



Exploring Toronto's Neighbourhoods to open a new Indian Restaurant - **The Battle of Neighborhoods**

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Introduction

- ▶ Optimum location for new Restaurant business
- ▶ Business Problem :
 - ▶ Choice of first neighbourhood to start restaurant business.
 - ▶ Low competition
 - ▶ High demand
- ▶ Success Criteria :
 - ▶ Best neighbourhood which meets above criteria.



About Toronto

- ▶ Most populous city in the Canada
- ▶ It is diverse and is the financial capital of Canada
- ▶ It is multicultural
- ▶ Provides lot of business opportunities
- ▶ Business friendly environment
- ▶ Attracted many different players into the market
- ▶ Global hub of business and commerce.



Toronto's Business Environment

- ▶ Market is highly competitive
- ▶ Highly developed city so cost of doing business is also one of the highest
- ▶ New business venture or expansion needs to be analysed carefully
- ▶ One should strategically targeting the market in order to
 - ▶ This will help in reduction of risk.
 - ▶ The Return on Investment will be reasonable.



Factors to choose location for restaurant

- ▶ Toronto Population
- ▶ Toronto Demographics
- ▶ Are there any Farmers Markets, Wholesale markets etc nearby so that the ingredients can be purchased fresh to maintain quality and cost?
- ▶ Are there any venues like Gyms, Entertainment zones, Parks etc nearby where floating population is high etc.
- ▶ Who are the competitors in that location?
- ▶ Cuisine served / Menu of the competitors
- ▶ Segmentation of the Borough
- ▶ Untapped markets
- ▶ Saturated markets etc

The list can go on...



Data Description - 1

- ▶ Data 1 : Neighbourhood has a total of 10 boroughs and 103 neighbourhoods.
- ▶ Scraped the following Wikipedia page, “List of Postal code of Canada: M” in order to obtain the data about the Toronto & the Neighbourhoods in it

	PostalCode	Borough	Neighborhood
0	M5G	Downtown Toronto	Central Bay Street
1	M2H	North York	Hillcrest Village
2	M4B	East York	Parkview Hill, Woodbine Gardens
3	M1J	Scarborough	Scarborough Village
4	M4G	East York	Leaside
5	M4M	East Toronto	Studio District
6	M1R	Scarborough	Wexford, Maryvale
7	M9V	Etoibicoke	South Steeles, Silverstone, Humbergate, Jamest...
8	M9L	North York	Humber Summit
9	M5V	Downtown Toronto	CN Tower, King and Spadina, Railway Lands, Har...
10	M1B	Scarborough	Malvern, Rouge
11	M5A	Downtown Toronto	Regent Park, Harbourfront

Data Description - 2

- ▶ Data II : In order to get all the **geographical coordinates** of the neighborhoods, we will be using “https://cocl.us/Geospatial_data” csv file and merge it with previous neighbourhood data.

	Borough	Postalcode	Neighborhood	Latitude	Longitude
0	Central Toronto	M4N	Lawrence Park	43.728020	-79.388790
1	Central Toronto	M4P	Davisville North	43.712751	-79.390197
2	Central Toronto	M4R	North Toronto West	43.715383	-79.405678
3	Central Toronto	M4S	Davisville	43.704324	-79.388790
4	Central Toronto	M4T	Moore Park, Summerhill East	43.689574	-79.383160

```
print('The dataframe has {} boroughs and {} neighborhoods.'.format(
    len(toronto_DF['Borough'].unique()),
    toronto_DF.shape[0]
))
```

The dataframe has 11 boroughs and 103 neighborhoods.

Data Description - 3

► Data 3 : Data from Wikipedia pages as given below :

► “Demographics of Toronto”

https://en.m.wikipedia.org/wiki/Demographics_of_Toronto#Ethnic_diversity

	Riding	Population	Ethnic Origin #1	Ethnic Origin 1 in %	Ethnic Origin #2	Ethnic Origin 2 in %	Ethnic Origin #3	Ethnic Origin 3 in %	Ethnic Origin #4	Ethnic Origin 4 in %	Ethnic Origin #5	Ethnic Origin 5 in %	Ethnic Origin #6	Ethnic Origin 6 in %	Ethnic Origin #7	Ethnic Origin 7 in %	Eth Ori
0	Spadina-Fort York	114315	English	16.4	Chinese	16.0	Irish	14.6	Canadian	14.0	Scottish	13.2	French	7.70	German	7.6	N
1	Beaches-East York	108435	English	24.2	Irish	19.9	Canadian	19.7	Scottish	18.9	French	8.7	German	8.40	NaN	NaN	N
2	Davenport	107395	Portuguese	22.7	English	13.6	Canadian	12.8	Irish	11.5	Italian	11.1	Scottish	11.00	NaN	NaN	N
3	Parkdale-High Park	106445	English	22.3	Irish	20.0	Scottish	18.7	Canadian	16.1	German	9.8	French	8.88	Polish	8.5	N
4	Toronto-Danforth	105395	English	22.9	Irish	19.5	Scottish	18.7	Canadian	18.4	Chinese	13.8	French	8.86	German	8.8	Gr
6	Toronto-St. Paul's	104940	English	18.5	Canadian	16.1	Irish	15.2	Scottish	14.8	Polish	10.3	German	7.90	Russian	7.7	Ita
6	University-Rosedale	100520	English	20.6	Irish	16.6	Scottish	16.3	Canadian	15.2	Chinese	14.7	German	8.70	French	7.7	Ita
7	Toronto Centre	99590	English	15.7	Canadian	13.7	Irish	13.4	Scottish	12.6	Chinese	12.5	French	7.20	NaN	NaN	N



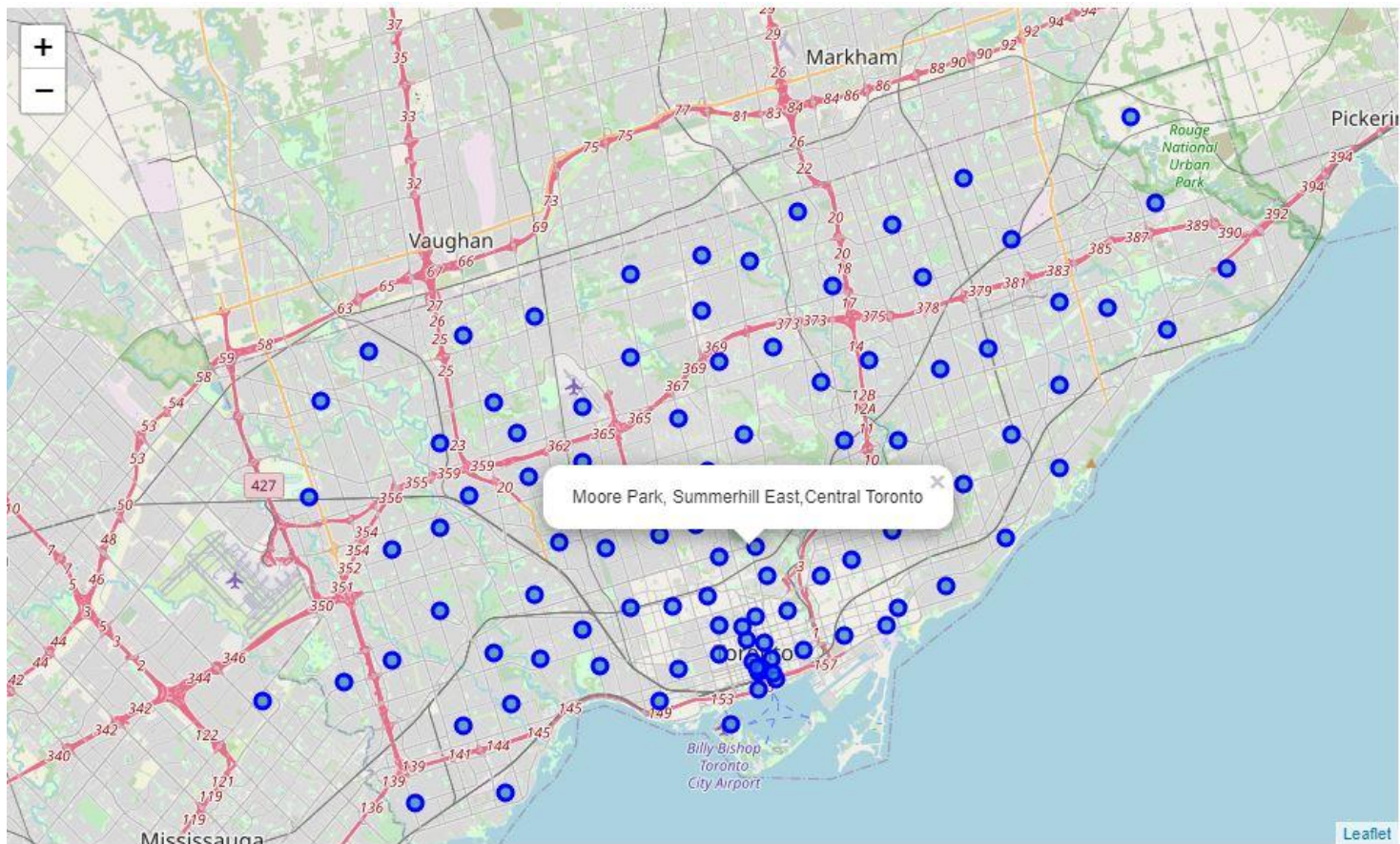
Data Description - 4

- Data from Foursquare API
(<https://developer.foursquare.com/docs>)

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Lawrence Park	43.728020	-79.388790	Lawrence Park Ravine	43.726963	-79.394382	Park
1	Lawrence Park	43.728020	-79.388790	Zodiac Swim School	43.728532	-79.382860	Swim School
2	Lawrence Park	43.728020	-79.388790	TTC Bus #162 - Lawrence-Donway	43.728026	-79.382805	Bus Line
3	Davisville North	43.712751	-79.390197	Homeway Restaurant & Brunch	43.712641	-79.391557	Breakfast Spot
4	Davisville North	43.712751	-79.390197	Summerhill Market North	43.715499	-79.392881	Food & Drink Shop
6	Davisville North	43.712751	-79.390197	Sherwood Park	43.716551	-79.387776	Park
6	Davisville North	43.712751	-79.390197	Winners	43.713236	-79.393873	Clothing Store
7	Davisville North	43.712751	-79.390197	Best Western Roehampton Hotel & Suites	43.708878	-79.390880	Hotel
8	Davisville North	43.712751	-79.390197	Subway	43.708378	-79.390473	Sandwich Place
9	Davisville North	43.712751	-79.390197	Gym	43.713126	-79.393537	Gym

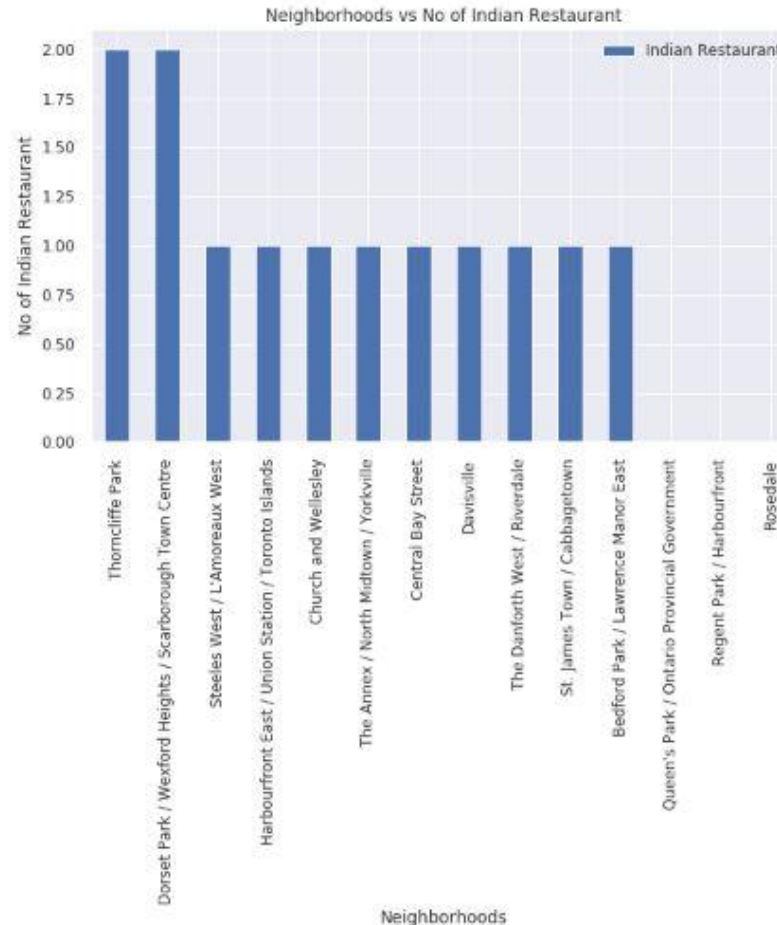
Exploratory Data Analysis -1

- **Create Map of Toronto and link data using Folium Library and Leaflet Map**



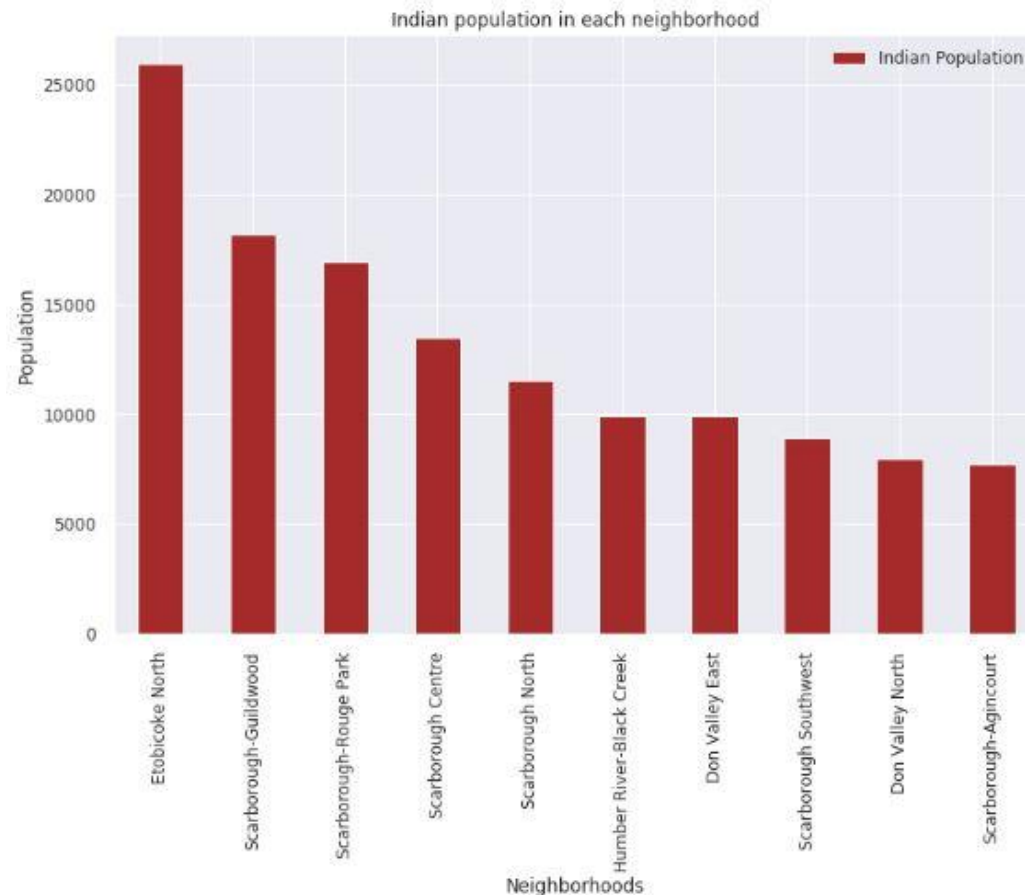
Exploratory Data Analysis -2

► Relationship between neighbourhood and Indian Restaurant



Exploratory Data Analysis -3

► Relationship between neighbourhood and Indian population



Exploratory Data Analysis -4

► Relationship between Indian population and Indian restaurant

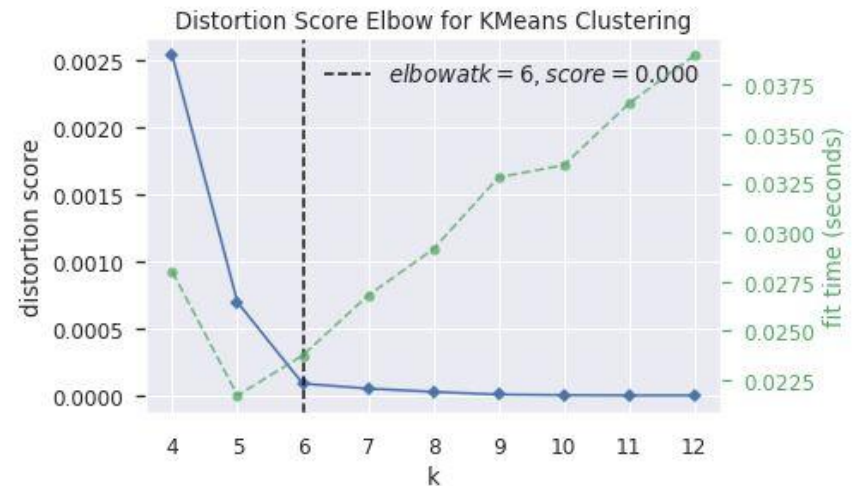
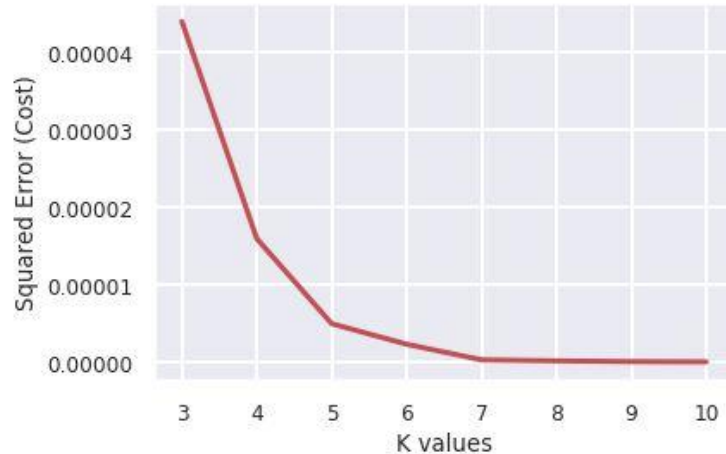
	Indian Population	Neighborhood	Indian Restaurant
0	7961.380	Henry Farm	0.0
1	8880.190	Oakridge	0.0
2	9910.700	Humberlea	0.0
3	8880.190	Cliffside	0.0
4	16941.315	Port Union	0.0

After performing the data cleaning & data analysis we can identify that their no big relationship established in terms of the Indian population & the popular Indian restaurants.



Predictive Modelling - 1

► Clustering Neighbourhoods of Toronto



Predictive Modelling - 2

► Examining the Clusters

Cluster 3 contains all the neighborhoods which is medium populated with Indian restaurants. It is shown in blue color in the map.

```
#Cluster 3  
toronto_merged.loc[toronto_merged['Cluster Labels'] == 3]
```

	Borough	Postal code	Neighborhood	Latitude	Longitude	Cluster Labels	Indian Restaurant
3	Central Toronto	M4S	Davisville	43.704324	-79.388790	3.0	0.027027
10	Downtown Toronto	M4X	St. James Town / Cabbagetown	43.667967	-79.367675	3.0	0.023256
11	Downtown Toronto	M4Y	Church and Wellesley	43.665860	-79.383160	3.0	0.013158
15	Downtown Toronto	M5G	Central Bay Street	43.657952	-79.387383	3.0	0.015625
28	East Toronto	M4K	The Danforth West / Riverdale	43.679557	-79.352188	3.0	0.023256

Result

- ▶ In those 11 boroughs we identified that only Central Toronto, Downtown Toronto, East Toronto, East York, North York & Scarborough boroughs have high amount of Indian restaurants with the help of **Violin plots** between no. of Indian restaurants in Borough of Toronto.
- ▶ In all the ridings, Scarborough-Guildwood, Scarborough-Rouge Park, Scarborough Centre, Scarborough North, Humber River-Black Creek, Don Valley East, Scarborough Southwest, Don Valley North & Scarborough-Agincourt are the densely populated with Indian crowd ridings.
- ▶ With the help of clusters examing & violin plots looks like Downtown Toronto, Central Toronto, East York are already densely populated with Indian restaurants. So it is better idea to leave those boroughs out and consider only Scarborough, East Toronto & North York for the new restaurant's location.
- ▶ After careful consideration it is a good idea to open a new Indian restaurant in Scarborough borough since it has high number of Indian population which gives a higher number of customers possibility and lower competition since very less Indian restaurants in the neighborhoods.



Discussion

- ▶ Scarborough borough will provide least competition
- ▶ Drawbacks of this analysis-
 - ▶ Clustering completely based only on data from Foursquare API
 - ▶ Census is not up-to date



Conclusion

- ▶ Business problem like how a real data scientists would do.
- ▶ Used many python libraries to fetch, manipulate & analyze as well as visualize data.
- ▶ Use of Foursquare API to explore the venues in neighbourhoods of Toronto,
- ▶ Data from Wikipedia which we scraped with help of Wikipedia python library and visualized using various plots present in seaborn & matplotlib.
- ▶ Applied machine learning techniques to predict the output given the data and used Folium to visualize it on a map

