postal Code'] = df['Postal Code'].str.rstrip()
df['Borough'] = df['Borough'].str.rstrip()
df['Neighborhood'] = df['Neighborhood'].str.rstrip()
```

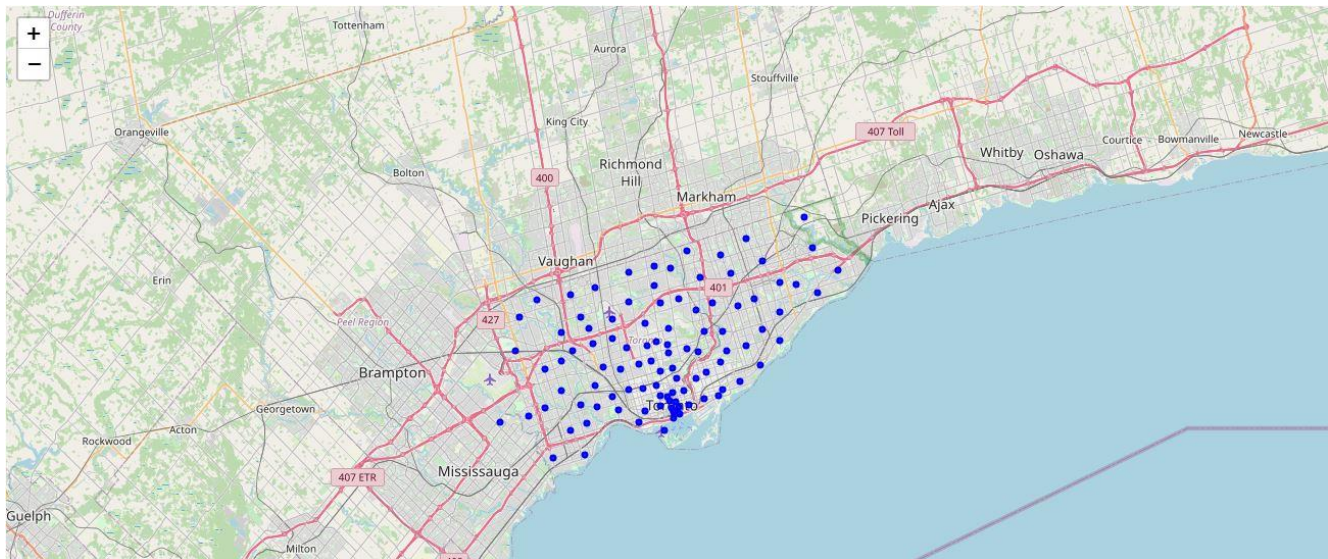
using pd.merge to combine two dataframe together

```
result = pd.merge(df, lat_lng, on='Postal Code', how='inner')
result
```

	Postal Code	Borough	Neighborhood	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	Regent Park, Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494
...	...	...	...	...	...
98	M8X	Etobicoke	The Kingsway, Montgomery Road, Old Mill North	43.653654	-79.506944
99	M4Y	Downtown Toronto	Church and Wellesley	43.665860	-79.383160
100	M7Y	East Toronto	Business reply mail Processing Centre	43.662744	-79.321558
101	M8Y	Etobicoke	Old Mill South, King's Mill Park, Sunnylea, Hu...	43.636258	-79.498509
102	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...	43.628841	-79.520999

Third step:

using folium try to publish first map from our data.



4th step:

Start using FourSquare for get a .json file and transfer it into DataFrame

```
print(toronto_venues.shape)
toronto_venues.head()
```

(2116, 7)

	Neighborhood	Neighborhood Latitude	Neighborhood 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	Variety Store	43.751974	-79.333114	Food & Drink Shop
2	Victoria Village	43.725882	-79.315572	Victoria Village Arena	43.723481	-79.315635	Hockey Arena
3	Victoria Village	43.725882	-79.315572	Tim Hortons	43.725517	-79.313103	Coffee Shop
4	Victoria Village	43.725882	-79.315572	Portugril	43.725819	-79.312785	Portuguese Restaurant

5th step:

using mean of frequency to analyze data per each neighborhood to get top 5 and top 10, and put all data into DataFrame.

```
----Agincourt----
      venue  freq
0      Lounge  0.2
1  Breakfast Spot  0.2
2  Latin American Restaurant  0.2
3    Clothing Store  0.2
4    Skating Rink  0.2
```

```
----Alderwood, Long Branch----
      venue  freq
0  Pizza Place  0.25
1  Coffee Shop  0.12
2      Gym  0.12
3  Skating Rink  0.12
4    Pharmacy  0.12
```

```
----Bathurst Manor, Wilson Heights, Downsview North----
      venue  freq
0  Coffee Shop  0.10
1      Bank  0.10
2    Pharmacy  0.05
3  Shopping Mall  0.05
4  Sandwich Place  0.05
```

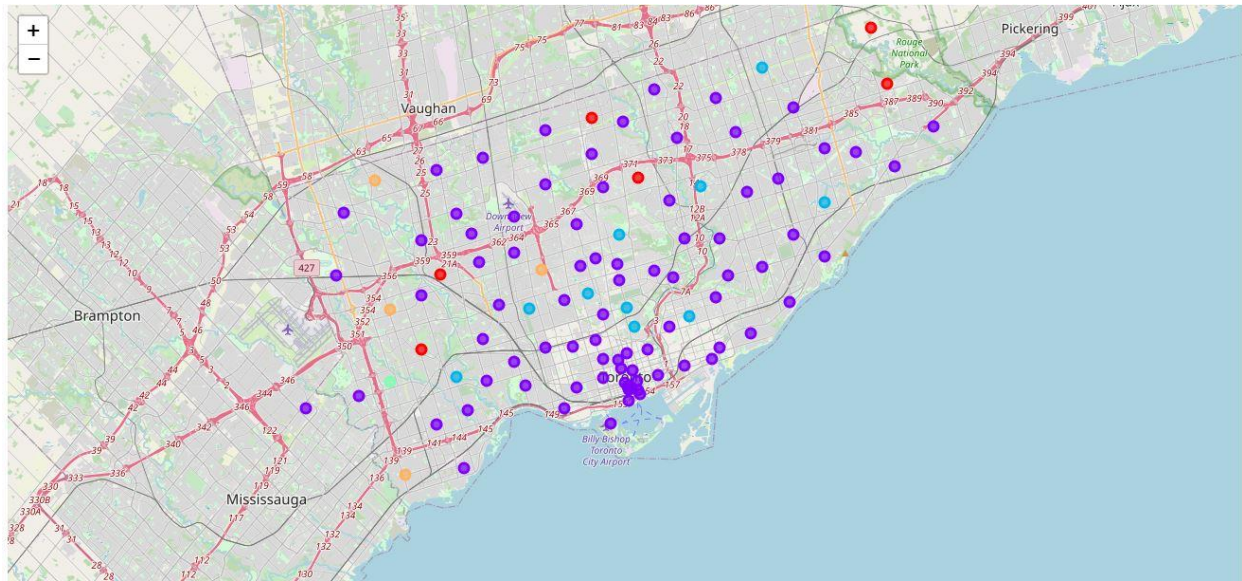
```
----Bayview Village----
      venue  freq
0      Café  0.25
1      Bank  0.25
2  Chinese Restaurant  0.25
3  Japanese Restaurant  0.25
4    Yoga Studio  0.00
```

	Neighborhood	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	Agincourt	Skating Rink	Latin American Restaurant	Lounge	Breakfast Spot	Clothing Store	Donut Shop	Diner	Discount Store	Distribution Center	Dog Run
1	Alderwood, Long Branch	Pizza Place	Gym	Skating Rink	Coffee Shop	Pub	Pharmacy	Sandwich Place	Women's Store	Discount Store	Department Store
2	Bathurst Manor, Wilson Heights, Downsview North	Bank	Coffee Shop	Pharmacy	Deli / Bodega	Supermarket	Ice Cream Shop	Sushi Restaurant	Middle Eastern Restaurant	Restaurant	Diner
3	Bayview Village	Café	Chinese Restaurant	Bank	Japanese Restaurant	Ethiopian Restaurant	Electronics Store	Eastern European Restaurant	Drugstore	Donut Shop	Dessert Shop
4	Bedford Park, Lawrence Manor East	Italian Restaurant	Sandwich Place	Restaurant	Coffee Shop	Thai Restaurant	Butcher	Café	Indian Restaurant	Sushi Restaurant	Pizza Place



6th step:

using k-means to cluster the data from nearby place in Toronto, Canada.



7th step:

let's see the detail insight per each cluster, see the next section for the result.



Results section:

from each cluster result will be shown below:

Cluster 0

	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
5	Etobicoke	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
6	Scarborough	0	Fast Food Restaurant	Department Store	Fabric Shop	Event Space	Ethiopian Restaurant	Electronics Store	Eastern European Restaurant	Drugstore	Donut Shop	Doner Restaurant
45	North York	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
52	North York	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
64	York	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
95	Scarborough	0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN

Cluster 1

	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	1	Hockey Arena	Intersection	Coffee Shop	Financial or Legal Service	French Restaurant	Portuguese Restaurant	Women's Store	Dim Sum Restaurant	Diner	Discount Store
2	Downtown Toronto	1	Coffee Shop	Bakery	Park	Breakfast Spot	Pub	Theater	Café	Health Food Store	Historic Site	Hotel
3	North York	1	Event Space	Gift Shop	Furniture / Home Store	Clothing Store	Coffee Shop	Miscellaneous Shop	Vietnamese Restaurant	Boutique	Accessories Store	Electronics Store
4	Downtown Toronto	1	Coffee Shop	Sushi Restaurant	Mexican Restaurant	Bar	Beer Bar	Sandwich Place	Burrito Place	Café	Park	College Auditorium
7	North York	1	Restaurant	Coffee Shop	Gym	Asian Restaurant	Japanese Restaurant	Beer Store	Gym / Fitness Center	Sporting Goods Shop	Sandwich Place	Dim Sum Restaurant
...	...	...	...	...	...	...	...	...	...	...	...	...
97	Downtown Toronto	1	Coffee Shop	Café	Restaurant	Hotel	Gym	Japanese Restaurant	Deli / Bodega	Salad Place	Steakhouse	Seafood Restaurant
99	Downtown Toronto	1	Japanese Restaurant	Coffee Shop	Sushi Restaurant	Restaurant	Pub	Hotel	Café	Yoga Studio	Men's Store	Gay Bar
100	East Toronto	1	Gym / Fitness Center	Pizza Place	Skate Park	Smoke Shop	Brewery	Spa	Farmers Market	Fast Food Restaurant	Burrito Place	Restaurant
101	Etobicoke	1	Baseball Field	Locksmith	Women's Store	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore
102	Etobicoke	1	Grocery Store	Convenience Store	Supplement Shop	Discount Store	Burrito Place	Burger Joint	Sandwich Place	Bakery	Hardware Store	Fast Food Restaurant

## 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	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	North York	2	Park	Food & Drink Shop	Dog Run	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Doner Restaurant	Falafel Restaurant
21	York	2	Park	Pool	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Deli / Bodega
32	Scarborough	2	Playground	Women's Store	Donut Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Drugstore
35	East York	2	Park	Coffee Shop	Convenience Store	Donut Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant
61	Central Toronto	2	Park	Bus Line	Swim School	Dog Run	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Doner Restaurant	Department Store
68	Central Toronto	2	Park	Trail	Sushi Restaurant	Jewelry Store	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant
83	Central Toronto	2	Park	Playground	Restaurant	Distribution Center	Department Store	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Doner Restaurant
85	Scarborough	2	Park	Playground	Doner Restaurant	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Donut Shop
91	Downtown Toronto	2	Park	Trail	Playground	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant
98	Etobicoke	2	Park	Pool	River	Electronics Store	Eastern European Restaurant	Drugstore	Donut Shop	Doner Restaurant	Deli / Bodega	Distribution Center

## 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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
11	Etobicoke	3	Golf Course	Women's Store	Donut Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Drugstore

## 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	9th Most Common Venue	10th Most Common Venue
10	North York	4	Pizza Place	Japanese Restaurant	Asian Restaurant	Pub	Women's Store	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run
50	North York	4	Pizza Place	Women's Store	Donut Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Drugstore
77	Etobicoke	4	Bus Line	Pizza Place	Sandwich Place	Mobile Phone Shop	Women's Store	Distribution Center	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store
93	Etobicoke	4	Pizza Place	Gym	Skating Rink	Coffee Shop	Pub	Pharmacy	Sandwich Place	Women's Store	Discount Store	Department Store

**Discussion section:**

from the result you can see each cluster, it has different detail insight the table such as

cluster 0 don't have enough data to prospect detail insight.

cluster 1 have a lot of restaurant and coffee shop (including bar and pub also).

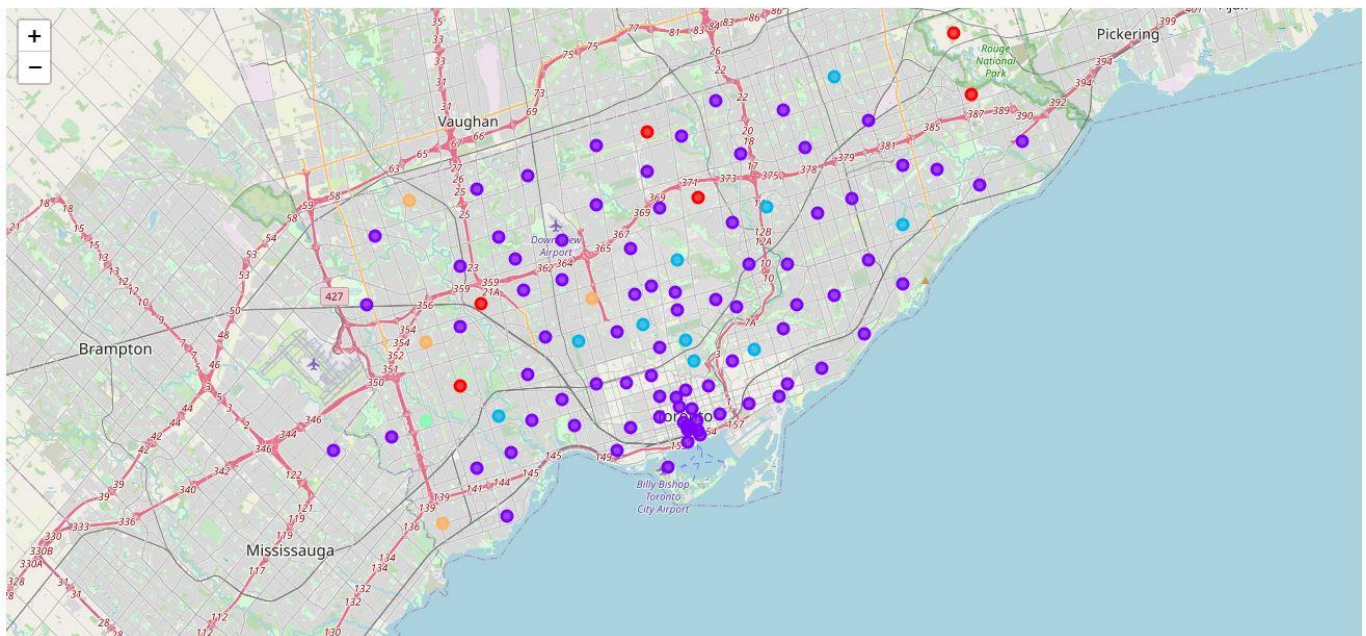
cluster 2 leader by park and follow by trail and bus line by order.

cluster 3 have a golf course and fashion store.

cluster 4 Pizza place is the most common, shopping store and transportation is coming up.

## Conclusion section:

From the result section, you can see the most interest place to open the restaurant is Cluster 2. Follow by the factor of problem in business which need a park or attraction place to invited the people to take a rest or do the activity around there.



Cluster 2 is the Blue-sky color dot that shown on the cluster map.