Capstone Project
Battle of the Neighborhoods

Final Report

1. Introduction:

Toronto is the financial capital of Canada. Hence, it provides large business opportunities. This also means that the cost of doing business is substantially high. Any new business entering the retail market needs to be located strategically in order to maximize the return on investment. The retailer must be located in an area which can provide higher revenue with a lesser risk.

1.1 Problem Statement:

To find the most suitable neighborhood in Toronto for a grocery seller to set up a retail store, in order to maximize the return on investment by increasing revenue and minimizing the risk.

2. Data Description:

2.0 Data Requirement:

Our problem statement deals with clustering and segmentation of data of the neighborhoods of Toronto. We require data of the individual neighborhoods of Toronto city. The data should include the co-ordinates of each of these neighborhoods and other key information such as number of residents, venues, etc. for each neighborhood.

2.1 Data Collection:

Since the required data is not available easily in a well structured format, we will need to scrape the data from the Wikipedia web page.

2.2. Data Features:

1. Neighborhood
2. Population
3. Land Area
4. Density
5. Population %
6. Income
7. Commuting
8. 2nd Language
9. 2nd Language %
10. Latitude
11. Longitude

	Neighbourhood	Population	Land Area	Density	Population %	Income	Commuting	2nd Language	2nd Language %	Latitude	Longitude
1	Agincourt	44577	12.45	3580	4.6	25,750	11.1	Cantonese (19.3%)	19.3% Cantonese	43.788	-79.2839
2	Alderwood	11656	4.94	2360	-4.0	35,239	8.8	Polish (6.2%)	06.2% Polish	43.6035	-79.5464
3	Alexandra Park	4355	0.32	13,609	0.0	19,687	13.8	Cantonese (17.9%)	17.9% Cantonese	43.6498	-79.4015
4	Allenby	2513	0.58	4333	-1.0	245,592	5.2	Russian (1.4%)	01.4% Russian	43.7077	-79.4127
5	Amesbury	17318	3.51	4,934	1.1	27,546	16.4	Spanish (6.1%)	06.1% Spanish	43.7011	-79.481
6	Armour Heights	4384	2.29	1914	2.0	116,651	10.8	Russian (9.4%)	09.4% Russian	43.7454	-79.4226
7	Banbury	6641	2.72	2442	5.0	92,319	6.1	Unspecified Chinese (5.1%)	05.1% Unspecified Chinese	43.7491	-79.3664
8	Bathurst Manor	14945	4.69	3187	12.3	34,169	13.4	Russian (9.5%)	09.5% Russian	43.7627	-79.4563
9	Bay Street Corridor	4787	0.11	43,518	3.0	40,598	17.1	Mandarin (9.6%)	09.6% Mandarin	43.6567	-79.3835
10	Bayview Village	12280	4.14	2,966	41.6	46,752	14.4	Cantonese (8.4%)	08.4% Cantonese	43.7782	-79.3828

3. Methodology:

Step 1: Web scrapping of the Toronto neighborhoods data from Wikipedia. This data forms the basis of the project. Additional steps, such as removing NULL values, were carried out on the data.

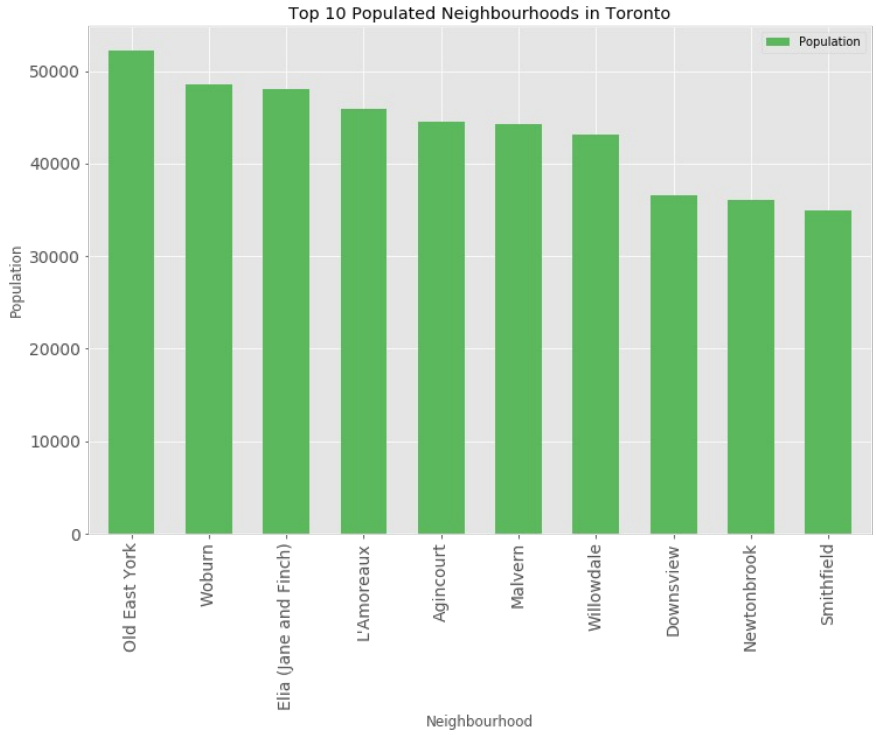
Step 2: Using the geocoder API to indicate the latitude and longitude coordinates to each of the neighborhoods. This data is essential while using the Foursquare API.

Step 3: The K-Means machine learning technique was used to cluster the neighborhoods. Neighborhoods within the clusters were studied to find the their similarities in order to find the best suites cluster and neighborhood.

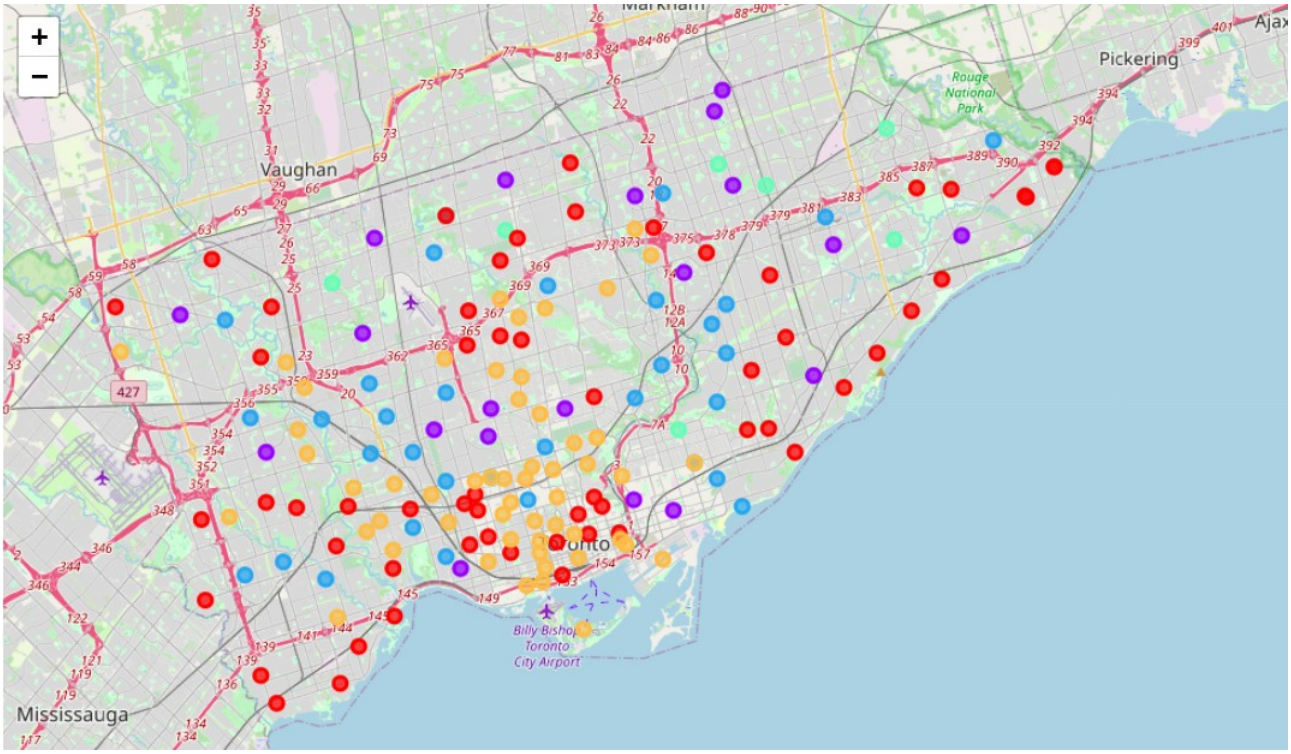
Step 4: We make a conclusion regarding which neighborhood is most suitable in order to start a new retail store. The decision is based on the fact that the demand in that neighborhood is high with lesser competition offered due to fewer grocery stores in that area.

4. **Results**:

Neighborhood populations:



Results of K-Means clustering (k=5):



Most common venues in each neighborhood:

	Neighbourhood	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
0	Agincourt	Coffee Shop	Yoga Studio	Fast Food Restaurant	Empanada Restaurant	Ethiopian Restaurant	Event Space	Exhibit	Falafel Restaurant
1	Alderwood	Pizza Place	Gym	Dance Studio	Pub	Coffee Shop	Donut Shop	Bank	Convenience Store
2	Alexandra Park	Bar	Café	Vegetarian / Vegan Restaurant	Restaurant	Coffee Shop	French Restaurant	Dessert Shop	Yoga Studio
3	Allenby	Coffee Shop	Sushi Restaurant	Gym	Italian Restaurant	Café	Fruit & Vegetable Store	Liquor Store	Gastropub
4	Amesbury	Bakery	Fast Food Restaurant	Park	Sandwich Place	Flea Market	Fish Market	Fish & Chips Shop	Filipino Restaurant

5. <u>Discussion</u>:

Cluster 0 looks to offer a higher number of similar neighborhoods and allow a new retail grocery store to run successfully. (As these neighborhoods are similar). It can be noted that the neighborhood **Humbermede** looks to be the most suitable choice as it is the highest populated neighborhood and very few grocery stores are present.

- Suitable cluster: Cluster 0
- Suitable Neighborhood: Humbermede

There is a large Punjabi population in that neighborhood and hence, we can also suggest the sale of Punjabi food or related items.

	Neighbourhood	Population	Income	Commuting	2nd Language	2nd Language %	Latitude	Longitude	Population Score	Venue Score	Total Score
60	Humbermede	14778	24,297	11.8	Punjabi (9.7%)	09.7% Punjabi	43.7421	-79.5407	0.611729	0.0	0.305865

6. <u>Conclusion</u>:

We conclude that the Humbermede neighborhood is the most suitable neighborhood to start a new retail grocery store.

- Suitable cluster: **Cluster 0**
- Suitable Neighborhood: **Humbermede**