Capstone Project - Battle Of Neighborhoods

Toronto Indian Restaurants

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Introduction

Toronto is the provincial capital of Ontario and is considered the commercial capital of Canada.Toronto is an international centre of business, finance, arts, and culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world.The diverse population of Toronto reflects its current and historical role as an important destination for immigrants to Canada. More than 50 percent of residents belong to a visible minority population group and over 200 distinct ethnic origins are represented among its inhabitants. (*source:Wikipedia*)

The cuisine of Toronto reflects Toronto's size and multicultural diversity. Numerous other world cuisines are available throughout the city, including Portuguese, Hungarian, Japanese, and Caribbean. In addition to ethnic cuisines, Toronto is also home to many fine dining establishments and chain restaurants ranging from fast food to casual or upscale dining. (*source:Wikipedia*)

As a part of this project, we will explore the neighborhoods of Toronto, we will research and visualize the areas that has great Indian restaurants.

Background and Description of the Problem

For somebody trying to immigrate to Canada from India, there are multiple things to consider before the migration. The first thing that would make somebody homesick is the food in the area. This is true for many Indians trying to immigrate to a different country. Toronto is a home to multi-cultural cuisines and has many Indian restaurants. The challenge is to identify the best among those restaurants and the areas where they are concentrated.

This is one of the problems, we will try to address in this project.

Other questions that can be asked from the Analysis-

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

Data

Data

For this project we need the following data :

- Toronto data that contains list Boroughs, Neighborhoods, Postal Code including Latitude and Longitude
  - Data source : 'https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M'
  - Description : Contains data for Toronto with Postal code, Borough and Neighborhood details. We will add more data as needed to explore the Boroughs of Toronto.
- Indian restaurants in each neighborhood of Toronto.
  - Data source : Fousquare API
  - Description : We can use this api to get all the venues along with a list of Indian restaurants with ratings in each neighborhood.

Methodology

- Use the **wikipedia** data combined with **Foursquare** to get Borough and Neighborhood with the most number of Indian restaurants.
- Identify the top restaurant for an area based on the results from 1 using 'ratings', 'likes' and 'tips'.
- Utilize *Bar chart* visualization to get insights into Indian restaurant details.
- Summarize the results and draw conclusion

Steps

1. Import necessary libraries for data and feature engineering
2. Collect the Toronto data from https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
3. Utilize Foursquare API to get the venue details and Indian restaurants
4. Get ratings and tips for the restaurants from Foursquare API
5. Visualize data as needed for analysis
6. Conclusion

1. Import necessary libraries

In [1]:

```
Solving environment: done

## Package Plan ##

  environment location: /opt/conda/envs/Python36

  added / updated specs:
    - geopy


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    certifi-2019.6.16          |           py36_1         149 KB  conda-forge
    geographiclib-1.49         |             py_0          32 KB  conda-forge
    geopy-1.20.0               |             py_0          57 KB  conda-forge
    openssl-1.1.1c             |       h516909a_0         2.1 MB  conda-forge
    ca-certificates-2019.6.16  |       hecc5488_0         145 KB  conda-forge
    ------------------------------------------------------------
                                           Total:         2.5 MB

The following NEW packages will be INSTALLED:

    geographiclib:   1.49-py_0         conda-forge
    geopy:           1.20.0-py_0       conda-forge

The following packages will be UPDATED:

    ca-certificates: 2019.5.15-0                  --> 2019.6.16-hecc5488_0 conda-forge
    certifi:         2019.6.16-py36_0             --> 2019.6.16-py36_1     conda-forge

The following packages will be DOWNGRADED:

    openssl:         1.1.1c-h7b6447c_1            --> 1.1.1c-h516909a_0    conda-forge


Downloading and Extracting Packages
certifi-2019.6.16    | 149 KB    | ##################################### | 100%
geographiclib-1.49   | 32 KB     | ##################################### | 100%
geopy-1.20.0         | 57 KB     | ##################################### | 100%
openssl-1.1.1c       | 2.1 MB    | ##################################### | 100%
ca-certificates-2019 | 145 KB    | ##################################### | 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Solving environment: done

## Package Plan ##

  environment location: /opt/conda/envs/Python36
```

2. Collect Toronto Data

In [2]:

```
wiki_can='https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M'
resp = requests.get(wiki_can).text
soup = BeautifulSoup(resp, 'xml')#Beautiful Soup to Parse the url page
table=soup.find('table')
column_names=['Postalcode','Borough','Neighbourhood']
df = pd.DataFrame(columns=column_names)
# extracting information from the table
for tr_cell in table.find_all('tr'):
    row_data=[]
    for td_cell in tr_cell.find_all('td'):
        row_data.append(td_cell.text.strip())
    if len(row_data)==3:
        df.loc[len(df)] = row_data
# remove rows where Borough is 'Not assigned'
df=df[df['Borough']!='Not assigned']
# assign Neighbourhood=Borough where Neighbourhood is 'Not assigned'
df[df['Neighbourhood']=='Not assigned']=df['Borough']
df.head()
```

Out[2]:

	Postalcode	Borough	Neighbourhood
2	M3A	North York	Parkwoods
3	M4A	North York	Victoria Village
4	M5A	Downtown Toronto	Harbourfront
5	M5A	Downtown Toronto	Regent Park
6	M6A	North York	Lawrence Heights

In [3]:

```
# group multiple Neighbourhood under one Postcode
temp_df=df.groupby('Postalcode')['Neighbourhood'].apply(lambda x: "%s" % ', '.join(x))
temp_df=temp_df.reset_index(drop=False)
temp_df.rename(columns={'Neighbourhood':'Neighbourhood_joined'},inplace=True)

# join the newly constructed joined data frame
df_merge = pd.merge(df, temp_df, on='Postalcode')

# drop the Neighbourhood column
df_merge.drop(['Neighbourhood'],axis=1,inplace=True)

# drop duplicates from the data frame
df_merge.drop_duplicates(inplace=True)

# rename Neighbourhood_joined back to Neighbourhood
df_merge.rename(columns={'Neighbourhood_joined':'Neighborhood'},inplace=True)

toronto_data=df_merge

toronto_data.head()
```

Out[3]:

	Postalcode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Harbourfront, Regent Park
4	M6A	North York	Lawrence Heights, Lawrence Manor
6	Queen's Park	Queen's Park	Queen's Park

In [4]:

Out[4]:

	Postal Code	Latitude	Longitude
0	M1B	43.806686	-79.194353
1	M1C	43.784535	-79.160497
2	M1E	43.763573	-79.188711
3	M1G	43.770992	-79.216917
4	M1H	43.773136	-79.239476

In [5]:

```
toronto_geo_df.rename(columns={'Postal Code':'Postalcode'},inplace=True)
toronto_geo_merged = pd.merge(toronto_geo_df, df_merge, on='Postalcode')
toronto_geo_merged.head()

toronto_data=toronto_geo_merged[['Borough','Neighborhood','Latitude','Longitude']]
toronto_data.tail()
```

Out[5]:

	Borough	Neighborhood	Latitude	Longitude
97	York	Weston	43.706876	-79.518188
98	Etobicoke	Westmount	43.696319	-79.532242
99	Etobicoke	Kingsview Village, Martin Grove Gardens, Richv...	43.688905	-79.554724
100	Etobicoke	Albion Gardens, Beaumond Heights, Humbergate, ...	43.739416	-79.588437
101	Etobicoke	Northwest	43.706748	-79.594054

3. Connect to get Foursquare Location Data for Toronto

In [6]:

```
CLIENT_ID = 'FGZH3PW500W4UBWXAFOTK21RT14QXK4CVYPH35ZVW5VYKVQV' # your Foursquare ID
CLIENT_SECRET = 'D5RWKFN35D30LIOU2VFVYJV20QMYW4XMXIZ2V21R5G0MDUYA' # your Foursquare Secre
t
VERSION = '20180605' # Foursquare API version
```

In [7]:

```
def get_venues(lat,lng):

    #set variables
    radius=1000
    LIMIT=100
    CLIENT_ID = 'FGZH3PW500W4UBWXAFOTK21RT14QXK4CVYPH35ZVW5VYKVQV' # your Foursquare ID
    CLIENT_SECRET = 'D5RWKFN35D30LIOU2VFVYJV20QMYW4XMXIZ2V21R5G0MDUYA' # your Foursquare S
ecret
    VERSION = '20180605' # Foursquare API version

    #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v=
{}&ll={},{}&radius={}&limit={}'.format(
            CLIENT_ID,
            CLIENT_SECRET,
            VERSION,
            lat,
            lng,
            radius,
            LIMIT)

    # get all the data
    results = requests.get(url).json()
    venue_data=results["response"]['groups'][0]['items']
    venue_details=[]
    for row in venue_data:
        try:
            venue_id=row['venue']['id']
            venue_name=row['venue']['name']
            venue_category=row['venue']['categories'][0]['name']
            venue_details.append([venue_id,venue_name,venue_category])
        except KeyError:
            pass

    column_names=['ID','Name','Category']
    df = pd.DataFrame(venue_details,columns=column_names)
    return df
```

In [8]:

Out[8]:

	ID	Name	Category
0	4b04a05bf964a520c45522e3	Sheriff's No Frills	Grocery Store
1	4be58dc4cf200f479154133c	Shoppers Drug Mart	Pharmacy
2	4c633939e1621b8d48842553	Subway	Sandwich Place
3	4ca8d10976d3a093d6c2196b	Bestco Food Mart	Grocery Store
4	4be70e26cf200f47e334153c	Popeyes Louisiana Kitchen	Fried Chicken Joint
5	4cd4738cdfb4a1cd4337535c	The Beer Store	Beer Store
6	4d8ba6910c4e41bdaaf7667f	Pizza Pizza	Pizza Place
7	4f60c4b6e4b0f4b0a38cd727	Pizza Hut	Pizza Place
8	5112b872e4b0c0a78d7bcd27	Sunny Foodmart	Grocery Store
9	4d8ba6960c4e41bd9cfc667f	Pizza Pizza	Pizza Place
10	4c1951d6834e2d7f2d3a2a80	McDonald's	Fast Food Restaurant
11	4bd0c04dcaff9521bd77cff0	Canadian Tire	Hardware Store
12	4cd9d00734bb8cfa6576babf	Tim Hortons	Coffee Shop
13	4f035c5c5c5c51dd31b52e55	Dollarama	Discount Store
14	54e521a9498e559c968e8083	NORI SUSHI	Japanese Restaurant
15	4c6fbf3234443704ebda215f	46 Martingrove North	Bus Line
16	5931cac9c5b11c6c1620adbb	Carlos Laya Productions	Video Store
17	4ddec726d22d28453ec7cb33	Panorama Park	Park

4. Connect to Foursquare to get ratings, likes and useful tips data for additional analysis

In [9]:

```
# prepare neighborhood list that contains indian restaurants
column_names=['Borough', 'Neighborhood', 'ID','Name']
indian_rest_tn=pd.DataFrame(columns=column_names)
count=1
for row in toronto_data.values.tolist():
    Borough, Neighborhood, Latitude, Longitude=row
    venues = get_venues(Latitude,Longitude)
    indian_restaurants=venues[venues['Category']=='Indian Restaurant']
    #print('(',count,'/',len(toronto_data),')','Indian Restaurants in '+Neighborhood+', '+
Borough+':'+str(len(indian_restaurants)))
    for restaurant_detail in indian_restaurants.values.tolist():
        id, name , category=restaurant_detail
        indian_rest_tn = indian_rest_tn.append({'Borough': Borough,
                                                'Neighborhood': Neighborhood,
                                                'ID': id,
                                                'Name' : name
                                               }, ignore_index=True)
    count+=1
```

In [10]:

```
def get_addl_details(venue_id):

    #url to fetch data from foursquare api
    url = 'https://api.foursquare.com/v2/venues/{}?&client_id={}&client_secret={}&v={}'.fo
rmat(
            venue_id,
            CLIENT_ID,
            CLIENT_SECRET,
            VERSION)

    # get all the data
    results = requests.get(url).json()
    venue_data=results['response']['venue']
    venue_details=[]
    try:
        venue_id=venue_data['id']
        venue_name=venue_data['name']
        venue_likes=venue_data['likes']['count']
        venue_rating=venue_data['rating']
        venue_tips=venue_data['tips']['count']
        venue_price=venue_data['price']['message']
        venue_details.append([venue_id,venue_name,venue_likes,venue_rating,venue_tips,venu
e_price])
    except KeyError:
        pass

    column_names=['ID','Name','Likes','Rating','Tips','Price']
    df = pd.DataFrame(venue_details,columns=column_names)
    return df
```

Lets get additional details around 'Madras Masala' restaurant

In [11]:

```
get_addl_details('4b7369d7f964a52049ad2de3')
```

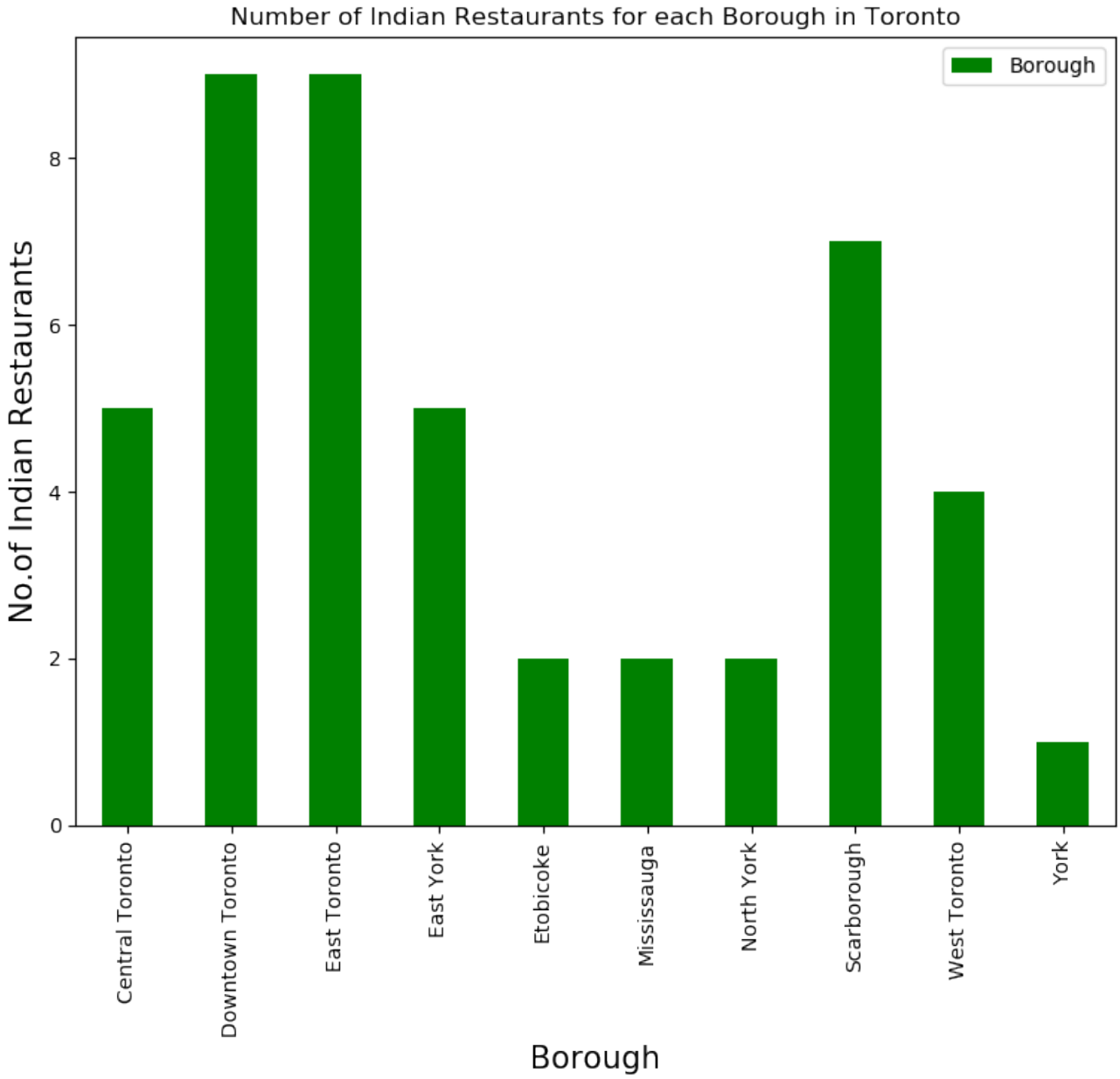
Out[11]:

	ID	Name	Likes	Rating	Tips	Price
0	4b7369d7f964a52049ad2de3	Madras Masala	32	7.8	21	Moderate

Based on this, 'Madras Masala' has 32 likes with a '7.8' rating with 'Moderate' price tag.

Lets find out how many Indian restaurants are there for each Borough in Toronto

In [12]:



In [14]:

```
indian_rest_tn.shape
```

Out[14]:

```
(46, 4)
```

There are 46 Indian Restaurants in Toronto. Downtown and East Toronto has the maximum number of Indian restaurants.

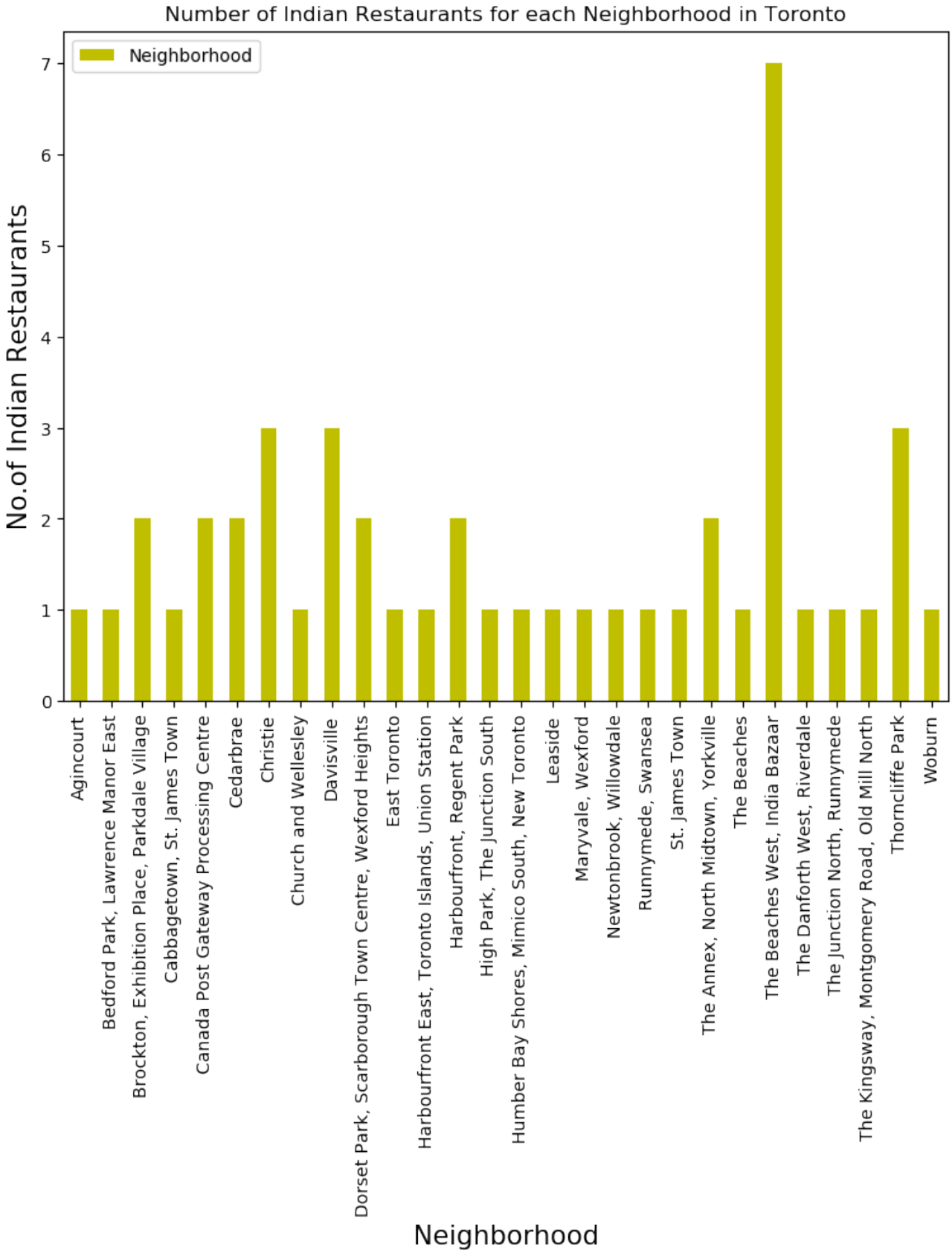
In [15]:

Out[15]:

	Borough	Neighborhood	ID	Name
8	East Toronto	The Beaches	4dcd7c6352b1f8915b7e7f7e	Delhi Bistro
14	East Toronto	The Danforth West, Riverdale	4c1d5337eac020a1cb1048c2	Sher-E-Punjab
15	East Toronto	The Beaches West, India Bazaar	4ae0c7a8f964a520638221e3	Udupi Palace
16	East Toronto	The Beaches West, India Bazaar	4afc9816f964a520312422e3	Motimahal
17	East Toronto	The Beaches West, India Bazaar	4bac30a2f964a52018ea3ae3	Bombay Chowpatty
18	East Toronto	The Beaches West, India Bazaar	4ad9052cf964a520301721e3	Regency Restaurant
19	East Toronto	The Beaches West, India Bazaar	4bbcc0efa0a0c9b60ebd1a0f	Haandi 2000
20	East Toronto	The Beaches West, India Bazaar	4d8d278a1d06b1f712942a3b	Gautama
21	East Toronto	The Beaches West, India Bazaar	4edd30c09adfe5cbe2818dc4	Lahori Taste & Burger House
25	Downtown Toronto	Cabbagetown, St. James Town	4c8c21fdf0ce236ab28e15ef	Butter Chicken Factory
26	Downtown Toronto	Church and Wellesley	4bedf8b5e24d20a17b567214	Kothur Indian Cuisine
27	Downtown Toronto	Harbourfront, Regent Park	4af9a379f964a520c91222e3	Bombay Palace
28	Downtown Toronto	Harbourfront, Regent Park	52af6dc5498e33995b0bbf03	Sultan Of Samosas
29	Downtown Toronto	St. James Town	4af9a379f964a520c91222e3	Bombay Palace
30	Downtown Toronto	Harbourfront East, Toronto Islands, Union Station	50b79b94e4b0a577af25a83f	Indian Roti House
34	Downtown Toronto	Christie	4adb969ef964a520332921e3	Banjara Indian Cuisine
35	Downtown Toronto	Christie	4b7369d7f964a52049ad2de3	Madras Masala
36	Downtown Toronto	Christie	4b02ecc8f964a520114b22e3	Maroli

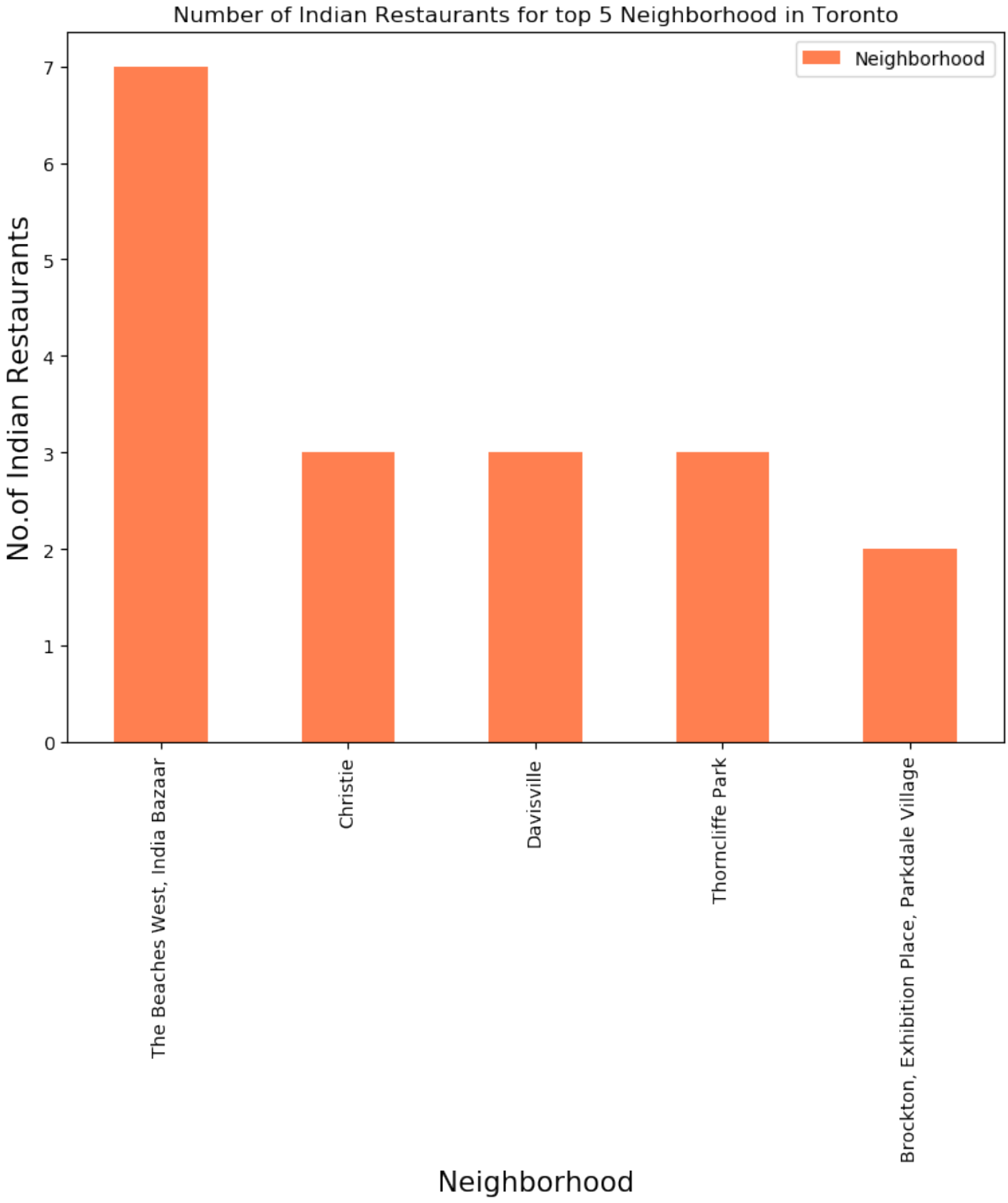
Lets find out how many Indian restaurants are there for each Neighborhood in Toronto

In [16]:


Number of Indian Restaurants for each Neighborhood in Toronto
Neighborhood
No.of Indian Restaurants
0
1
2
3
4
5
6
7
Agincourt
Bedford Park, Lawrence Manor East
Brockton, Exhibition Place, Parkdale Village
Cabbagetown, St. James Town
Canada Post Gateway Processing Centre
Cedarbrae
Christie
Church and Wellesley
Davisville
Dorset Park, Scarborough Town Centre, Wexford Heights
East Toronto
Harbourfront East, Toronto Islands, Union Station
Harbourfront, Regent Park
High Park, The Junction South
Humber Bay Shores, Mimico South, New Toronto
Leaside
Maryvale, Wexford
Newtonbrook, Willowdale
Runnymede, Swansea
St. James Town
The Annex, North Midtown, Yorkville
The Beaches
The Beaches West, India Bazaar
The Danforth West, Riverdale
The Junction North, Runnymede
The Kingsway, Montgomery Road, Old Mill North
Thorncliffe Park
Woburn
Neighborhood

Lets find out top 5 Neighborhood that has the most Indian restaurants in Toronto

In [17]:



We see that there are 8 Indian restaurants in 'The Beaches West, India Bazaar' neighborhood

In [20]:

```
# Get the list of Indian restaurants in 'The Beaches West, India Bazaar' neighborhood
indian_rest_tn[(indian_rest_tn['Neighborhood']=='The Beaches West, India Bazaar')]
```

Out[20]:

	Borough	Neighborhood	ID	Name
15	East Toronto	The Beaches West, India Bazaar	4ae0c7a8f964a520638221e3	Udupi Palace
16	East Toronto	The Beaches West, India Bazaar	4afc9816f964a520312422e3	Motimahal
17	East Toronto	The Beaches West, India Bazaar	4bac30a2f964a52018ea3ae3	Bombay Chowpatty
18	East Toronto	The Beaches West, India Bazaar	4ad9052cf964a520301721e3	Regency Restaurant
19	East Toronto	The Beaches West, India Bazaar	4bbcc0efa0a0c9b60ebd1a0f	Haandi 2000
20	East Toronto	The Beaches West, India Bazaar	4d8d278a1d06b1f712942a3b	Gautama
21	East Toronto	The Beaches West, India Bazaar	4edd30c09adfe5cbe2818dc4	Lahori Taste & Burger House

In [23]:

```
Empty DataFrame
Columns: [ID, Name, Likes, Rating, Tips, Price]
Index: []
No data available for id= 4c632edeedd320a19ad5ae29
                         ID             Name  Likes  Rating  Tips     Price
0  4d6008f829ef236a8832a059  CANBE Foods Inc     22     8.2     8  Moderate
                         ID           Name  Likes  Rating  Tips     Price
0  4c77fc87bd346dcb8c90f0ef  La Sani Grill     13     6.9    12  Moderate
                         ID     Name  Likes  Rating  Tips     Price
0  5226562611d2cd49d83ef03b  Kairali      9     7.7     6  Moderate
                         ID                                          Name  \
0  4bf96c435317a593a23a017f  Karaikudi Chettinad South Indian Restaurant

   Likes  Rating  Tips     Price
0     27     6.2    23  Moderate
                         ID               Name  Likes  Rating  Tips  Price
0  4c27cddd9fb5d13a8cab9857  Patna Kebab House      4     7.8     6  Cheap
                         ID                                Name  Likes  \
0  4d570727fb65236a7f600db4  Silver Spoon Pak-Indian Restaurant     10

   Rating  Tips     Price
0     7.5     6  Moderate
                         ID                      Name  Likes  Rating  Tips  \
0  4b43dde2f964a52099ec25e3  Earth Indian Restaurant      4     5.9    11

      Price
0  Moderate
                         ID          Name  Likes  Rating  Tips     Price
0  4dcd7c6352b1f8915b7e7f7e  Delhi Bistro      5     6.6     3  Moderate
                         ID                    Name  Likes  Rating  Tips  \
0  504bcf32e4b0ef19b0e2ecf8  Mt Everest Restaurant      8     6.6     6

      Price
0  Moderate
                         ID                         Name  Likes  Rating  Tips  \
0  4daf08e66e81e2dffdd4fe40  Iqbal Kebab & Sweet Centre     13     8.1     7

   Price
0  Cheap
                         ID          Name  Likes  Rating  Tips     Price
0  4bed9f2fbac3c9b6ad93fee9  Hakka Garden     10     6.4    12  Moderate
                         ID              Name  Likes  Rating  Tips     Price
0  507a19e5e4b0602b62f73d11  Faley Restaurant      6     6.7     4  Moderate
Empty DataFrame
Columns: [ID, Name, Likes, Rating, Tips, Price]
Index: []
No data available for id= 4c9fe5ca03133704df8d76d5
                         ID           Name  Likes  Rating  Tips     Price
0  4c1d5337eac020a1cb1048c2  Sher-E-Punjab     10     7.5     7  Moderate
                         ID          Name  Likes  Rating  Tips  Price
0  4ae0c7a8f964a520638221e3  Udupi Palace     79     8.6    31  Cheap
```

In [24]:

```
indian_rest_details_tn[indian_rest_details_tn.Borough=='East Toronto']
```

Out[24]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips	P
8	East Toronto	The Beaches	4dcd7c6352b1f8915b7e7f7e	Delhi Bistro	5	6.6	3	Mode
14	East Toronto	The Danforth West, Riverdale	4c1d5337eac020a1cb1048c2	Sher-E-Punjab	10	7.5	7	Mode
15	East Toronto	The Beaches West, India Bazaar	4ae0c7a8f964a520638221e3	Udupi Palace	79	8.6	31	Chea
16	East Toronto	The Beaches West, India Bazaar	4afc9816f964a520312422e3	Motimahal	25	8	13	Mode
17	East Toronto	The Beaches West, India Bazaar	4bac30a2f964a52018ea3ae3	Bombay Chowpatty	7	7.3	5	Mode
18	East Toronto	The Beaches West, India Bazaar	4ad9052cf964a520301721e3	Regency Restaurant	5	6.6	2	Mode
19	East Toronto	The Beaches West, India Bazaar	4bbcc0efa0a0c9b60ebd1a0f	Haandi 2000	3	6.3	7	Mode
20	East Toronto	The Beaches West, India Bazaar	4d8d278a1d06b1f712942a3b	Gautama	15	6.1	15	Mode
21	East Toronto	The Beaches West, India Bazaar	4d8d278a1d06b1f712942a3b	Gautama	15	6.1	15	Mode

In [25]:

Out[25]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips	
41	West Toronto	Runnymede, Swansea	525e1812498e2c14b4d80b8b	Bukhara indian cuisine	6	6.8	3	Mo
42	Mississauga	Canada Post Gateway Processing Centre	595fb4ab178a2a1a946eec2b	Barbq Tonight	7	7.2	1	Mo
43	Mississauga	Canada Post Gateway Processing Centre	4bff0c5668c7a5932a1f4044	Zauq	9	6	11	Mo
44	Etobicoke	Humber Bay Shores, Mimico South, New Toronto	4bc10d44abf49521d773c093	Bombay on the Lake	6	7.3	9	Mo
45	Etobicoke	The Kingsway, Montgomery Road, Old Mill North	4af1c64ff964a5200ae321e3	Chutneys Fine Indian Cuisine	5	6.7	10	Mo

In [26]:

```
indian_rest_details_tn.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 46 entries, 0 to 45
Data columns (total 8 columns):
Borough         46 non-null object
Neighborhood    46 non-null object
ID              46 non-null object
Name            46 non-null object
Likes           46 non-null object
Rating          46 non-null object
Tips            46 non-null object
Price           46 non-null object
dtypes: object(8)
memory usage: 3.0+ KB
```

In order for us to do some math around the ratings, likes columns, we need to convert the columns to integer or float.

In [27]:

```
indian_rest_details_tn['Likes']=indian_rest_details_tn['Likes'].astype('float64')
indian_rest_details_tn['Rating']=indian_rest_details_tn['Rating'].astype('float64')
indian_rest_details_tn['Tips']=indian_rest_details_tn['Tips'].astype('float64')
```

In [28]:

```
indian_rest_details_tn.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 46 entries, 0 to 45
Data columns (total 8 columns):
Borough         46 non-null object
Neighborhood    46 non-null object
ID              46 non-null object
Name            46 non-null object
Likes           46 non-null float64
Rating          46 non-null float64
Tips            46 non-null float64
Price           46 non-null object
dtypes: float64(3), object(5)
memory usage: 3.0+ KB
```

Lets get the Indian restaurant with maximum rating, likes and tips

In [29]:

```
# Restaurant with maximum Rating
indian_rest_details_tn.iloc[indian_rest_details_tn['Rating'].idxmax()]
```

Out[29]:

```
Borough                            Central Toronto
Neighborhood    The Annex, North Midtown, Yorkville
ID                          4c62c59ce1621b8dd0332453
Name                           Roti Cuisine of India
Likes                                             39
Rating                                           8.9
Tips                                              18
Price                                       Moderate
Name: 32, dtype: object
```

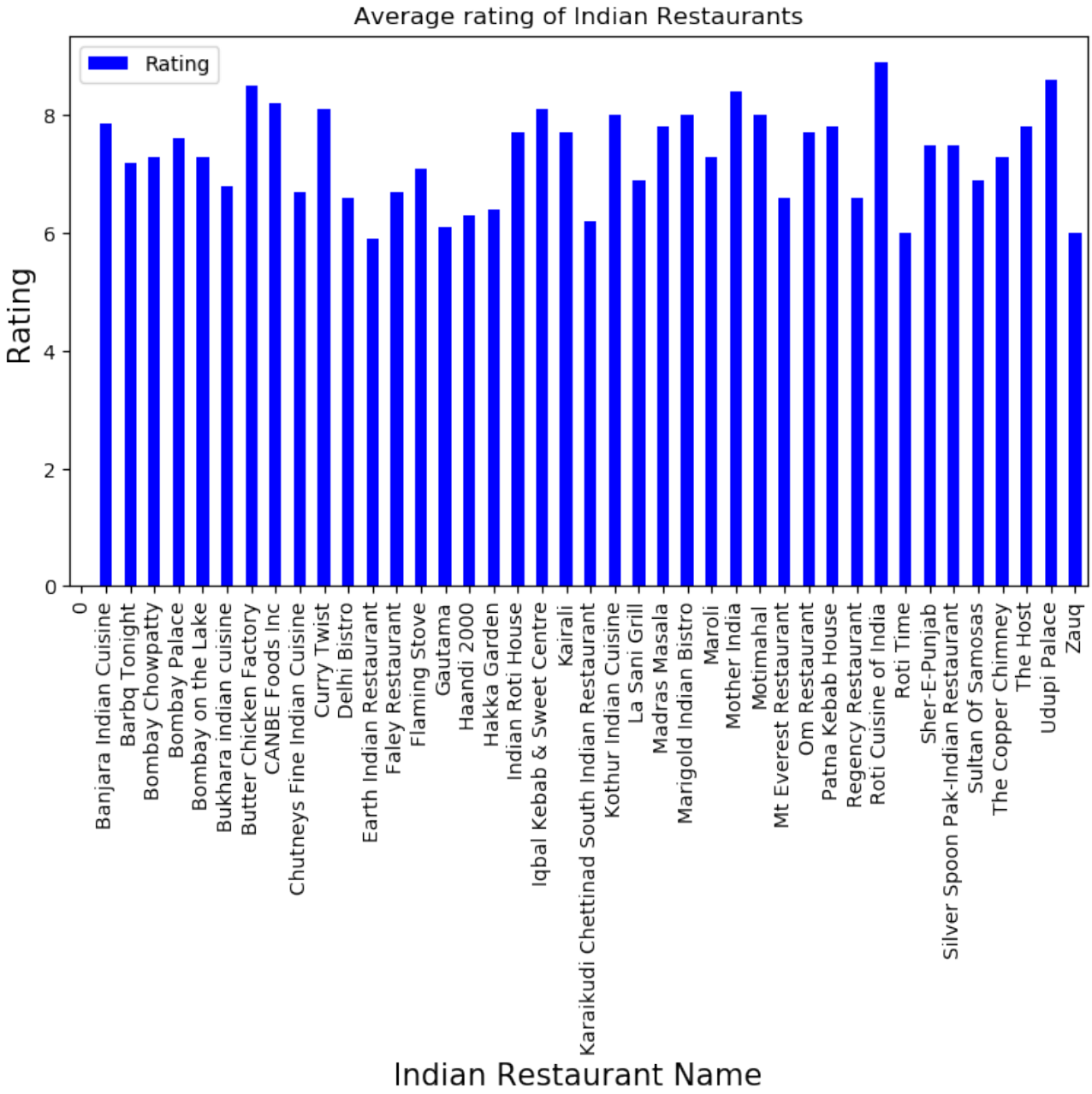
In [30]:

```
indian_rest_tn_neighborhood=indian_rest_details_tn.groupby(['ID','Borough','Neighborhoo
d','Name'], as_index=False).mean()[['ID','Borough','Neighborhood','Name','Rating']]
indian_rest_tn_neighborhood.columns=['ID','Borough','Neighborhood','Indian Restaurant Nam
e','Rating']
indian_rest_tn_rating=indian_rest_tn_neighborhood.sort_values(['Rating'],ascending=False)
indian_rest_tn_rating_top5=indian_rest_tn_rating.head()
indian_rest_tn_rating_top5
```

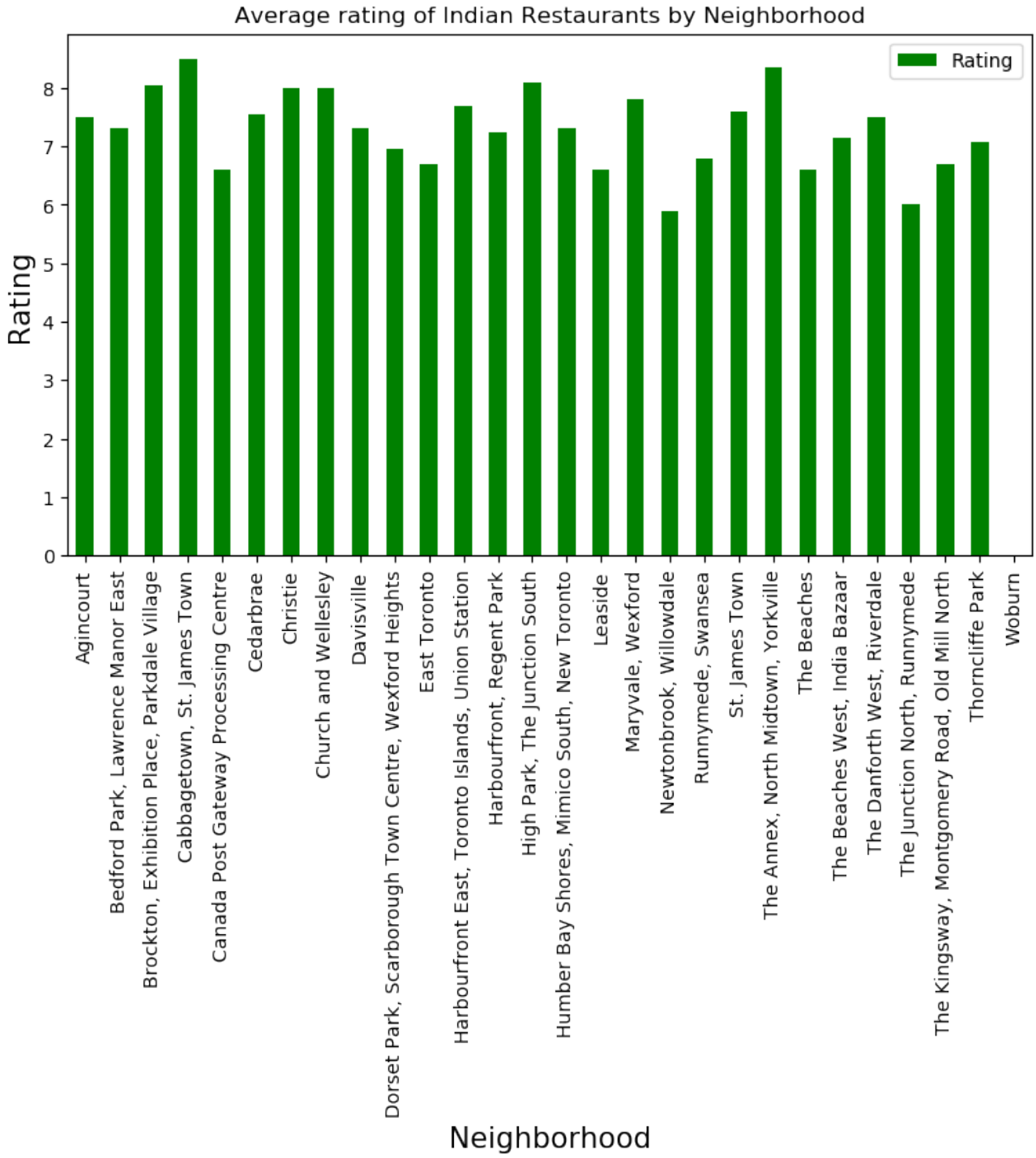
Out[30]:

	ID	Borough	Neighborhood	Indian Restaurant Name	Rating
26	4c62c59ce1621b8dd0332453	Central Toronto	The Annex, North Midtown, Yorkville	Roti Cuisine of India	8.9
3	4adb969ef964a520332921e3	Downtown Toronto	Christie	Banjara Indian Cuisine	8.9
4	4ae0c7a8f964a520638221e3	East Toronto	The Beaches West, India Bazaar	Udupi Palace	8.6
28	4c8c21fdf0ce236ab28e15ef	Downtown Toronto	Cabbagetown, St. James Town	Butter Chicken Factory	8.5
5	4aecbbb0f964a520bcca21e3	West Toronto	Brockton, Exhibition Place, Parkdale Village	Mother India	8.4

In [31]:

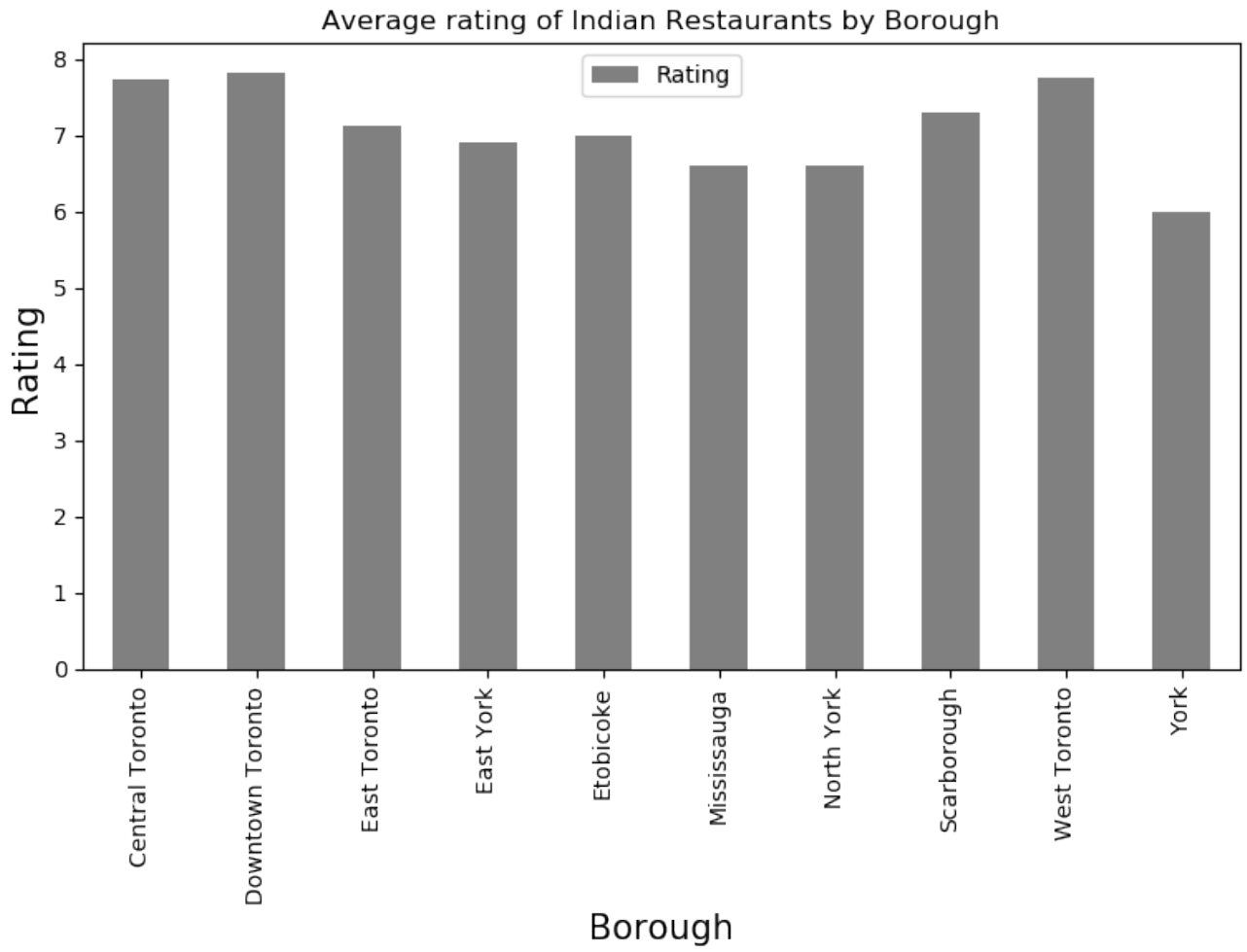

Average rating of Indian Restaurants
Rating
Rating
0
2
4
6
8
0
Banjara Indian Cuisine
Barbq Tonight
Bombay Chowpatty
Bombay Palace
Bombay on the Lake
Bukhara indian cuisine
Butter Chicken Factory
CANBE Foods Inc
Chutneys Fine Indian Cuisine
Curry Twist
Delhi Bistro
Earth Indian Restaurant
Faley Restaurant
Flaming Stove
Gautama
Haandi 2000
Hakka Garden
Indian Roti House
Iqbal Kebab & Sweet Centre
Kairali
Karaikudi Chettinad South Indian Restaurant
Kothur Indian Cuisine
La Sani Grill
Madras Masala
Marigold Indian Bistro
Maroli
Mother India
Motimahal
Mt Everest Restaurant
Om Restaurant
Patna Kebab House
Regency Restaurant
Roti Cuisine of India
Roti Time
Sher-E-Punjab
Silver Spoon Pak-Indian Restaurant
Sultan Of Samosas
The Copper Chimney
The Host
Udupi Palace
Zauq
Indian Restaurant Name

In [32]:


Average rating of Indian Restaurants by Neighborhood
Rating
Rating
0
1
2
3
4
5
6
7
8
Agincourt
Bedford Park, Lawrence Manor East
Brockton, Exhibition Place, Parkdale Village
Cabbagetown, St. James Town
Canada Post Gateway Processing Centre
Cedarbrae
Christie
Church and Wellesley
Davisville
Dorset Park, Scarborough Town Centre, Wexford Heights
East Toronto
Harbourfront East, Toronto Islands, Union Station
Harbourfront, Regent Park
High Park, The Junction South
Humber Bay Shores, Mimico South, New Toronto
Leaside
Maryvale, Wexford
Newtonbrook, Willowdale
Runnymede, Swansea
St. James Town
The Annex, North Midtown, Yorkville
The Beaches
The Beaches West, India Bazaar
The Danforth West, Riverdale
The Junction North, Runnymede
The Kingsway, Montgomery Road, Old Mill North
Thorncliffe Park
Woburn
Neighborhood

In [90]:

```
plt.figure(figsize=(9,5), dpi = 100)
# title
plt.title('Average rating of Indian Restaurants by Borough')
#On x-axis
plt.xlabel('Borough', fontsize = 15)
#On y-axis
plt.ylabel('Rating', fontsize=15)
#giving a bar plot
indian_rest_tn_neighborhood.groupby('Borough').mean()['Rating'].plot(kind='bar',label='Rat
ing', color='grey')
#legend
plt.legend()
#displays the plot
plt.show()
```



In [33]:

```
# Restaurant with maximum number of likes
indian_rest_details_tn.iloc[indian_rest_details_tn['Likes'].idxmax()]
```

Out[33]:

```
Borough                 Downtown Toronto
Neighborhood                    Christie
ID              4adb969ef964a520332921e3
Name              Banjara Indian Cuisine
Likes                                137
Rating                               8.9
Tips                                  72
Price                             Cheap
Name: 34, dtype: object
```

In [34]:

```
indian_rest_tn_neighborhood=indian_rest_details_tn.groupby(['ID','Neighborhood','Name'], a
s_index=False).max()[['ID','Neighborhood','Name','Likes']]
indian_rest_tn_neighborhood.columns=['ID','Neighborhood','Name','Likes']
indian_rest_tn_likes=indian_rest_tn_neighborhood.sort_values(['Likes'],ascending=False)
indian_rest_tn_likes.head()
```

Out[34]:

	ID	Neighborhood	Name	Likes
3	4adb969ef964a520332921e3	Christie	Banjara Indian Cuisine	137.0
4	4ae0c7a8f964a520638221e3	The Beaches West, India Bazaar	Udupi Palace	79.0
5	4aecbbb0f964a520bcca21e3	Brockton, Exhibition Place, Parkdale Village	Mother India	46.0
39	50b79b94e4b0a577af25a83f	Harbourfront East, Toronto Islands, Union Station	Indian Roti House	39.0
26	4c62c59ce1621b8dd0332453	The Annex, North Midtown, Yorkville	Roti Cuisine of India	39.0

In [35]:

Out[35]:

```
Borough                 Downtown Toronto
Neighborhood                    Christie
ID              4adb969ef964a520332921e3
Name              Banjara Indian Cuisine
Likes                                137
Rating                               8.9
Tips                                  72
Price                             Cheap
Name: 34, dtype: object
```

In [36]:

```
indian_rest_tn_neighborhood=indian_rest_details_tn.groupby(['ID','Neighborhood','Name'], as_index=False).max()[['ID','Neighborhood','Name','Tips']]
indian_rest_tn_neighborhood.columns=['ID','Neighborhood','Name','Tips']
indian_rest_tn_tips=indian_rest_tn_neighborhood.sort_values(['Tips'],ascending=False)
indian_rest_tn_tips.head()
```

Out[36]:

	ID	Neighborhood	Name	Tips
3	4adb969ef964a520332921e3	Christie	Banjara Indian Cuisine	72.0
4	4ae0c7a8f964a520638221e3	The Beaches West, India Bazaar	Udupi Palace	31.0
5	4aecbbb0f964a520bcca21e3	Brockton, Exhibition Place, Parkdale Village	Mother India	31.0
22	4bf96c435317a593a23a017f	Dorset Park, Scarborough Town Centre, Wexford ...	Karaikudi Chettinad South Indian Restaurant	23.0
14	4b7369d7f964a52049ad2de3	Christie	Madras Masala	21.0

Toronto Area Restaurants - By Rating

In [37]:

Out[37]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips	
32	Central Toronto	The Annex, North Midtown, Yorkville	4c62c59ce1621b8dd0332453	Roti Cuisine of India	39.0	8.9	18.0	Mo
34	Downtown Toronto	Christie	4adb969ef964a520332921e3	Banjara Indian Cuisine	137.0	8.9	72.0	Ch
15	East Toronto	The Beaches West, India Bazaar	4ae0c7a8f964a520638221e3	Udupi Palace	79.0	8.6	31.0	Ch
25	Downtown Toronto	Cabbagetown, St. James Town	4c8c21fdf0ce236ab28e15ef	Butter Chicken Factory	19.0	8.5	10.0	Mo
37	West Toronto	Brockton, Exhibition Place, Parkdale Village	4aecbbb0f964a520bcca21e3	Mother India	46.0	8.4	31.0	Mo
1	Scarborough	Cedarbrae	4d6008f829ef236a8832a059	CANBE Foods Inc	22.0	8.2	8.0	Mo
40	West Toronto	High Park, The Junction South	4b511f6ff964a520994327e3	Curry Twist	20.0	8.1	17.0	Mo
10	East York	Thorncliffe Park	4daf08e66e81e2dffdd4fe40	Iqbal Kebab & Sweet Centre	13.0	8.1	7.0	Ch
16	East Toronto	The Beaches West, India Bazaar	4afc9816f964a520312422e3	Motimahal	25.0	8.0	13.0	Mo
26	Downtown Toronto	Church and Wellesley	4bedf8b5e24d20a17b567214	Kothur Indian Cuisine	13.0	8.0	16.0	Mo

Toronto Area Restaurants - By Likes

In [38]:

Out[38]:

	Borough	Neighborhood	ID	Name	Likes	Rating	Tips	
34	Downtown Toronto	Christie	4adb969ef964a520332921e3	Banjara Indian Cuisine	137.0	8.9	72.0	C
15	East Toronto	The Beaches West, India Bazaar	4ae0c7a8f964a520638221e3	Udupi Palace	79.0	8.6	31.0	C
37	West Toronto	Brockton, Exhibition Place, Parkdale Village	4aecbbb0f964a520bcca21e3	Mother India	46.0	8.4	31.0	M
32	Central Toronto	The Annex, North Midtown, Yorkville	4c62c59ce1621b8dd0332453	Roti Cuisine of India	39.0	8.9	18.0	M
30	Downtown Toronto	Harbourfront East, Toronto Islands, Union Station	50b79b94e4b0a577af25a83f	Indian Roti House	39.0	7.7	14.0	M
35	Downtown Toronto	Christie	4b7369d7f964a52049ad2de3	Madras Masala	32.0	7.8	21.0	M
33	Central Toronto	The Annex, North Midtown, Yorkville	4ad4c060f964a5204af720e3	The Host	29.0	7.8	12.0	M
4	Scarborough	Dorset Park, Scarborough Town Centre, Wexford ...	4bf96c435317a593a23a017f	Karaikudi Chettinad South Indian Restaurant	27.0	6.2	23.0	M
16	East Toronto	The Beaches West, India Bazaar	4afc9816f964a520312422e3	Motimahal	25.0	8.0	13.0	M
23	Central Toronto	Davisville	4b7ccc72f964a520e3a52fe3	Banjara Indian Cuisine	23.0	6.8	19.0	M

In [53]:

Out[53]:

	Borough_x	Neighborhood	ID	Name	Likes	Rating	Tips	
0	Scarborough	Woburn	0	0	0.0	0.0	0.0	0
1	Scarborough	Cedarbrae	4d6008f829ef236a8832a059	CANBE Foods Inc	22.0	8.2	8.0	M
2	Scarborough	Cedarbrae	4c77fc87bd346dcb8c90f0ef	La Sani Grill	13.0	6.9	12.0	M
3	Scarborough	Dorset Park, Scarborough Town Centre, Wexford ...	5226562611d2cd49d83ef03b	Kairali	9.0	7.7	6.0	M
4	Scarborough	Dorset Park, Scarborough Town Centre, Wexford ...	4bf96c435317a593a23a017f	Karaikudi Chettinad South Indian Restaurant	27.0	6.2	23.0	M
5	Scarborough	Maryvale, Wexford	4c27cddd9fb5d13a8cab9857	Patna Kebab House	4.0	7.8	6.0	C
6	Scarborough	Agincourt	4d570727fb65236a7f600db4	Silver Spoon Pak-Indian Restaurant	10.0	7.5	6.0	M
7	North York	Newtonbrook, Willowdale	4b43dde2f964a52099ec25e3	Earth Indian Restaurant	4.0	5.9	11.0	M
8	East Toronto	The Beaches	4dcd7c6352b1f8915b7e7f7e	Delhi Bistro	5.0	6.6	3.0	M
9	East York	Leaside	504bcf32e4b0ef19b0e2ecf8	Mt Everest Restaurant	8.0	6.6	6.0	M
10	East York	Thorncliffe Park	4daf08e66e81e2dffdd4fe40	Iqbal Kebab & Sweet Centre	13.0	8.1	7.0	C
11	East York	Thorncliffe Park	4bed9f2fbac3c9b6ad93fee9	Hakka Garden	10.0	6.4	12.0	M
12	East York	Thorncliffe Park	507a19e5e4b0602b62f73d11	Faley Restaurant	6.0	6.7	4.0	M

In [67]:

```
!conda install -c conda-forge folium=0.5.0 --yes
import folium
```

```
Solving environment: done

# All requested packages already installed.
```

In [70]:

```
# create map and display it
# get geo location of address
def geo_location(address):
    geolocator = Nominatim(user_agent="my_explorer")
    location = geolocator.geocode(address)
    Latitude = location.latitude
    Longitude = location.longitude
return Latitude,Longitude
```

Out[70]:

```
(43.706748299999994, -79.5940544)
```

In [74]:

```
toronto_map = folium.Map(location=geo_location('Toronto'), zoom_start=12)
```

In [71]:

```
# instantiate a feature group for the restaurants in the dataframe
restaurants = folium.map.FeatureGroup()
# loop through the 100 crimes and add each to the incidents feature group
for lat, lng, in indian_rest_tn_merged[['Latitude','Longitude']].values:
    restaurants.add_child(
    folium.CircleMarker(
    [lat, lng],
    radius=10, # define how big you want the circle markers to be
    color='orange',
    fill=True,
    fill_color='black',
    fill_opacity=0.6
    )
)
```

In [73]:

```
indian_rest_tn_merged['Label']=indian_rest_tn_merged['Neighborhood']+', '+indian_rest_tn_m
erged['Borough_x']+'('+indian_rest_tn_merged['Rating'].map(str)+')'
```

In [77]:

```
# add pop-up text to each marker on the map
for lat, lng, label in indian_rest_tn_merged[['Latitude','Longitude','Label']].values:
    folium.Marker([lat, lng], popup=label).add_to(toronto_map)
# add incidents to map
toronto_map.add_child(restaurants)
```

Out[77]:

In [79]:

```
toronto_map.save('toronto_indian_restaurants.html') #Sometimes the map is not visible. Hen
ce an image is extracted and uploaded to GitHub
```

Conclusion

Based on the data set and analysis

- The Beaches West, India Bazaar neighborhood in East Toronto Borough is the best place for Indian restaurants
- Christie, Davisville and Thorncliffe park are the next best neighborhoods for Indian cuisine
- Boroughs- Downtown Toronto, East Toronto and Scarborough has the most number of Indian restaurants in Greater Toronto Area
- Banjara Indian Cuisine is rated as the best indian restaurant with cheap pricing
- Roti Indian cuisine is equally good but it is a little expensive

From an Immigrant perspective, it is better to stay in the East Toronto area to start, as it has the most Indian restaurants.

To answer the other questions from our background-

- Which is the best place to stay if I prefer Indian Cuisine? **The Beaches West, Indian Bazaar neighborhood**
- What is the best location in Toronto for Indian Cuisine? **Downtown and East Toronto**
- Which areas lack Indian Restaurants and have potential for a new Indian Restaurant? **Etobioke, North York and York seem to have potential for some Indian cuisine. But the demographic and 'likes' need to be researched for market analysis.**