Business problem and Target niche

- The capstone project that I will pursue will be in the domain of restaurant. The city for that is Toronto, Canada. The **problem statement** is to locate the places that have the restaurants nearby and hence such places would be of more certainty to be helpful for new restaurant owners to be more profitable. My main goal is to use data segmentation technique and machine learning algorithms to predict the location that will have higher success for a restaurant to flourish. The **business problem** that I want to tackle is to find locations that are suitable for the owners of restaurants or franchise so such that there are many restaurants in close proximity enough to get their attention at the opening of new restaurant.

The data that will be used to solve the problem and the source of the data.

- The data available of Toronto neighbourhood from Wikipedia
- The longitude-latitude locations data available from foursquare API
- Data of restaurants available in Toronto from foursquare API.

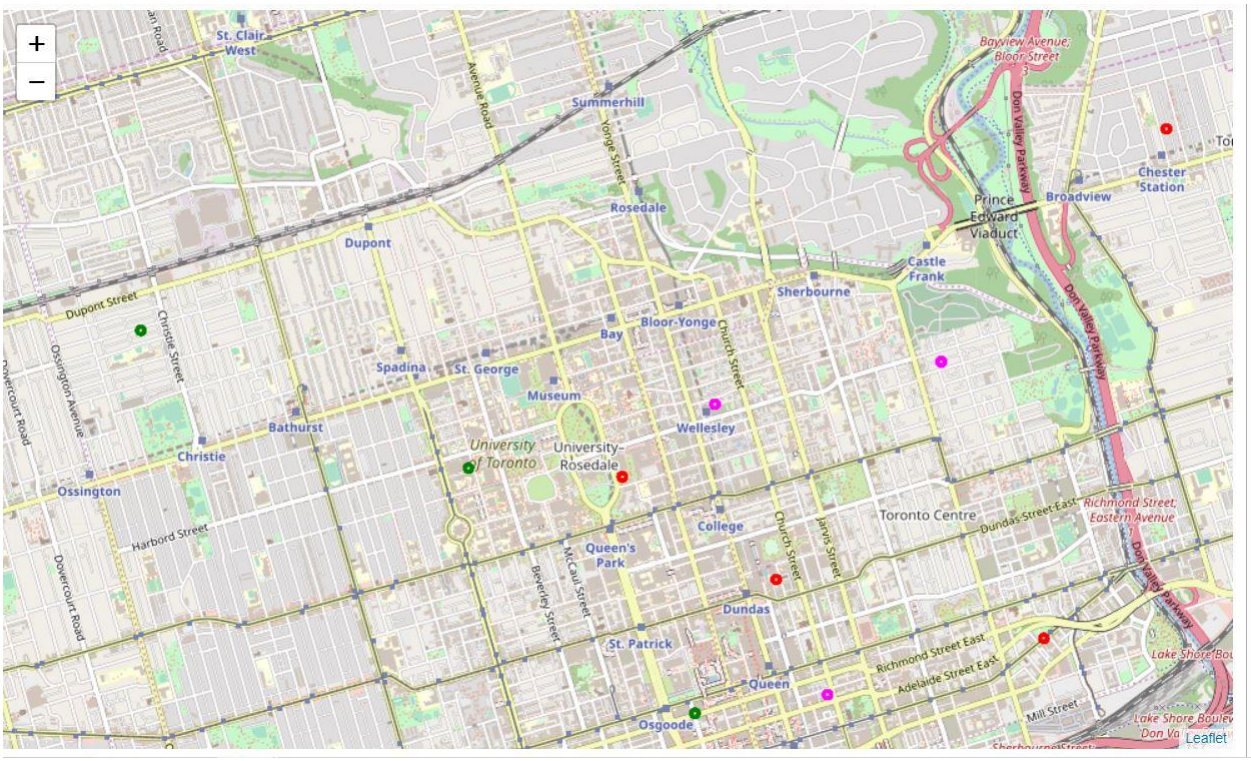
With these data on the location of different neighbourhoods and different location of restaturants, I would be able to get the correct locations in different locality of Toronto where a restaturant and franchise can be opened.

Methodology

- Here K-means clustering was used as out of the 26 restaurnats in different areas which area would best suit for a new restaurant such that our business would flourish more.
- With the help of K-means Clustering, we divided the restaurants in to 5 clusters. With k means clustering we found the there are maximum shops in cluster 2. Cluster 0 and 4 had appropriate number of restaurants and hence they were selected to be the best one for new shops to open.

Results:

- Clustering



- K=0

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

	Neighborhood	Restaurant	Cluster Labels	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
14	Harbourfront East / Union Station / Toronto Is...	0.030000	0	43.640816	-79.381752	Steam Whistle's Biergarten	43.640666	-79.385859	Restaurant
14	Harbourfront East / Union Station / Toronto Is...	0.030000	0	43.640816	-79.381752	Sushi Shop	43.643485	-79.380960	Restaurant
14	Harbourfront East / Union Station / Toronto Is...	0.030000	0	43.640816	-79.381752	Kellys Landing	43.645082	-79.383050	Restaurant
13	Garden District, Ryerson	0.020000	0	43.657162	-79.378937	Jack Astor's Bar & Grill	43.656019	-79.380326	Restaurant
13	Garden District, Ryerson	0.020000	0	43.657162	-79.378937	JOEY Eaton Centre	43.655404	-79.381929	Restaurant
8	Davisville	0.028571	0	43.704324	-79.388790	Starving Artist	43.701538	-79.387240	Restaurant
28	Runnymede / Swansea	0.022222	0	43.651571	-79.484450	Supper Solved	43.648781	-79.485233	Restaurant
36	The Danforth West / Riverdale	0.023810	0	43.679557	-79.352188	Rikkochez	43.677267	-79.353274	Restaurant
23	Queen's Park / Ontario Provincial Government	0.029412	0	43.662301	-79.389494	Gallery Grill	43.663841	-79.394309	Restaurant
24	Regent Park / Harbourfront	0.022222	0	43.654260	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant

- K = 4

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

	Neighborhood	Restaurant	Cluster Labels	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
6	Church and Wellesley	0.037037	4	43.665860	-79.383160	Wish	43.668759	-79.385694	Restaurant
6	Church and Wellesley	0.037037	4	43.665860	-79.383160	O. Noir	43.669145	-79.382505	Restaurant
0	Berczy Park	0.036364	4	43.644771	-79.373306	The Works Gourmet Burger Bistro	43.648742	-79.374142	Restaurant
0	Berczy Park	0.036364	4	43.644771	-79.373306	The Keg Steakhouse + Bar - Esplanade	43.646712	-79.374768	Restaurant
6	Church and Wellesley	0.037037	4	43.665860	-79.383160	Fabarnak	43.666377	-79.380964	Restaurant
1	Brockton / Parkdale Village / Exhibition Place	0.043478	4	43.636847	-79.428191	Vogue Supper Club	43.636951	-79.425446	Restaurant
29	St. James Town	0.040000	4	43.651494	-79.375418	The Carbon Bar	43.653367	-79.374965	Restaurant
29	St. James Town	0.040000	4	43.651494	-79.375418	GEORGE Restaurant	43.653346	-79.374445	Restaurant
29	St. James Town	0.040000	4	43.651494	-79.375418	The Works Gourmet Burger Bistro	43.648742	-79.374142	Restaurant
19	Little Portugal / Trinity	0.040000	4	43.647927	-79.419750	Founder Restaurant & Bar	43.649478	-79.425352	Restaurant
19	Little Portugal / Trinity	0.040000	4	43.647927	-79.419750	Montgomery's	43.644273	-79.418521	Restaurant
21	North Toronto West	0.047619	4	43.715383	-79.405678	Sushi Shop	43.713861	-79.400093	Restaurant
31	Stn A PO Boxes	0.042105	4	43.646435	-79.374846	Marché Mövenpick	43.647262	-79.378600	Restaurant
31	Stn A PO Boxes	0.042105	4	43.646435	-79.374846	The Works Gourmet Burger Bistro	43.648742	-79.374142	Restaurant
31	Stn A PO Boxes	0.042105	4	43.646435	-79.374846	Victoria's Restaurant	43.649298	-79.376431	Restaurant
31	Stn A PO Boxes	0.042105	4	43.646435	-79.374846	The Keg Steakhouse + Bar - Esplanade	43.646712	-79.374768	Restaurant
30	St. James Town / Cabbagetown	0.046512	4	43.667967	-79.367675	Murgatroid	43.667381	-79.369311	Restaurant
29	St. James Town	0.040000	4	43.651494	-79.375418	Bannock	43.652101	-79.381178	Restaurant
30	St. James Town / Cabbagetown	0.046512	4	43.667967	-79.367675	The Pear Tree	43.664904	-79.368246	Restaurant

Discussion and Conclusion:

- From the above analysis we can see that in **cluster 2** has **maximum** number of restaurants.

- Out of the total 5 Clusters, **Cluster 0** and **Cluster 4** have **proportionate** amount of restaurants.

- In **Cluster 2**, we see a lot of restaurants and **Cluster 1** has only 1 restaurant which is very few. Opening in these areas would result in **strong competition** in one and low attraction due to other restaurants in another.

- Hence, we can say that by opening restaurants in

    - Cluster 0: Garden District, Ryerson Harbourfront East, Union Station, The Danforth West , Riverdale, Runnymede , Swansea

    - Cluster 4:Stn A PO Boxes, St. James Town, Cabbagetown, St. James Town

  these areas, one can have enough attraction due to their new restaurants due to already present restaurants and also moderate competition with average number of restaurants in these areas.