Capstone Project - The Battle of Neighbourhoods

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Contents

Overview :

I will be playing a role of a Consultant who helps people in Restaurant business by Recommending appropriate location and cuisine type for the Restaurant .

This analysis is likely to increase the profit margin to a great extent by providing in depth analysis and providing answer to the most important questions :

- Where to open a new Restaurant
- Which type of Cuisine is best suitable for the business?

Problem Statement:

A Restaurant Company "XYZ" is looking to open new restaurants in Toronto area. They are not able to narrow down the location options and suitable cuisine for the restaurants. The company wants to find out the most suitable location for the restaurant which is likely to get maximum customers possible. Along with the location, the company also wants to find out the best suitable Cuisine according to the locality which will enhance the chances of the attracting more customers.

The Company have below cuisine options for the restaurant:

- Vegetarian / Vegan restaurant
- Mexican restaurant
- Indian restaurant
- Japanese restaurant
- Italian restaurant

Background:

Two years back the Restaurant company opened a restaurant in London.

The restaurant business was fine for first two months but soon the business started going down with very huge loss. Eventually the Company decided to close the restaurant due to the Campany had to incur a huge loss.

Keeping the incident in mind, the officials at the Restaurant company decided to get professional consultation for the detailed analysis of **where and what** before opening a new restaurant chain in Toronto.

Data:

Data Sources:

Postal Codes for Toronto on wekipedia:

Toronto - 103 FSAs

Note: There are no rural FSAs in Toronto, hence no postal codes should start with M0. However, the postal code M0R 8T0 is assigned to an Amazon warehouse in Mississauga, and the postal code M0R 2A2 is used for the Gateway postal facility in Mississauga, suggesting that Canada Post may have reserved the M0 FSA for high volume addresses.

Postal Code	Borough	Neighbourhood
M1A	Not assigned	Not assigned
M2A	Not assigned	Not assigned
M3A	North York	Parkwoods
M4A	North York	Victoria Village
M5A	Downtown Toronto	Regent Park, Harbourfront
M6A	North York	Lawrence Manor, Lawrence Heights
M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government
M8A	Not assigned	Not assigned
M9A	Etobicoke	Islington Avenue, Humber Valley Village
M1B	Scarborough	Malvern, Rouge
M2B	Not assigned	Not assigned
M3B	North York	Don Mills
M4B	East York	Parkview Hill, Woodbine Gardens
M5B	Downtown	Garden District, Ryerson

Get the Postal Code Data from Wikipedia page and create a dataframe:

```
url = 'https://en.wikipedia.org/w/index.php?title=List_of_postal_codes_of_Canada:_M&direction=prev&oldid=1012023397'
```

Using padas read_html function to read the url data

```
data = pd.read_html(url, flavor='bs4')
```

	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
...	...	...	...
175	M5Z	Not assigned	Not assigned
176	M6Z	Not assigned	Not assigned
177	M7Z	Not assigned	Not assigned
178	M8Z	Etobicoke	Mimico NW, The Queensway West, South of Bloor,...
179	M9Z	Not assigned	Not assigned

Now process the dataframe to remove the Not assigned Boroughs.
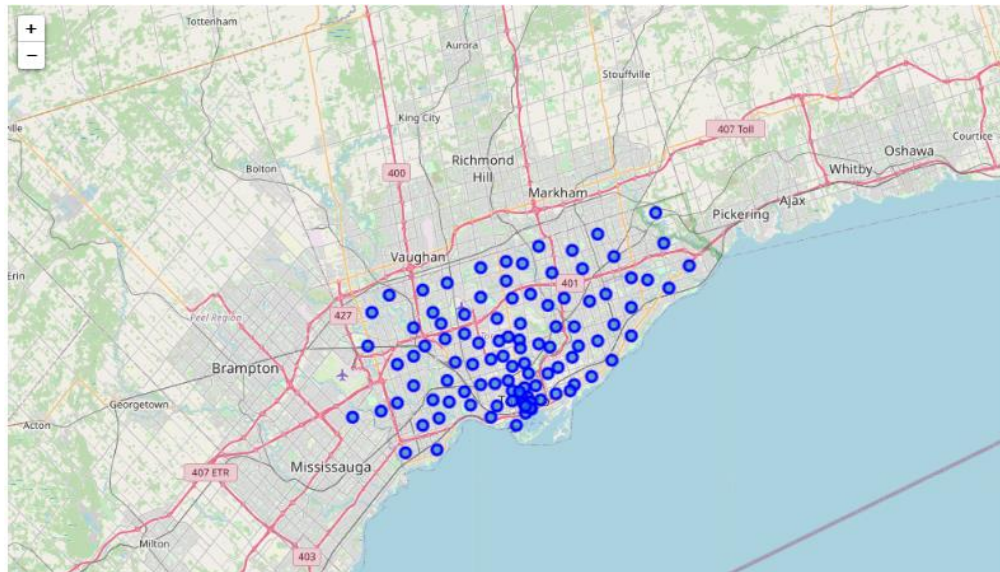
Get Geospatial using the geocoder.

	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
...	...	...	...
98	M9N	43.706876	-79.518188
99	M9P	43.696319	-79.532242
100	M9R	43.688905	-79.554724
101	M9V	43.739416	-79.588437
102	M9W	43.706748	-79.594054

Merge the data :

	Postal Code	Borough	Neighbourhood	Latitude	Longitude
0	M1B	Scarborough	Malvern, Rouge	43.806686	-79.194353
1	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711
3	M1G	Scarborough	Woburn	43.770992	-79.216917
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476
...	...	...	...	...	...
98	M9N	York	Weston	43.706876	-79.518188
99	M9P	Etobicoke	Westmount	43.696319	-79.532242
100	M9R	Etobicoke	Kingsview Village, St. Phillips, Martin Grove ...	43.688905	-79.554724
101	M9V	Etobicoke	South Steeles, Silverstone, Humbergate, Jamest...	43.739416	-79.588437
102	M9W	Etobicoke	Northwest, West Humber - Clairville	43.706748	-79.594054

103 rows × 5 columns

Map of Toronto to visualize the neighbourhoods.

Get the Venue data using the Foursquare API:

Creating the details required for Foursquare:

```
CLIENT_ID = 'X████████████████████████L537A3EX07O7MTRGQ█████
CLIENT_SECRET = '███████████████████████SUGEBCDWVUCMEA█████████
VERSION = '20180605' # Foursquare API version

print('Your credentails:')
print('CLIENT_ID: ' + CLIENT_ID)
print('CLIENT_SECRET:' + CLIENT_SECRET)
```

	Postal Code	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	M4E	43.676357	-79.293031	Glen Manor Ravine	43.676821	-79.293942	Trail
1	M4E	43.676357	-79.293031	Tori's Bakeshop	43.672114	-79.290331	Vegetarian / Vegan Restaurant
2	M4E	43.676357	-79.293031	Beaches Bake Shop	43.680363	-79.289692	Bakery
3	M4E	43.676357	-79.293031	The Beech Tree	43.680493	-79.288846	Gastropub
4	M4E	43.676357	-79.293031	The Fox Theatre	43.672801	-79.287272	Indie Movie Theater

Implementing One-Hot Encoding on the Venue Category

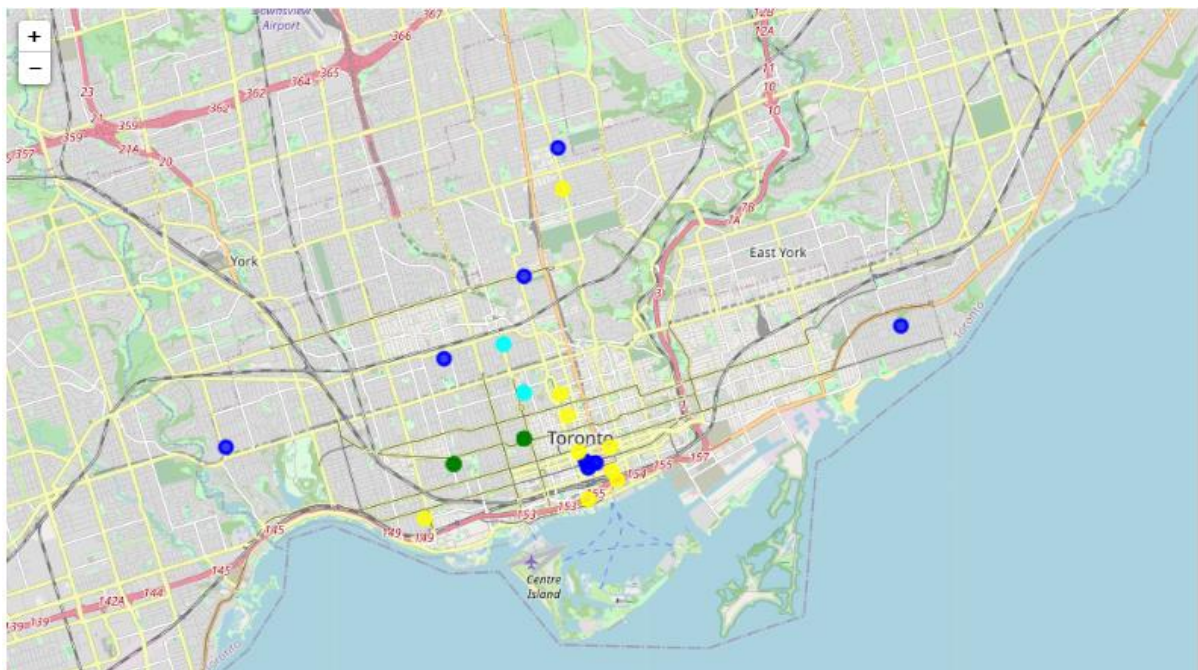|	Postal Code	Accessories Store	Adult Boutique	Airport	Airport Food Court	Airport Gate	Airport Lounge	Airport Service	Airport Terminal	American Restaurant	...	University	Vegetarian / Vegan Restaurant	Video Game Store	Video Store	Vietnamese Restaurant	Whi
0	M4E	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	
1	M4E	0	0	0	0	0	0	0	0	0	...	0	1	0	0	0	
2	M4E	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	
3	M4E	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	
4	M4E	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	

Unique Restaurants:

```
array(['Vegetarian / Vegan Restaurant', 'French Restaurant',
       'Mexican Restaurant', 'Japanese Restaurant',
       'Mediterranean Restaurant', 'Indian Restaurant', 'Thai Restaurant',
       'Caribbean Restaurant', 'Ramen Restaurant', 'Greek Restaurant',
       'Asian Restaurant', 'Italian Restaurant', 'Restaurant',
       'Tapas Restaurant', 'Tibetan Restaurant', 'Cuban Restaurant',
       'New American Restaurant', 'Fast Food Restaurant',
       'Falafel Restaurant', 'Chinese Restaurant', 'Sushi Restaurant',
       'Pakistani Restaurant', 'Indian Chinese Restaurant',
       'Seafood Restaurant', 'Middle Eastern Restaurant',
       'American Restaurant', 'Comfort Food Restaurant',
       'Latin American Restaurant', 'Vietnamese Restaurant',
       'Indonesian Restaurant', 'Syrian Restaurant',
       'Cantonese Restaurant', 'German Restaurant',
       'Modern European Restaurant', 'Taiwanese Restaurant',
       'Filipino Restaurant', 'Theme Restaurant', 'Korean Restaurant',
       'Spanish Restaurant', 'Portuguese Restaurant',
       'Molecular Gastronomy Restaurant', 'Brazilian Restaurant',
       'Jewish Restaurant', 'Doner Restaurant',
       'Eastern European Restaurant', 'Dumpling Restaurant',
       'Belgian Restaurant', 'Udon Restaurant', 'Sri Lankan Restaurant',
       'Persian Restaurant', 'Gluten-free Restaurant',
       'Ethiopian Restaurant', 'Hawaiian Restaurant',
       'Cajun / Creole Restaurant'], dtype=object)
```

Clustering the data for each Cuisine (Restaurant) type to get the suitable neighbourhood for the new Restaurant:

Vegetarian / Vegan Restaurants:

Map to show Clusters of Vegetarian Restaurants in the neighbourhood

Clustering:

Analysing all the clusters to find out most suitable neighbourhood for the restaurants

Cluster 0:

No Veg Restaurants found

```
#Cluster 0
Veg_merged.loc[(Veg_merged['Cluster Labels'] ==0) & (Veg_merged['Venue Category'] == 'Vegetarian / Vegan Restaurant') ]
```

Veg Restauant Recommendation:

Suitable Neighbourhood for Veg restaurant in cluster 0 are : 'Church and Wellesley', 'The Danforth West, Riverdale', 'Garden District, Ryerson', 'Studio District', 'India Bazaar, The Beaches West'

Cluster 1 is having many Veg/Vegan restaurants mainly in : The Beaches, D, avisville North, First Canadian Place, Commerce Court, Toronto Dominion Centre.

This cluster is not recommended for a new Veg restaurant

```
#Cluster 1
Veg_merged.loc[(Veg_merged['Cluster Labels'] ==1) & (Veg_merged['Venue Category'] == 'Vegetarian / Vegan Restaurant') ]
```

	Postal Code	Vegetarian / Vegan Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
21	M5L	0.020000	1	43.648198	-79.379817	Rosalinda	43.650252	-79.385156	Vegetarian / Vegan Restaurant	Downtown Toronto	Commerce Court, Victoria Hotel
20	M5K	0.020000	1	43.647177	-79.381576	Fresh On Front	43.647815	-79.374453	Vegetarian / Vegan Restaurant	Downtown Toronto	Toronto Dominion Centre, Design Exchange
20	M5K	0.020000	1	43.647177	-79.381576	Rosalinda	43.650252	-79.385156	Vegetarian / Vegan Restaurant	Downtown Toronto	Toronto Dominion Centre, Design Exchange
21	M5L	0.020000	1	43.648198	-79.379817	Fresh On Front	43.647815	-79.374453	Vegetarian / Vegan Restaurant	Downtown Toronto	Commerce Court, Victoria Hotel
30	M6G	0.015625	1	43.669542	-79.422564	Annapurna Vegetarian Restaurant	43.672804	-79.414087	Vegetarian / Vegan Restaurant	Downtown Toronto	Christie
37	M6S	0.014925	1	43.651571	-79.484450	Awai	43.650412	-79.478477	Vegetarian / Vegan Restaurant	West Toronto	Runnymede, Swansea
29	M5X	0.020000	1	43.648429	-79.382280	Rosalinda	43.650252	-79.385156	Vegetarian / Vegan Restaurant	Downtown Toronto	First Canadian Place, Underground city

Cluster 2:

The cluster 2 is having multiple Veg restaurants in the Neighbourhood : Kensington Market, Chinatown, Grange Park, Little Portugal, Trinity.

```
#Cluster 2
Veg_merged.loc[(Veg_merged['Cluster Labels'] ==2) & (Veg_merged['Venue Category'] == 'Vegetarian / Vegan Restaurant') ]
```

	Postal Code	Vegetarian / Vegan Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
26	M5T	0.05	2	43.653206	-79.400049	Vegetarian Haven	43.656016	-79.392758	Vegetarian / Vegan Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
26	M5T	0.05	2	43.653206	-79.400049	Fresh On Spadina	43.648048	-79.396008	Vegetarian / Vegan Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
26	M5T	0.05	2	43.653206	-79.400049	Buddha's Vegetarian	43.651904	-79.403312	Vegetarian / Vegan Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
26	M5T	0.05	2	43.653206	-79.400049	Urban Herbivore	43.656193	-79.402673	Vegetarian / Vegan Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
26	M5T	0.05	2	43.653206	-79.400049	Hibiscus	43.655454	-79.402439	Vegetarian / Vegan Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
32	M6J	0.04	2	43.647927	-79.419750	Feel Good Guru	43.645488	-79.412575	Vegetarian / Vegan Restaurant	West Toronto	Little Portugal, Trinity
32	M6J	0.04	2	43.647927	-79.419750	E.L. Ruddy Co. Cafe	43.649532	-79.427828	Vegetarian / Vegan Restaurant	West Toronto	Little Portugal, Trinity

Cluster 3:

The cluster 3 is having multiple Veg restaurants in the Neighbourhood. Not recommended for new restaurant

```
#Cluster 3
Veg_merged.loc[(Veg_merged['Cluster Labels'] ==3) & (Veg_merged['Venue Category'] == 'Vegetarian / Vegan Restaurant') ]
```

	Postal Code	Vegetarian / Vegan Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
15	M5C	0.010000	3	43.651494	-79.375418	Fresh On Front	43.647815	-79.374453	Vegetarian / Vegan Restaurant	Downtown Toronto	St. James Town
33	M6K	0.010000	3	43.636847	-79.428191	Live Market	43.640044	-79.421433	Vegetarian / Vegan Restaurant	West Toronto	Brockton, Parkdale Village, Exhibition Place
38	M7A	0.010000	3	43.662301	-79.389494	Vegetarian Haven	43.656016	-79.392758	Vegetarian / Vegan Restaurant	Downtown Toronto	Queen's Park, Ontario Provincial Government
19	M5J	0.010000	3	43.640816	-79.381752	Kupfert & Kim	43.641179	-79.378144	Vegetarian / Vegan Restaurant	Downtown Toronto	Harbourfront East, Union Station, Toronto Islands
7	M4S	0.012821	3	43.704324	-79.388790	Fresh	43.707324	-79.395649	Vegetarian / Vegan Restaurant	Central Toronto	Davisville
18	M5H	0.010000	3	43.650571	-79.384568	Rosalinda	43.650252	-79.385156	Vegetarian / Vegan Restaurant	Downtown Toronto	Richmond, Adelaide, King

Cluster 4:

Veg Restauant Recommendation:

Suitable Neighbourhood for Veg restaurant in cluster 4 are : University of Toronto, Harbord

```
#Cluster 4
Veg_merged.loc[(Veg_merged['Cluster Labels'] ==4) & (Veg_merged['Venue Category'] == 'Vegetarian / Vegan Restaurant') ]
```

	Postal Code	Vegetarian / Vegan Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
24	M5R	0.027027	4	43.672710	-79.405678	Annapurna Vegetarian Restaurant	43.672804	-79.414087	Vegetarian / Vegan Restaurant	Central Toronto	The Annex, North Midtown, Yorkville
24	M5R	0.027027	4	43.672710	-79.405678	Fresh on Bloor	43.666755	-79.403491	Vegetarian / Vegan Restaurant	Central Toronto	The Annex, North Midtown, Yorkville
25	M5S	0.030000	4	43.662696	-79.400049	The Hogtown Vegan	43.657007	-79.405302	Vegetarian / Vegan Restaurant	Downtown Toronto	University of Toronto, Harbord
25	M5S	0.030000	4	43.662696	-79.400049	Fresh on Bloor	43.666755	-79.403491	Vegetarian / Vegan Restaurant	Downtown Toronto	University of Toronto, Harbord

Vegetarian/ Vegan Restaurant Recommendation:

It is suitable to open a new Vegetarian / Vegan restaurant in below neighbourhoods:

- Church and Wellesley
- The Danforth West, Riverdale
- Garden District, Ryerson'
- Studio District
- India Bazaar, The Beaches West
- University of Toronto, Harbord

In similar all the restaurants were clustered and analysed to find out the best recommendation.

Indian Restaurants:

Map to show Clusters of Indian Restaurants in the neighbourhood

Clustering
Analysing all the clusters to find out most suitable neighbourhood for the restaurants

```
#Cluster 1
Indian_merged.loc[(Indian_merged['Cluster Labels'] ==1) & (Indian_merged['Venue Category'] == 'Indian Restaurant') ]
```

	Postal Code	Indian Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
2	M4L	0.117647	1	43.668999	-79.315572	Udupi Palace	43.672480	-79.321275	Indian Restaurant	East Toronto	India Bazaar, The Beaches West
2	M4L	0.117647	1	43.668999	-79.315572	Motimahal	43.672175	-79.322532	Indian Restaurant	East Toronto	India Bazaar, The Beaches West
2	M4L	0.117647	1	43.668999	-79.315572	Bombay Chowpatty	43.671875	-79.324114	Indian Restaurant	East Toronto	India Bazaar, The Beaches West
2	M4L	0.117647	1	43.668999	-79.315572	Haandi 2000	43.671929	-79.323662	Indian Restaurant	East Toronto	India Bazaar, The Beaches West
2	M4L	0.117647	1	43.668999	-79.315572	Gautama	43.672150	-79.322877	Indian Restaurant	East Toronto	India Bazaar, The Beaches West
2	M4L	0.117647	1	43.668999	-79.315572	Lahori Taste & Burger House	43.671656	-79.324581	Indian Restaurant	East Toronto	India Bazaar, The Beaches West

```
#Cluster 3
Indian_merged.loc[(Indian_merged['Cluster Labels'] ==3) & (Indian_merged['Venue Category'] == 'Indian Restaurant') ]
```

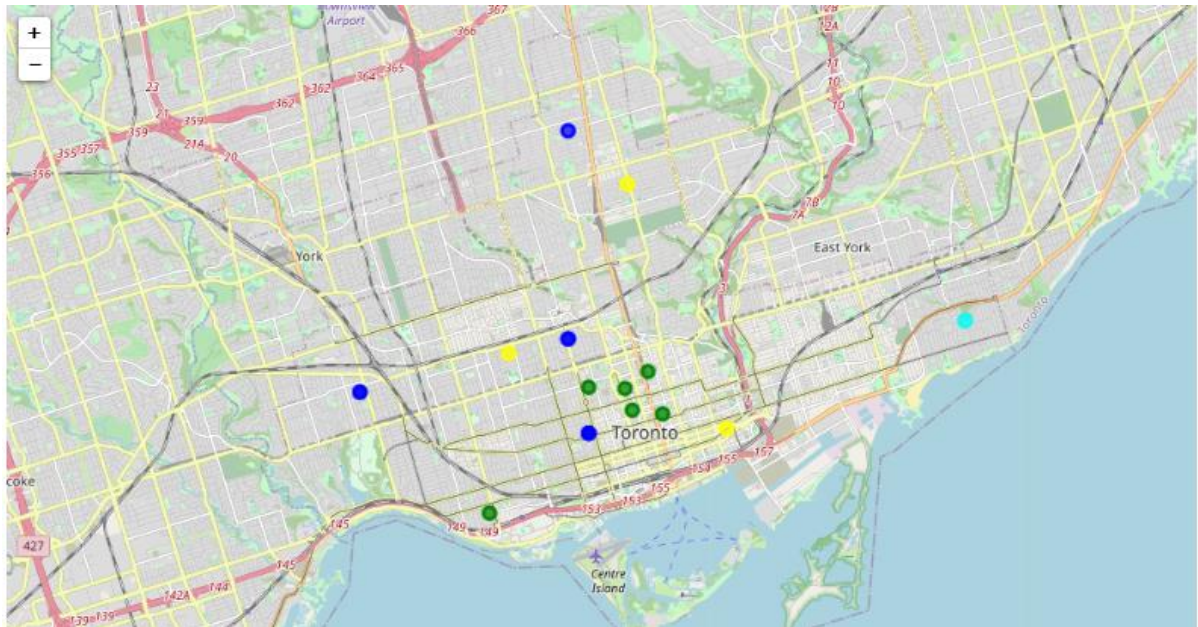|	Postal Code	Indian Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
35	M6P	0.014493	3	43.661608	-79.464763	Curry Twist	43.665581	-79.470541	Indian Restaurant	West Toronto	High Park, The Junction South
37	M6S	0.014925	3	43.651571	-79.484450	Bukhara indian cuisine	43.651105	-79.477104	Indian Restaurant	West Toronto	Runnymede, Swansea
1	M4K	0.010000	3	43.679557	-79.352188	Sher-E-Punjab	43.677308	-79.353066	Indian Restaurant	East Toronto	The Danforth West, Riverdale
33	M6K	0.010000	3	43.636847	-79.428191	Mother India	43.640718	-79.436259	Indian Restaurant	West Toronto	Brockton, Parkdale Village, Exhibition Place
24	M5R	0.013514	3	43.672710	-79.405678	Roti Cuisine of India	43.674618	-79.408249	Indian Restaurant	Central Toronto	The Annex, North Midtown, Yorkville

Indian Restaurant Recommendation:

It is suitable to open a new Indian restaurant in below neighbourhoods:

- The Beaches , Runnymede
- The Junction, Weston-Pellam Park

Mexican Restaurants:

Map to show Clusters of **Mexican** Restaurants in the neighbourhood

Clustering

Analysing all the clusters to find out most suitable neighbourhood for the restaurants

```
#Cluster 1
Mexican_merged.loc[(Mexican_merged['Cluster Labels'] ==1) & (Mexican_merged['Venue Category'] == 'Mexican Restaurant') ]
```

	Postal Code	Mexican Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
26	M5T	0.030000	1	43.653206	-79.400049	Seven Lives - Tacos y Mariscos	43.654418	-79.400545	Mexican Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
26	M5T	0.030000	1	43.653206	-79.400049	Torteria San Cosme	43.654702	-79.400646	Mexican Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
26	M5T	0.030000	1	43.653206	-79.400049	El Trompo	43.655832	-79.402561	Mexican Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
24	M5R	0.027027	1	43.672710	-79.405678	Playa Cabana	43.676112	-79.401279	Mexican Restaurant	Central Toronto	The Annex, North Midtown, Yorkville
35	M6P	0.028986	1	43.661608	-79.464763	La Revolucion	43.665460	-79.464308	Mexican Restaurant	West Toronto	High Park, The Junction South

```
#Cluster 2
Mexican_merged.loc[(Mexican_merged['Cluster Labels'] ==2) & (Mexican_merged['Venue Category'] == 'Mexican Restaurant') ]
```

	Postal Code	Mexican Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
17	M5G	0.01	2	43.657952	-79.387383	Chipotle Mexican Grill	43.656860	-79.380910	Mexican Restaurant	Downtown Toronto	Central Bay Street
33	M6K	0.01	2	43.636847	-79.428191	Grand Electric	43.641714	-79.431545	Mexican Restaurant	West Toronto	Brockton, Parkdale Village, Exhibition Place
25	M5S	0.01	2	43.662696	-79.400049	El Trompo	43.655832	-79.402561	Mexican Restaurant	Downtown Toronto	University of Toronto, Harbord
12	M4Y	0.01	2	43.665860	-79.383160	Como En Casa	43.665160	-79.384796	Mexican Restaurant	Downtown Toronto	Church and Wellesley

Mexican Restaurant Recommendation:

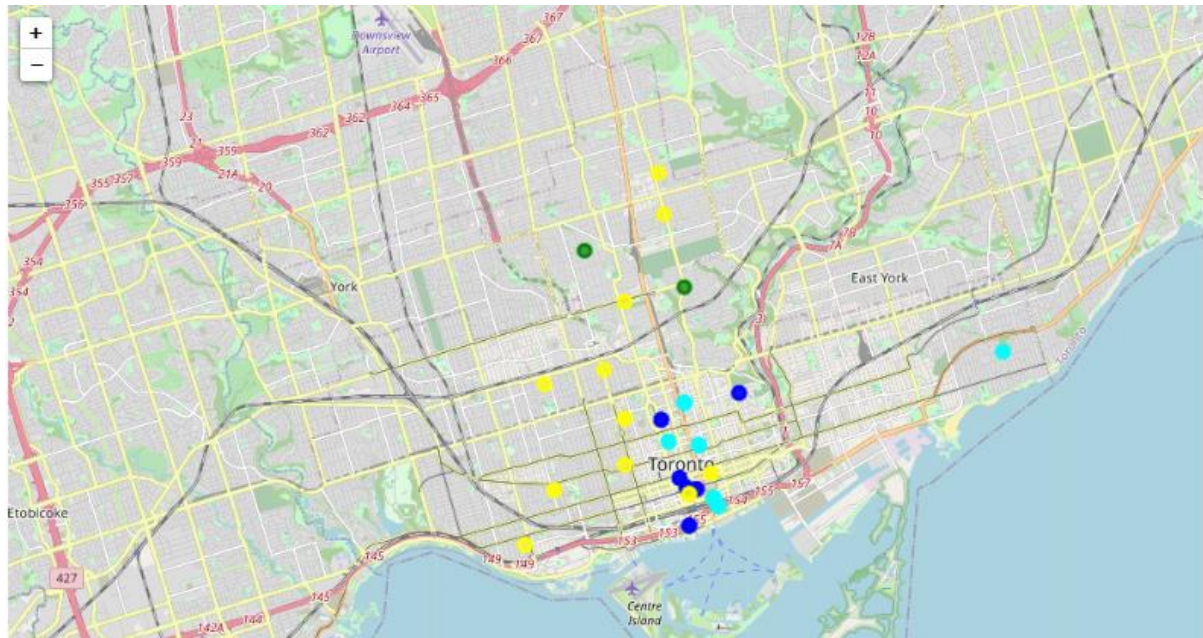## It is suitable to open a new Mexican restaurant in below neighbourhoods:

- Christie
- The Beaches

Japanese Restaurants:

Map to show Clusters of **Japanese** Restaurants in the neighbourhood

Clustering
Analysing all the clusters to find out most suitable neighbourhood for the restaurants

```
#Cluster 1
Japanese_merged.loc[(Japanese_merged['Cluster Labels'] ==1) & (Japanese_merged['Venue Category'] == 'Japanese Restaurant') ]
```

	Postal Code	Japanese Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
29	M5X	0.030000	1	43.648429	-79.382280	Chotto Matte	43.646473	-79.378782	Japanese Restaurant	Downtown Toronto	First Canadian Place, Underground city
29	M5X	0.030000	1	43.648429	-79.382280	Ki Modern Japanese + Bar	43.647223	-79.379374	Japanese Restaurant	Downtown Toronto	First Canadian Place, Underground city
21	M5L	0.030000	1	43.648198	-79.379817	Chotto Matte	43.646473	-79.378782	Japanese Restaurant	Downtown Toronto	Commerce Court, Victoria Hotel
29	M5X	0.030000	1	43.648429	-79.382280	Gyu-Kaku Japanese BBQ	43.651422	-79.375047	Japanese Restaurant	Downtown Toronto	First Canadian Place, Underground city
21	M5L	0.030000	1	43.648198	-79.379817	Ki Modern Japanese + Bar	43.647223	-79.379374	Japanese Restaurant	Downtown Toronto	Commerce Court, Victoria Hotel
19	M5J	0.030000	1	43.640816	-79.381752	Ki Modern Japanese +	43.647223	-79.379374	Japanese	Downtown	Harbourfront East, Union

```
#Cluster 3
Japanese_merged.loc[(Japanese_merged['Cluster Labels'] ==3) & (Japanese_merged['Venue Category'] == 'Japanese Restaurant') ]
```

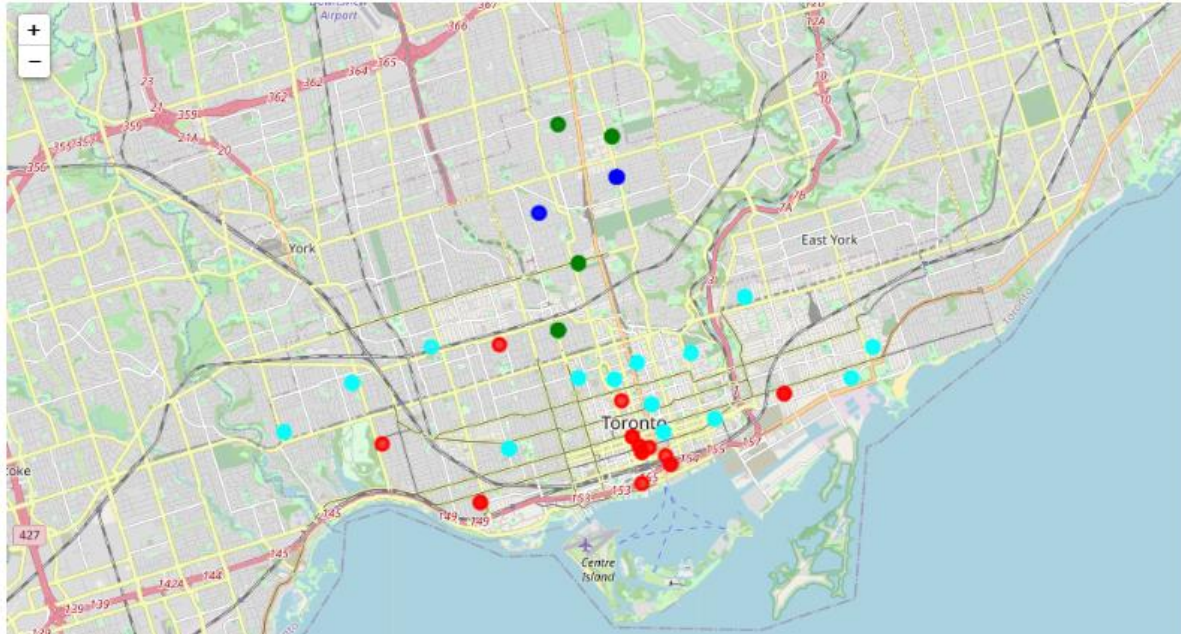|	Postal Code	Japanese Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
26	M5T	0.010000	3	43.653206	-79.400049	Gushi	43.652258	-79.404884	Japanese Restaurant	Downtown Toronto	Kensington Market, Chinatown, Grange Park
33	M6K	0.010000	3	43.636847	-79.428191	Guu Izakaya	43.641846	-79.431086	Japanese Restaurant	West Toronto	Brockton, Parkdale Village, Exhibition Place
30	M6G	0.015625	3	43.669542	-79.422564	Japanhako	43.663811	-79.417655	Japanese Restaurant	Downtown Toronto	Christie
32	M6J	0.020000	3	43.647927	-79.419750	Imanishi Japanese Kitchen	43.649546	-79.426551	Japanese Restaurant	West Toronto	Little Portugal, Trinity
32	M6J	0.020000	3	43.647927	-79.419750	Bazara	43.648535	-79.420521	Japanese Restaurant	West Toronto	Little Portugal, Trinity
20	M5K	0.020000	3	43.647177	-79.381576	Ki Modern Japanese + Bar	43.647223	-79.379374	Japanese Restaurant	Downtown Toronto	Toronto Dominion Centre, Design Exchange
15	M5C	0.020000	3	43.651494	-79.375418	Gyu-Kaku Japanese BBQ	43.651422	-79.375047	Japanese Restaurant	Downtown Toronto	St. James Town
9	M4V	0.016393	3	43.686412	-79.400049	Suki Japanese Cuisine	43.688668	-79.391854	Japanese Restaurant	Central Toronto	Summerhill West, Rathnelly, South Hill, Forest...
15	M5C	0.020000	3	43.651494	79.375418	Ki Modern Japanese +	43.647223	79.379374	Japanese	Downtown	St. James Town

Japanese Restaurant Recommendation:

It is suitable to open a new Japanese restaurant in below neighbourhoods:

- Moore Park, Summerhill East'

Itallian Restaurants:

Map to show Clusters of **Italian** Restaurants in the neighbourhood

Clustering
Analysing all the clusters to find out most suitable neighbourhood for the restaurants

```
#Cluster 0
Italian_merged.loc[(Italian_merged['Cluster Labels'] ==0) & (Italian_merged['Venue Category'] == 'Italian Restaurant') ]
```

	Postal Code	Italian Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
28	M5W	0.010000	0	43.646435	-79.374846	Terroni	43.650927	-79.375602	Italian Restaurant	Downtown Toronto	Stn A PO Boxes
18	M5H	0.020000	0	43.650571	-79.384568	Terroni	43.650927	-79.375602	Italian Restaurant	Downtown Toronto	Richmond, Adelaide, King
29	M5X	0.020000	0	43.648429	-79.382280	Terroni	43.650927	-79.375602	Italian Restaurant	Downtown Toronto	First Canadian Place, Underground city
29	M5X	0.020000	0	43.648429	-79.382280	TOCA	43.645431	-79.387059	Italian Restaurant	Downtown Toronto	First Canadian Place, Underground city
30	M6G	0.015625	0	43.669542	-79.422564	Vinny's Panini	43.670679	-79.426148	Italian Restaurant	Downtown Toronto	Christie
16	M5E	0.020000	0	43.644771	-79.373306	Terroni	43.650927	-79.375602	Italian Restaurant	Downtown Toronto	Berczy Park
16	M5E	0.020000	0	43.644771	-79.373306	Carisma	43.649617	-79.375434	Italian Restaurant	Downtown Toronto	Berczy Park
17	M5G	0.010000	0	43.657952	-79.387383	Mercatto	43.660391	-79.387664	Italian Restaurant	Downtown Toronto	Central Bay Street

```
#Cluster 4
Italian_merged.loc[(Italian_merged['Cluster Labels'] ==4) & (Italian_merged['Venue Category'] == 'Italian Restaurant') ]
```

	Postal Code	Italian Restaurant	Cluster Labels	Neighborhood Group Latitude	Neighborhood Group Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Borough	Neighbourhood
1	M4K	0.030000	4	43.679557	-79.352188	IL FORNELLO on Danforth	43.678604	-79.346904	Italian Restaurant	East Toronto	The Danforth West, Riverdale
35	M6P	0.043478	4	43.661608	-79.464763	nodo	43.665303	-79.465621	Italian Restaurant	West Toronto	High Park, The Junction South
35	M6P	0.043478	4	43.661608	-79.464763	Annette Food Market	43.662457	-79.470979	Italian Restaurant	West Toronto	High Park, The Junction South
32	M6J	0.040000	4	43.647927	-79.419750	Noce	43.645550	-79.411294	Italian Restaurant	West Toronto	Little Portugal, Trinity
32	M6J	0.040000	4	43.647927	-79.419750	Levetto	43.641425	-79.422180	Italian Restaurant	West Toronto	Little Portugal, Trinity
32	M6J	0.040000	4	43.647927	-79.419750	Enoteca Sociale	43.649535	-79.425792	Italian Restaurant	West Toronto	Little Portugal, Trinity
32	M6J	0.040000	4	43.647927	-79.419750	Ufficio	43.649439	-79.423014	Italian Restaurant	West Toronto	Little Portugal, Trinity

Itallian Restaurant Recommendation:

It is suitable to open a new Italian restaurant in below neighbourhoods:

- Kensington Market, Chinatown, Grange Park
- The Beaches
- Runnymede, The Junction, Weston-Pellam Park Carlton Village
- Moore Park, Summerhill East
- Forest Hill North & West, Forest Hill Road Park

Summary

Restaurant and Neighbourhood recommendation:

Restaurant Type	Recommended Neighbourhood
Vegetarian / Vegan Restaurant	• Church and Wellesley • The Danforth West, Riverdale • Garden District, Ryerson' • Studio District • India Bazaar, The Beaches West • University of Toronto, Harbord
Indian Restaurant	• The Beaches, Runnymede • The Junction, Weston- Pellam Park
Mexican Restaurant	• Christie • The Beaches
Japanese Restaurant	• Moore Park, Summerhill East'
Italian Restaurant	• Kensington Market, Chinatown, Grange Park • The Beaches • Runnymede, The Junction, Weston- Pellam Park Carlton Village • Moore Park, Summerhill East • Forest Hill North & West, Forest Hill Road Park

Discussion:

This project will be very helpful to analyse all the possible data and get best recommendations.
The approach is very useful and can be used for n number of fields like Restaurant business, Construction business, Grocery Outlets, Hospitals etc.

I will be enhancing the project going forward.

Future Enhancement and Improvement plan:

- Create a recommender API using the project.
- Further create a web interface to use the API and show recommendations on basis of the location selected.

- Enhance the visualizations and clustering techniques.

Conclusion:

This project will help a Restaurant business to analyse and get recommendation for the best suitable neighbourhood and Restaurant types.

During the whole course I was able to learn the data science techniques which can help us to achieve better goals in nearly all the fields of life like Manufacturing, Construction, Hospitality, Healthcare, Automobile etc.