Capstone Project - The Battle of Neighborhoods

Opening an Ethiopian Cuisine Restaurant

1. Introduction

i.   Business problem

The purpose of this project is to help investors establish which neighborhood in Toronto would be the best to open an Ethiopian restaurant. We will explore various neighborhoods and demographics of those neighborhoods in order to arrive at an answer to the question "which place/s would be the most ideal to open an Ethiopian restaurant?"

Toronto ranks as the 3rd most diverse city in the world, with over half its residents born abroad. It is often touted as the most multicultural city on the globe. This means generally the population would be open to diverse food offerings.

ii.   Target Audience

The target audience for this project is foreign investors, looking to expand their footprint in Toronto. The results of the analysis would give them a better understanding of which places would be most ideal to open up an additional franchise for their Ethiopian cuisine restaurants. This would help the investor to make better informed decisions, especially that they are unfamiliar with the place.

2. Data

Our data will be sourced from three main sources, namely:

i.   Open-source dataset of Toronto

The dataset will be downloaded from https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

From this dataset, we would get information of the locations in Toronto relating to:

- Postal code
- Borough
- Neighborhood

ii.   Geocoder package

This will be used to source geographical coordinates of locations i.e., latitude and longitude.

iii.   Foursquare API

For sourcing information related to the venues such as:

- Name of the venue
- Latitude of the venue
- Longitude of the venue
- Most rated venues
- Most popular venues
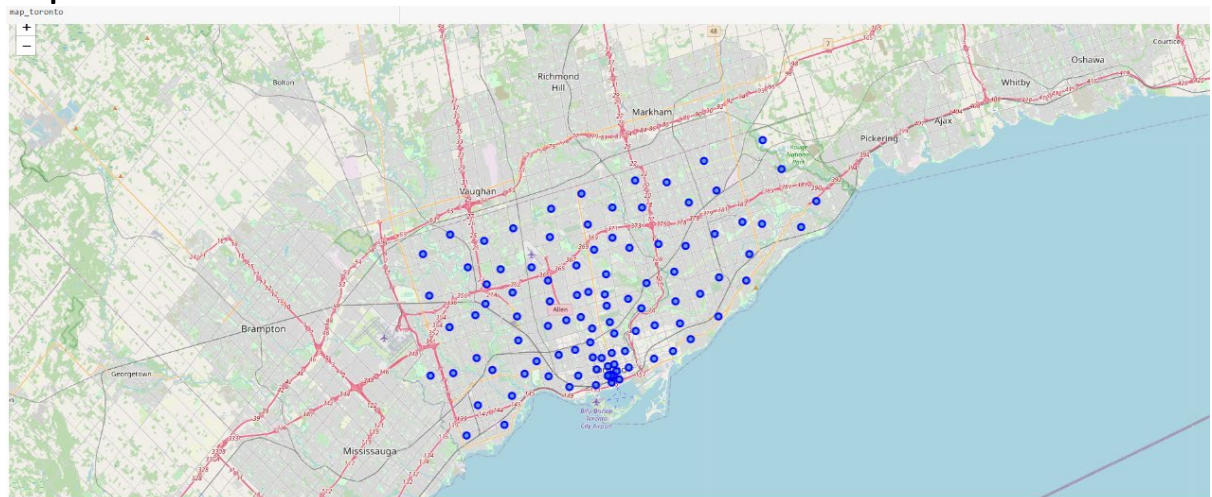- Most popular venues per cluster grouping

The data would be visualized and presented to the user, in this case, the investor looking to open the restaurant in Toronto. Based on the findings, we would then recommend the best location(s) to open the restaurant.

3. Methodology

We will explore the neigborhoods in Toronto, find out which venues are most popular and which restaurants in particular are most popular. We will segment and group the neighborhoods to explore the venues further. To do this, we will use k-Means clustering. The aim of this is to find out how popular Ethiopian Restaurants are, if at all, and what the trend is of restaurants that are more popular with the general population.

4. Results
Map of Toronto

Restaurant Types
There were 46 different types of restaurants in total that we discovered in Toronto. Below are the number of restaurants per type. The most popular restaurants were the unclassified restaurants, followed by Italian, Japanese, sushi and fast-food restaurants. The figure below shows the list of all the restaurant types according to count.

```
Restaurant                              64
Italian Restaurant                      51
Japanese Restaurant                     47
Sushi Restaurant                        39
Fast Food Restaurant                    32
Seafood Restaurant                      29
Thai Restaurant                         27
American Restaurant                     27
Asian Restaurant                        22
Middle Eastern Restaurant               20
Vegetarian / Vegan Restaurant           19
Greek Restaurant                        15
French Restaurant                       13
Indian Restaurant                       12
Chinese Restaurant                      12
Ramen Restaurant                        11
Vietnamese Restaurant                   11
Mediterranean Restaurant                11
Mexican Restaurant                      10
New American Restaurant                  8
Falafel Restaurant                       7
Korean Restaurant                        6
Comfort Food Restaurant                  5
Latin American Restaurant                5
Caribbean Restaurant                     5
Brazilian Restaurant                     5
Eastern European Restaurant              5
Gluten-free Restaurant                   4
Modern European Restaurant               3
Ethiopian Restaurant                     3
German Restaurant                        2
Moroccan Restaurant                      2
Turkish Restaurant                       2
Cuban Restaurant                         2
Molecular Gastronomy Restaurant          2
Portuguese Restaurant                    2
Cantonese Restaurant                     1
Dumpling Restaurant                      1
Theme Restaurant                         1
Peruvian Restaurant                      1
Colombian Restaurant                     1
Belgian Restaurant                       1
Taiwanese Restaurant                     1
Hawaiian Restaurant                      1
Hong Kong Restaurant                     1
Halal Restaurant                         1
Name: Venue Category, dtype: int64
```
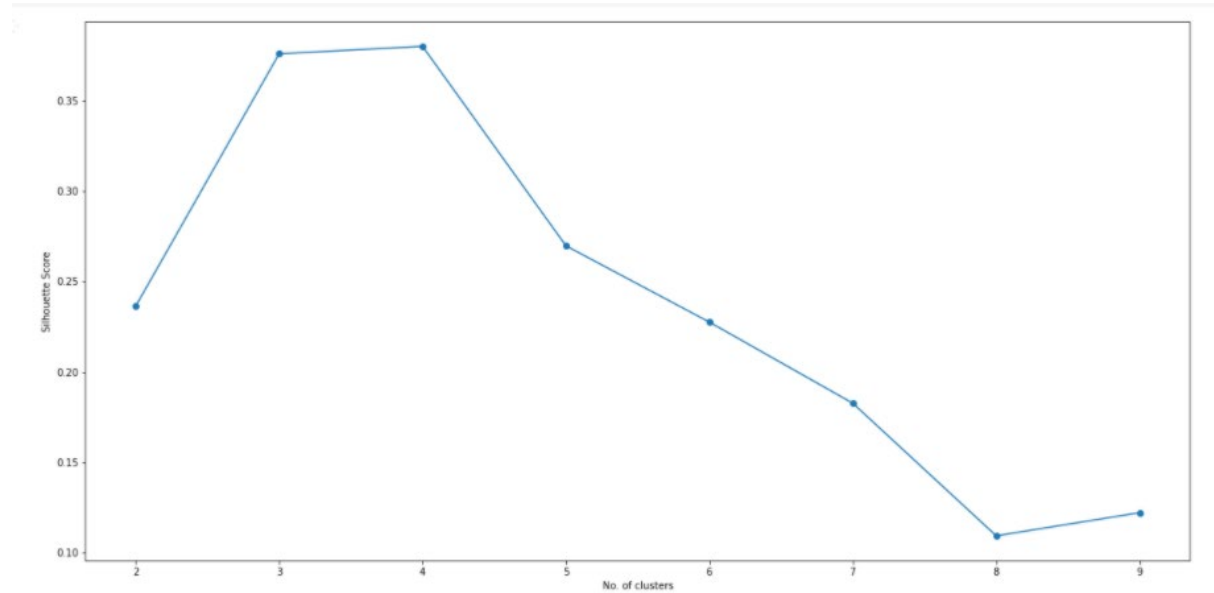
We sampled the top 30 most popular restaurants types to visualize the most popular restaurants, relative to the Ethiopian restaurant. The Ethiopian restaurant ranked 30th. The chart below visualizes the results.

Number of restaurants per category

k-Means Clustering

We explored various ranges for clustering and found that the optimal number of clusters was 4.

Results per cluster:

Cluster 1

	PostalCode	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	M3A	North York	Parkwoods	43.75245	-79.32991	0.0	Food & Drink Shop	Park	Convenience Store	Pool	Electronics Store	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant
1	M4A	North York	Victoria Village	43.73057	-79.31306	0.0	Grocery Store	Park	German Restaurant	Women's Store	Eastern European Restaurant	Doctor's Office	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant
16	M6C	York	Humewood-Cedarvale	43.69211	-79.43036	0.0	Field	Grocery Store	Playground	Hockey Arena	Trail	Park	Falafel Restaurant	Farm	Event Space	Ethiopian Restaurant
18	M1E	Scarborough	Guildwood, Morningside, West Hill	43.76575	-79.17470	0.0	Gym / Fitness Center	Construction & Landscaping	Park	Women's Store	Electronics Store	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant
22	M1G	Scarborough	Woburn	43.76812	-79.21761	0.0	Construction & Landscaping	Park	Business Service	Coffee Shop	Women's Store	Electronics Store	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant
32	M1J	Scarborough	Scarborough Village	43.74446	-79.23117	0.0	Restaurant	Grocery Store	Park	Indian Restaurant	Eastern European Restaurant	Doctor's Office	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant
35	M4J	East YorkEast Toronto	The Danforth East	43.68811	-79.33418	0.0	Music Venue	Intersection	Park	Dumpling Restaurant	Distribution Center	Doctor's Office	Dog Run	Donut Shop	Dry Cleaner	Women's Store
39	M2K	North York	Bayview Village	43.78112	-79.38060	0.0	Trail	Dog Run	Construction & Landscaping	Park	Women's Store	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant	Electronics Store
49	M6L	North York	North Park, Maple Leaf Park, Upwood Park	43.71381	-79.48874	0.0	Bakery	Park	Basketball Court	Women's Store	Escape Room	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant
57	M9M	North York	Humberlea, Emery	43.73367	-79.53769	0.0	Coffee Shop	Park	Nightclub	Women's Store	Electronics Store	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant
66	M2P	North York	York Mills West	43.74778	-79.40033	0.0	Speakeasy	Park	Convenience Store	Coffee Shop	Women's Store	Escape Room	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant
69	M6P	West Toronto	High Park, The Junction South	43.65973	-79.46281	0.0	Residential Building (Apartment / Condo)	Park	Convenience Store	Sandwich Place	Women's Store	Dumpling Restaurant	Doctor's Office	Dog Run	Donut Shop	Dry Cleaner
72	M2R	North York	Willowdale West	43.77989	-79.44678	0.0	Baby Store	Park	Grocery Store	Pizza Place	Supermarket	Coffee Shop	Dumpling Restaurant	Doctor's Office	Dog Run	Donut Shop

Cluster 2 (sample)

Cluster 3

	PostalCode	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
62	M5N	Central Toronto	Rosealwn	43.71208	-79.41848	2.0	Home Service	Women's Store	Escape Room	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant	Electronics Store	Ethiopian Restaurant

Cluster 4

	PostalCode	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
27	M2H	North York	Hillcrest Village	43.80225	-79.35558	3.0	Residential Building (Apartment / Condo)	Park	Women's Store	Electronics Store	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant	Escape Room
45	M2L	North York	York Mills, Silver Hills	43.75698	-79.38060	3.0	Park	Women's Store	Distribution Center	Farmers Market	Farm	Falafel Restaurant	Event Space	Ethiopian Restaurant	Escape Room	Electronics Store
68	M5P	Central Toronto	Forest Hill North & West	43.69479	-79.41440	3.0	Park	Women's Store	Distribution Center	Farmers Market	Farm	Falafel Restaurant	Event Space	Ethiopian Restaurant	Escape Room	Electronics Store
91	M4W	Downtown Toronto	Rosedale	43.68190	-79.37829	3.0	Park	Playground	Bike Trail	Women's Store	Electronics Store	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant
98	M8X	Etobicoke	The Kingsway, Montgomery Road, Old Mill North	43.65319	-79.51113	3.0	Lounge	Park	Women's Store	Electronics Store	Dog Run	Donut Shop	Dry Cleaner	Dumpling Restaurant	Eastern European Restaurant	Ethiopian Restaurant

5. Discussion

The Ethiopian Restaurants are not very popular in Toronto. When grouped into four k-clusters, Ethiopian restaurants appeared in the 10 most popular venues list in the following boroughs:

- York
- North York
- Scarborough
- Central Toronto
- Etobicoke

The frequently appearing neighborhoods where from North York and Central Toronto.

There is an opportunity for the investor open the restaurant anywhere and leverage on having no competition in a neighborhood. It may also be safer to open the restaurant where people are already familiar with the Ethiopian cuisine. Because the investors have little experience with the market, I would recommend that they open the restaurant in either Central Toronto or North York.

6. Conclusion

The purpose of this project was to find out the most ideal place to open an Ethiopian restaurant. We processed the data and analysed it for further insights. We identified the most popular restaurants per cluster in search of an ideal location and to ultimately answer the question "which place/s would be the most ideal to open an Ethiopian restaurant?". The ultimate decision lies with the investor, after considering all factors.