Capstone Project – Explore Indian restaurants in Toronto

Introduction:

Toronto has an estimated population of just over 2.8 million in 2016, which makes it the 4th most populous city in North America and the most populous Great Lakes city. Toronto, which is located on Lake Ontario, is the most populous city in Canada and the provincial capital of Ontario.

City Size and Population Density

It is the most populous city in Canada and the largest urban and metro area, with a population density of 4,149.5 people per square kilometer (10,750/sq mi). The metro area of the city sprawls outward to a total surface area of 5,905.71 km2 (2,280.21 sq mi).

Toronto Demographics

According to the 2016 Census, the racial composition of Toronto was: White: 50.2% East Asian: 12.7% (10.8% Chinese, 1.4% Korean, 0.5% Japanese) South Asian: 12.3% Black: 8.5% Southeast Asian: 7.0% (5.1% Filipino) Latin American: 2.8% West Asian: 2.0% Arab: 1.1% Aborginal: 0.7% (0.5% First Nations, 0.2% Metis) Two or more races: 1.5% Other race: 1.3%

Given its diverse population, Toronto is home to many ethnic neighborhoods such as Little India, Greektown, Corso Italia, Chinatown and Little Jamaica.

Foreign-born people account for nearly half of the population of Toronto. This gives Toronto the second-highest percentage of foreign-born residents of all world cities after Miami. Unlike Miami, Toronto has no dominant culture or nationality, which also makes it one of the world's most diverse cities.

As of 2011 Toronto is the destination of over half of the immigrants coming from India to Canada, and India is the single largest source of immigrants in the Greater Toronto Area. As of 2016, there were 995,125 South Asian Canadians in the GTA.

With this various people in this city, people do have various cultural diversity and also the different type of food habit. People can fulfil their wishes of having their homely food as it has many restaurants over the city with different cuisines, such as Indian, Chinese etc.

In this capstone project we will explore the major part of the Toronto city with great Indian restaurants.

Business Problem:

This will be applicable for the entrepreneurs who would like to set up an Indian restaurant in the Toronto city. They need to consider many aspects before they go for their set up, such as getting the suitable location based on the other restaurants exist with the neighbourhoods and their ratings/likes. And also, they need to see the distribution of the Indian restaurants across the locality. Mainly the below questions from an entrepreneur point of view should be considered.

Questions to answer from datasets:

- What is best location in Toronto City for Indian Cuisine?
- Which areas have potential Indian Restaurant Market?
- Which all areas lack Indian Restaurants?
- Which is the best place to stay if I prefer Indian Cuisine?

Technical Dependencies for Analysis:

- We will import the required libraries for Python.
- Pandas and NumPy for handling data.
- Request module for using FourSquare API for getting the details about restaurants.
- geopy to get co-ordinates of City of Tornoto.
- folium to visualize the results on a map which will be easy for the entrepreneurs to see insights.

Data Sources:

To accomplish our task of exploring Indian restaurants in Toronto city, we need the datasets which covers the below:

1. Toronto City data that contains list Boroughs, Neighborhoods along with their latitude and longitude.
    - Data Source: https://en.wikipedia.org/wiki/ List_of_postal_codes_of_Canada:_M
    - Get the Latitude and Longitude Data from: http://cocl.us/Geospatial_data
    - This data set contains the required information of Canada. And we will use subset of this data set to explore various neighborhoods of Tornoto.

2. Indian restaurants in each neighborhood of Toronto city.
    - Data source: Foursquare API
    - Description: By using this API we will get all the venues in each neighborhood. We can filter these venues to get only Indian restaurants.

Approach of the Study:

- Collect the Toronto city data from https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
- Get the Latitude and Longitude Data from: http://cocl.us/Geospatial_data
- Filter the Data to populate only Toronto for which the analysis will be done
- Using FourSquare API we will find all venues for each neighborhood
- Filter out all venues that are Indian Restaurants
- Find ratings, tips and like count for each Indian Restaurants using FourSquare API.
- Using rating for each restaurant, we will sort that data.
- Visualize the Ranking of neighborhoods using folium library using python.

Data Exploration:

Toronto location data "https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M" has information related to Toronto Borough (East Toronto, Central Toronto, Downtown Toronto and West Toronto) set along with their 39 Neithborhoods. And the Longitude and Latitude information is available in another Data source http://cocl.us/Geospatial_data.

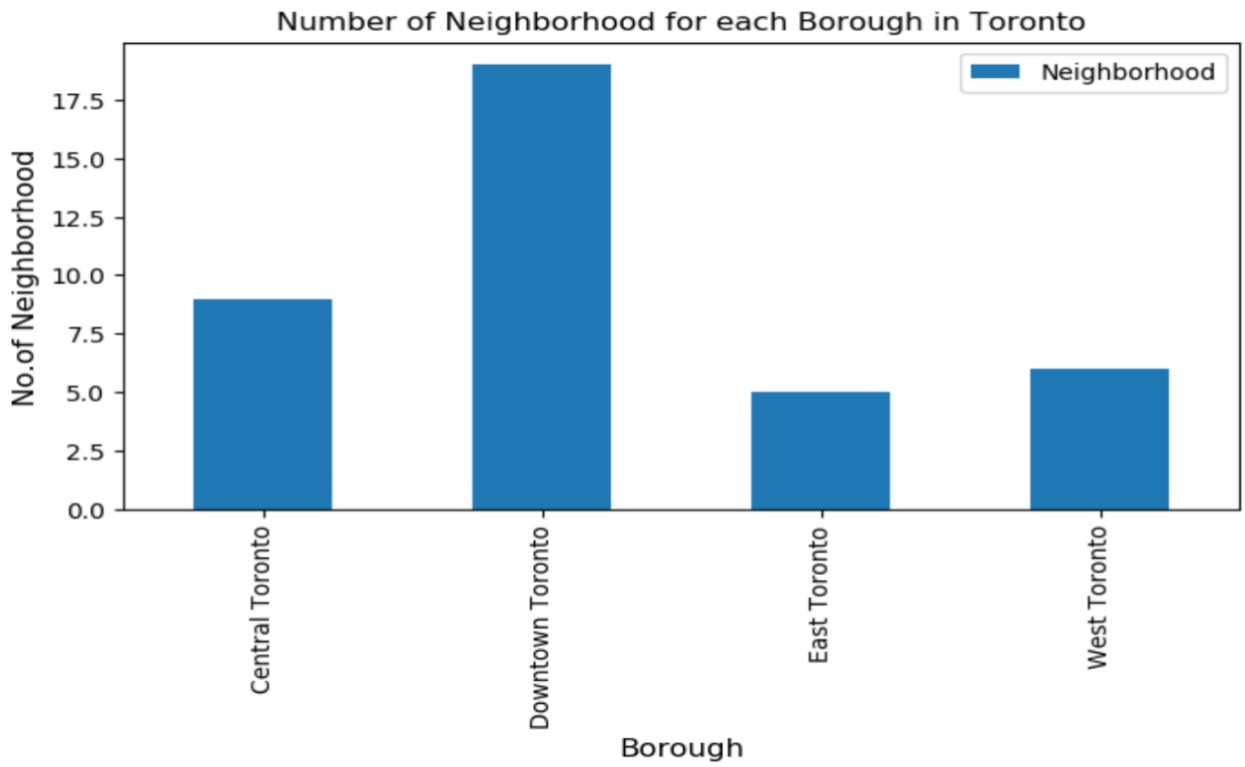
Combined both the information to form new Data set with all the required information of Borough, Neighborhood, Latitude and Longitude.

```
toronto_data
```

Out[9]:

	Borough	Neighborhood	Latitude	Longitude
0	East Toronto	The Beaches	43.676357	-79.293031
1	East Toronto	The Danforth West,Riverdale	43.679557	-79.352188
2	East Toronto	The Beaches West,India Bazaar	43.668999	-79.315572
3	East Toronto	Studio District	43.659526	-79.340923
4	Central Toronto	Lawrence Park	43.728020	-79.388790
5	Central Toronto	Davisville North	43.712751	-79.390197
6	Central Toronto	North Toronto West	43.715383	-79.405678
7	Central Toronto	Davisville	43.704324	-79.388790
8	Central Toronto	Moore Park,Summerhill East	43.689574	-79.383160
9	Central Toronto	Deer Park,Forest Hill SE,Rathnelly,South Hill,...	43.686412	-79.400049
10	Downtown Toronto	Rosedale	43.679563	-79.377529
11	Downtown Toronto	Cabbagetown,St. James Town	43.667967	-79.367675
12	Downtown Toronto	Church and Wellesley	43.665860	-79.383160
13	Downtown Toronto	Harbourfront	43.654260	-79.360636
14	Downtown Toronto	Ryerson,Garden District	43.657162	-79.378937

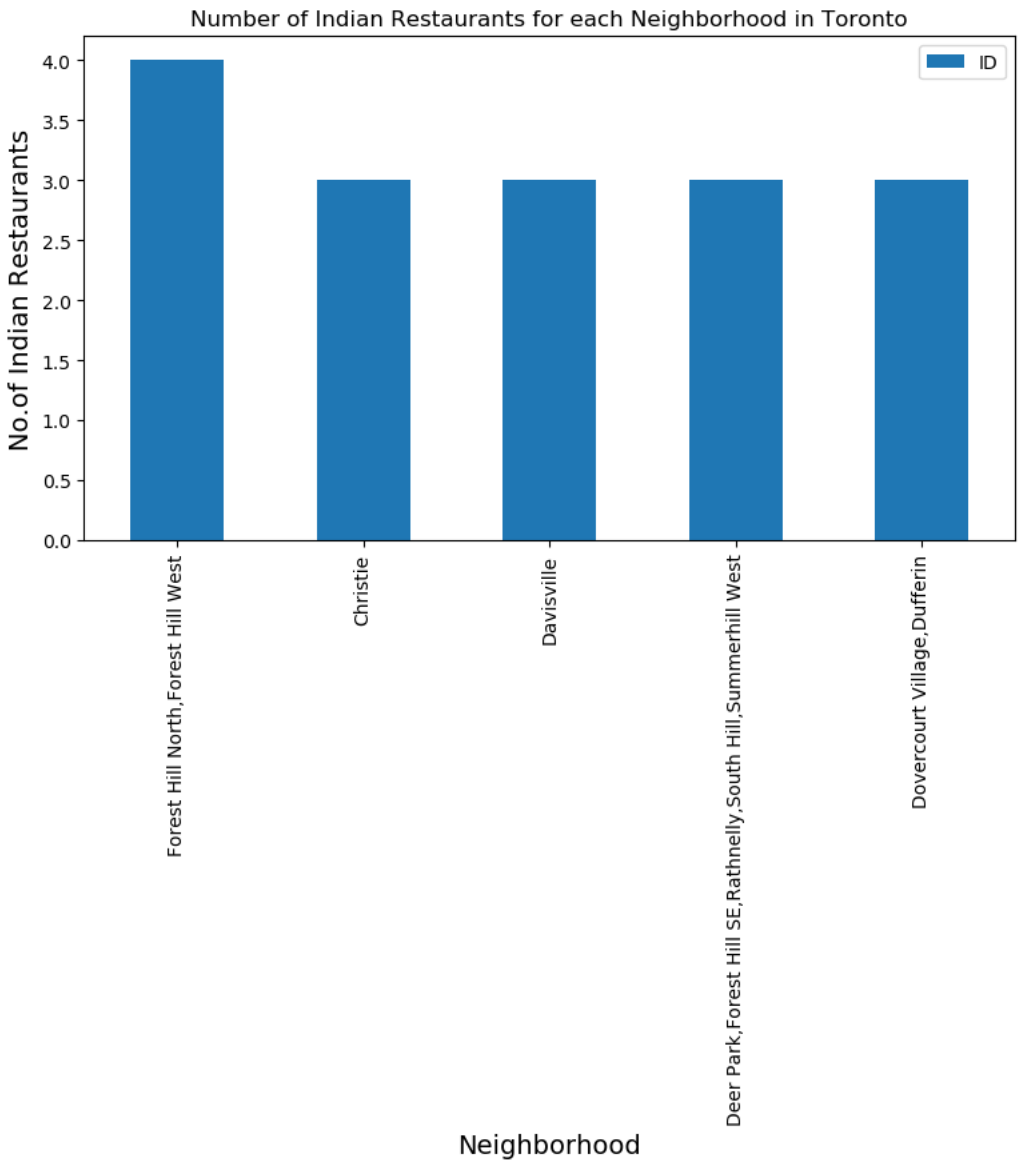
Neighborhood Distribution across each Toronto Borough



Indian Restaurants in Tornoto by Borough:

Using FourSquare API extracted the Indian restaurant from all the above neighborhoods. Top 100 venues within a radius of 1000 metres for a given latitude and longitude.. We found 50 Indian restaurants from the API.

Indian Restaurants in Tornoto by Neighborhood:



Ranking of Tornoto Indian Restaurants:

Using the FourSquare API extracted the rating related information for all mentioned Indian restaurant information in Tornoto. The fields got are Likes, Ratings (of Scale 10) and Tips.

```
In [24]: hfs_stats_toronto
```

Out[24]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips
0	East Toronto	The Beaches	4ae0c7a8f964a520638221e3	Udupi Palace	79	8.6	31
1	East Toronto	The Beaches	4afc9816f964a520312422e3	Motimahal	25	7.8	13
2	East Toronto	The Beaches	4dcd7c6352b1f8915b7e7f7e	Delhi Bistro	6	7.1	3
3	East Toronto	The Danforth West,Riverdale	4ae0c7a8f964a520638221e3	Udupi Palace	79	8.6	31
4	East Toronto	The Beaches West,India Bazaar	4ae0c7a8f964a520638221e3	Udupi Palace	79	8.6	31
5	East Toronto	The Beaches West,India Bazaar	4afc9816f964a520312422e3	Motimahal	25	7.8	13
6	East Toronto	Studio District	4ae0c7a8f964a520638221e3	Udupi Palace	79	8.6	31
7	Central Toronto	Lawrence Park	4b75c28af964a520ba222ee3	Kamasutra	18	8.2	12
8	Central Toronto	Davisville North	4daf08e66e81e2dffdd4fe40	Iqbal Kebab & Sweet Centre	13	8.0	6

Analysis and Results:

Using the Data gathered below is the Visual analysis:

Indian Restaurant with Maximum Likes:

The Restaurant “Banjara Indian Cuisine” has the Highest number of LIKES which is located in Central Toronto borough.

```
In [49]: # Indian Restaurant with maximum Likes
         hfs_stats_toronto.iloc[hfs_stats_toronto['Likes'].idxmax()]
```

```
Out[49]: Borough                                        Central Toronto
         Neighborhood    Deer Park,Forest Hill SE,Rathnelly,South Hill,...
         ID                                        4adb969ef964a520332921e3
         Name                                       Banjara Indian Cuisine
         Likes                                                         142
         Rating                                                        8.9
         Tips                                                           75
         Name: 19, dtype: object
```

Indian Restaurant with Highest Rating:

The Restaurant “Pukka Restaurant” has the Highest Rating which is also located in Central Toronto borough.

```
In [51]: # Indian Restaurant with maximum Rating
         hfs_stats_toronto.iloc[hfs_stats_toronto['Rating'].idxmax()]
```

```
Out[51]: Borough                 Central Toronto
         Neighborhood          North Toronto West
         ID              52418b0b7e48222eea81d2d2
         Name                    Pukka Restaurant
         Likes                                 43
         Rating                               9.1
         Tips                                  26
         Name: 11, dtype: object
```

Indian Restaurant with Maximum Tips:

The Restaurant “Banjara Indian Cuisine” has the Highest number of TIPS which is located in Central Toronto borough.

```
In [52]: # Indian Restaurant with maximum Tips
         hfs_stats_toronto.iloc[hfs_stats_toronto['Tips'].idxmax()]
```

```
Out[52]: Borough                                          Central Toronto
         Neighborhood    Deer Park,Forest Hill SE,Rathnelly,South Hill,...
         ID                                        4adb969ef964a520332921e3
         Name                                    Banjara Indian Cuisine
         Likes                                                      142
         Rating                                                     8.9
         Tips                                                        75
         Name: 19, dtype: object
```

Top Neighborhoods with Average Rating of Indian Restaurants:

```
In [54]: toronto_neighborhood_stats.sort_values(['Average Rating'],ascending=False).head(10)
```

Out[54]:

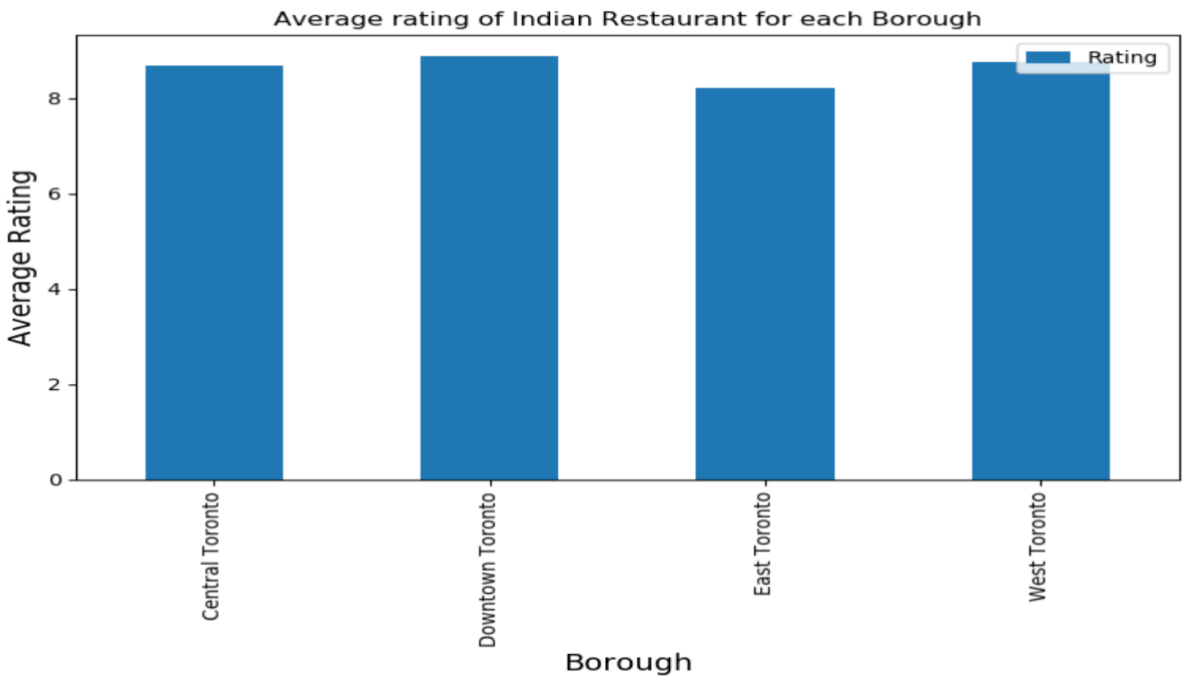
	Neighborhood	Average Rating
13	Moore Park,Summerhill East	8.950000
20	The Annex,North Midtown,Yorkville	8.933333
2	Christie	8.933333
7	Dovercourt Village,Dufferin	8.933333
6	Deer Park,Forest Hill SE,Rathnelly,South Hill,...	8.933333
0	Brockton,Exhibition Place,Parkdale Village	8.900000
12	Little Portugal,Trinity	8.900000
9	Harbord,University of Toronto	8.850000
16	Rosedale	8.800000
3	Church and Wellesley	8.800000

Average Rating of Indian Restaurants across Toronto Boroughs:

```
In [56]: toronto_borough_stats.sort_values(['Average Rating'],ascending=False).head()
```

Out[56]:

	Borough	Average Rating
1	Downtown Toronto	8.871429
3	West Toronto	8.758333
0	Central Toronto	8.691304
2	East Toronto	8.212500



Filtering the neighborhoods having a good average rating (more than 8.5)

```
In [58]: toronoto_neighborhood_stats=toronto_neighborhood_stats[toronto_neighborhood_stats['Average Rating']>8.5]
```

```
In [59]: toronoto_neighborhood_stats
```

Out[59]:

	Neighborhood	Average Rating
0	Brockton,Exhibition Place,Parkdale Village	8.900000
1	Business Reply Mail Processing Centre 969 Eastern	8.600000
2	Christie	8.933333
3	Church and Wellesley	8.800000
6	Deer Park,Forest Hill SE,Rathnelly,South Hill,...	8.933333
7	Dovercourt Village,Dufferin	8.933333
8	Forest Hill North,Forest Hill West	8.750000
9	Harbord,University of Toronto	8.850000
10	High Park,The Junction South	8.800000
12	Little Portugal,Trinity	8.900000
13	Moore Park,Summerhill East	8.950000
14	North Toronto West	8.650000
15	Parkdale,Roncesvalles	8.650000
16	Rosedale	8.800000
17	Roselawn	8.700000
19	Studio District	8.600000
20	The Annex,North Midtown,Yorkville	8.933333
23	The Danforth West,Riverdale	8.600000

Plotting the restaurants over neighborhoods having a good average rating (more than 8.5)

```
Out[71]: <folium.map.Marker at 0x1a25805750>
```

Out[71]:

Conclusion:

The above insights and analysis on Indian restaurants in different boroughs in Toronto will be helpful for an entrepreneur who wish to keep a good Indian restaurant in the Toronto. He/she can identify the most demanding borough to set up an Indian restaurant and which area has a great scope.

From user's point of view, they can identify the best place to live in the Toronto city if they prefer Indian cuisine.

The below few points from analysis we can note which will be useful for entrepreneurs and/or users.

- Central Toronto has many good Indian restaurants. It is the best place to stay if user prefer an Indian restaurant.
- Delhi Bistro ranks lowest average ratings of Indian restaurants.
- Central Toronto have potential Indian Restaurant Market.
- Downtown Toronto has less number of Indian Restaurants compared to other boroughs.
- Investors/entrepreneurs can look into the above areas for setting up Indian restaurants.

Limitations:

- **The ranking is purely on basis of rating of restaurants**
- **The accuracy of data purely depends on the data provided by FourSquare**