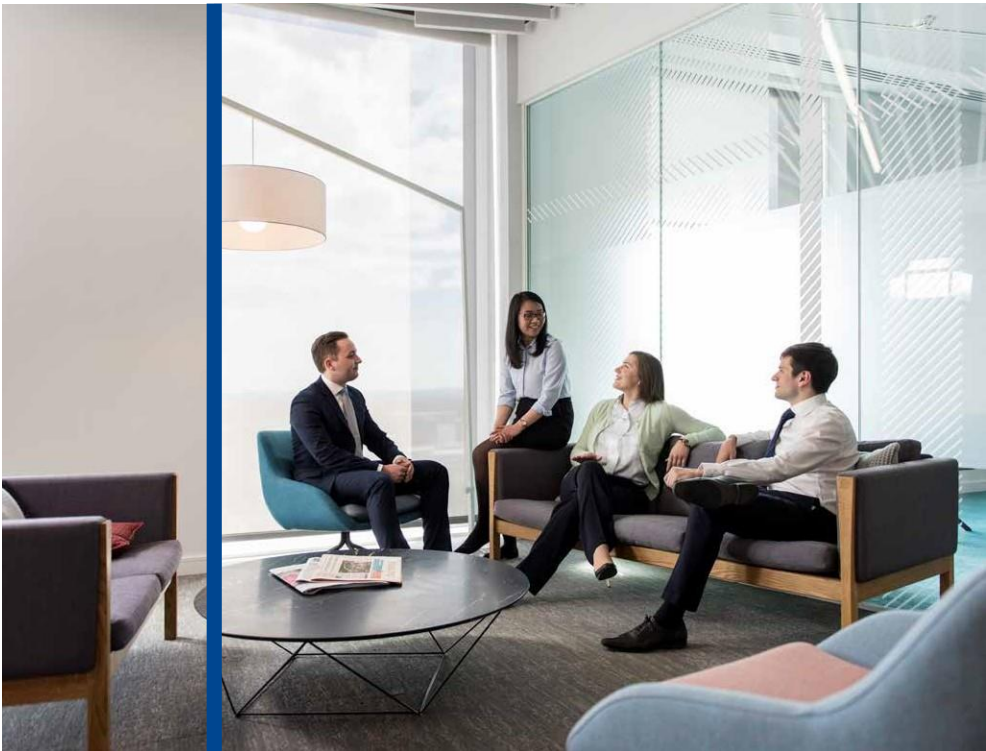# Capstone Project - The Battle of Neighborhoods (Week 2)

Report on the Battle of Neighborhoods

A Treatise on starting Laundromat business in Toronto City

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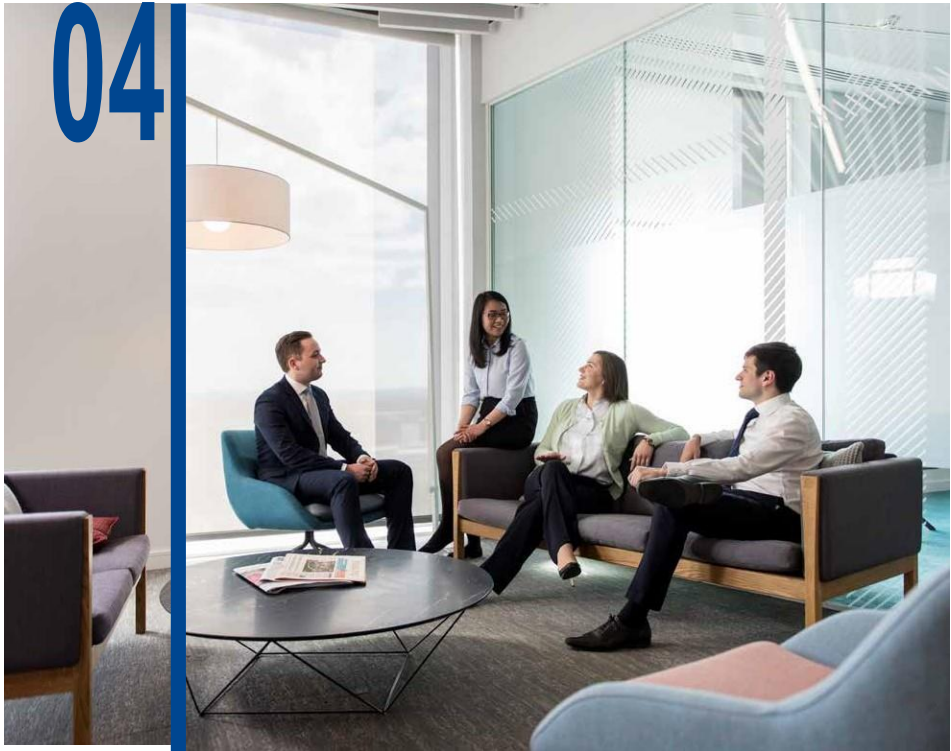
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Executive Summary

Toronto City – Transformation from "Toronto the Good" to a lively, thriving, cosmopolitan metropolitan area.

Toronto is the provincial capital of Ontario and the most populous city in Canada, with a population of 2,956,024 as of 2018. The Toronto census metropolitan area (CMA), of which the majority is within the Greater Toronto Area (GTA), held a population of 6,341,935, making it Canada's most populous CMA. The city is the anchor of the Golden Horseshoe, an urban agglomeration of 9,245,438 people surrounding the western end of Lake Ontario. 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 city is home to the Toronto Stock Exchange, the headquarters of Canada's five largest banks, and the headquarters of many large Canadian and multinational corporations. Its economy is highly diversified with strengths in technology, design, financial services, life sciences, education, arts, fashion, business services, environmental innovation, food services, and tourism.

This also means that the market is highly competitive. As it is highly developed city so cost of doing business is also one of the highest. Thus, any new business venture or expansion needs to be analysed carefully. The insights derived from analysis will give good understanding of the business environment which help in strategically targeting the market. This will help in reduction of risk. And the Return on Investment will be reasonable.

Opening a new Laundry Service

The huge influx of visitors has propelled the burgeoning demand on hotels and hostels in the region. With the growth in travel accommodations, laundry services would also be increasingly in demand. Investors interested in a business with low investment and high return can look to the business of Laundromats in a city with a high tourist volume, such as Toronto. Tourists would often favour a cheaper alternative than hotel laundry services, which explains the mushrooming of Laundromats in tourist-rich cities.
Therefore, the problem statement is:
What is the best/most optimal place to set up a Laundromat in the city of Toronto that is in close proximity to travel accommodations and preferably at a distance from other competing Laundromats?
Our main goal is to get optimum location for new Laundromat business in Toronto City for ABC Company. Various factors need to be studied and various questions need to be answered in order to decide on the Location such as :
- Toronto Population
- Toronto City Demographics
- Are there any Hotels nearby so that the service can be extended to the Hotel dwellers with quality and cost?
- Are there any venues the locations of travel accommodations such as hostels and motels in the region so that the travellers can avail this service?
- Who are the competitors in that location?
- Types of Services of the competitors
- Segmentation of the Borough - both demographic and psychographic (lifestyle)

The objective is **to locate and recommend to the management which neighborhood of Toronto City will be best choice to start a Laundromat Service** after due diligence of environment analysis. This would interest anyone who wants to start a new Laundromat in Toronto City. In order to search for locations of the existing Laundromats and hotels in the city of Toronto, it is necessary to find the coordinates of the neighbourhoods in Toronto for querying the Foursquare API.

Methodology adopted is narrated below.

- The Wikipedia page (https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M_) was scraped using the BeautifulSoup library to build a pandas dataframe listing the boroughs and neighborhoods in Toronto. The dataframe was cleaned and processed appropriately.
- Next, the geographical coordinates of each neighborhood was obtained from the csv downloaded from http://cocl.us/Geospatial_data.
- The postal codes for each of the neighborhoods were matched to the information from the csv file.
- There are 11 boroughs and 103 neighborhoods. To limit the range of the data, only the Central Toronto borough was investigated as this is the centre of Toronto where the tourists are centered and is the most happening area.
- The Foursquare API is used to query each of the neighbourhood for the locations of Laundromats, hotel, hostel and motels followed by data visualisation.
- In order to see the aggregation of the Laundromats and hotels, unsupervised machine learning hierarchical clustering is used to cluster the Laundromats and hotels separately. Hierarchical clustering is adopted because there was no need for a cluster number to be selected and can be purely based on the distance between the venues. The resulting clusters were plotted on a Folium map.
- A better visualisation was performed by obtaining the cluster centres for each group of Laundromat and hotel. The cluster centres were plotted on a Folium map, with the circle marker weighted corresponding to the number of venues in the specific cluster.

It can be observed that the Laundromat and hotel clusters are generally overlapping or close to each other. This observation makes sense as the Laundromats depend on the tourist population for supporting its business.

- A large concentration of Laundromats and hotels alike can be found surrounding The Annex neighbourhood.
- Conversely, there is a relatively smaller hotel concentration at the Forest Hill neighbourhood with only a very sparse number of Laundromats serving it. The closest cluster of Laundromats is located further away in the neighbourhood of Humewood.
- There is a small cluster of Laundromats in the neighbourhood of Caribou park which does not have any neighbouring hotel clusters. Upon closer inspection, this is probably due to the fact that there are boarding schools and hospitals in that region, which serve as the Laundromats' clientele.

It can be concluded that the most suitable place for setting up a new Laundromat is in the neighbourhood of Forest Hill in Central Toronto. This is due to the lack of Laundromats in its close proximity while still having a decent number of hotels. This is however applicable for the clients who are in mid cap range.

If the client can go for high level investment and can take risk, it is advisable to open a Laundromat service in The Annex neighborhood as there is a large concentration of hotels surrounding that area and all big competitors are present there. To combat the competition, differentiation in services is recommended for implementation.
More so it should have residential laundry, wash and fold, commercial laundry and linen service. Services can further be explored in Restaurants, Medical Clinics, Dental Offices, Day Cares, Dress & Suits Rentals, Salons, Spas, Fitness Clubs, Business Clubs, Schools, Senior Homes, Furnished Apartments and Offices.

1 Introduction & Business Problem

1.1 Problem Statement

Toronto city is the capital of the province of Ontario, southeastern Canada. It is the most populous city in Canada, a multicultural city, and the country's financial and commercial centre. Its location on the northwestern shore of Lake Ontario, which forms part of the border between Canada and the United States, and its access to Atlantic shipping via the St. Lawrence Seaway and to major U.S. industrial centres via the Great Lakes have enabled Toronto to become an important international trading centre. Moreover, the city is positioned on the edge of some of the best farmland in Canada, with a climate favourable to growing a wide range of crops, thereby making Toronto a transportation, distribution, and manufacturing centre. Most importantly, its central location, along with a host of political policies favouring international trade, places this city with the greatest economic ties to, and influence from, the United States. Since the second half of the 20th century the city has grown phenomenally, from a rather sedate provincial town—"Toronto the Good"—to a lively, thriving, cosmopolitan metropolitan area.

The city is home to the Toronto Stock Exchange, the headquarters of Canada's five largest banks, and the headquarters of many large Canadian and multinational corporations. Its economy is highly diversified with strengths in technology, design, financial services, life sciences, education, arts, fashion, business services, environmental innovation, food services, and tourism.

This also means that the market is highly competitive. As it is highly developed city so cost of doing business is also one of the highest. Thus, any new business venture or expansion needs to be analysed carefully. The insights derived from analysis will give good understanding of the business environment which help in strategically targeting the market. This will help in reduction of risk. And the Return on Investment will be reasonable.

Toronto is the main regional tourist centre serving the Muskoka Lakes, the Haliburton Highlands, and Georgian Bay, all magnificent lakeland and forest areas with fine hunting, fishing, and camping facilities. There has been a remarkable increase in winter sports, and, although Ontario's highest point is only 2,183 feet (665 metres), many skiing facilities are available within easy reach of the city, and two are within the city boundaries. Algonquin Provincial Park is some 130 miles (210 km) to the north, Niagara Falls is about 50 miles (80 km) south, and the city is surrounded by beautiful rolling farmland, with well-marked sites of historical and architectural interest. Camping, cottaging, boating, and fishing are the most popular forms of outdoor recreation in the summer and skiing, ice hockey, and curling in the winter.

The Hockey Hall of Fame is a museum dedicated to ice hockey, as well as a Hall of Fame.

The Canadian National Exhibition ("The Ex") is held annually at Exhibition Place, and it is the oldest annual fair in the world. The Ex has an average attendance of 1.25 million. City shopping areas include the Yorkville neighbourhood, Queen West, Harbourfront, the Entertainment District, the Financial District, and the St. Lawrence Market neighbourhood. The Eaton Centre is Toronto's most popular tourist attraction with over 52 million visitors annually.

Greektown on the Danforth is home to the annual "Taste of the Danforth" festival which attracts over one million people in 2½ days. Other notable neighbourhoods and attractions in Toronto include The Beaches, the Toronto Islands, Kensington Market, Fort York, and the Hockey Hall of Fame.

1.2 Background Analysis

Toronto is the provincial capital of Ontario and the most populous city in Canada, with a population of 2,956,024 as of 2018. The Toronto census metropolitan area (CMA), of which the majority is within the Greater Toronto Area (GTA), held a population of 6,341,935, making it Canada's most populous CMA. The city is the anchor of the Golden Horseshoe, an urban agglomeration of 9,245,438 people surrounding the western end of Lake Ontario. 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 huge influx of visitors has propelled the burgeoning demand on hotels and hostels in the region. With the growth in travel accommodations, laundry services would also be increasingly in demand. Investors interested in a business with low investment and high return can look to the business of Laundromats in a city with a high tourist volume, such as Toronto. Tourists would often favour a cheaper alternative than hotel laundry services, which explains the mushrooming of Laundromats in tourist-rich cities.

Therefore, the problem statement is:

What is the best/most optimal place to set up a Laundromat in the city of Toronto that is in close proximity to travel accommodations and preferably at a distance from other competing Laundromats?

Our main goal is to get optimum location for new Laundromat business in Toronto City for ABC Company.Various factors need to be studied and various questions need to be answered in order to decide on the Location such as :

- Toronto Population
- Toronto City Demographics
- Are there any Hotels nearby so that the service can be extended to the Hotel dwellers with quality and cost?
- Are there any venues the locations of travel accommodations such as hostels and motels in the region so that the travellers can avail this service?
- Who are the competitors in that location?
- Types of Services of the competitors
- Segmentation of the Borough - both demographic and psychographic (lifestyle)

1.3 Target Audience

To recommend the correct location, ABC Company Ltd has appointed me to lead the Data Science team. The objective is to locate and recommend to the management which neighborhood of Toronto City will be best choice to start a Laundromat after due diligence of environment analysis. This would interest anyone who wants to start a new Laundromat in Toronto City.

Even though well funded ABC Company Ltd needs to choose the correct location to start its first venture. If this is successful they can replicate the same in other locations. First move is very important, thereby choice of location is very important.

2 Methodology

City analysed in this project : Toronto City

2.1 Datasets used for analysing Toronto City

Data 1 :First data set contains 11 boroughs and 103 neighborhoods along with Postal codes associated to those. This data is loaded from the Wikipedia page.
(https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M_)

	PostalCode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Harbourfront
3	M6A	North York	Lawrence Heights, Lawrence Manor
4	M7A	Queen's Park	Queen's Park

Data 2 : Neighborhood has a total of 11 boroughs and 103 neighborhoods. In order to segment the neighborhoods and explore them, we will essentially need a dataset that contains the 11 boroughs and the neighborhoods that exist in each borough as well as the latitude and longitude coordinates of each neighborhood.
Second data is csv file that has the geographical coordinates of each postal code downloaded from http://cocl.us/Geospatial_data.

	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

Data 3 :Toronto city geographical coordinates data will be utilized as input for the Foursquare API, that will be leveraged to provision venues information for each neighborhood like existing Laundromat and nearest Hotel, hostel & motel information (www.foursquare.com)

The images of the Foursquare API data are charted below

Laundromat information

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Lawrence Park	43.728020	-79.388790	Maytag Laundry Linens And Gifts	43.730241	-79.403576	Laundry Service
1	Roselawn	43.711695	-79.416936	Royal Forest Coin Laundry	43.701115	-79.425177	Laundry Service
2	Roselawn	43.711695	-79.416936	Bathurst Street Coin Laundry	43.723356	-79.430118	Laundry Service
3	Roselawn	43.711695	-79.416936	Empire Dry Cleaners & Laundry Services - Etob...	43.699698	-79.415735	Dry Cleaner
4	Roselawn	43.711695	-79.416936	Coin Laundry	43.724148	-79.430481	Laundry Service

Information of hotels, hostels and motels in the neighborhood of Toronto

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Lawrence Park	43.728020	-79.388790	Hotel Wibke	43.707730	-79.395858	Speakeasy
1	Lawrence Park	43.728020	-79.388790	Best Western Roehampton Hotel & Suites	43.708878	-79.390880	Hotel
2	Lawrence Park	43.728020	-79.388790	Skyline Hotels & Resorts	43.707578	-79.395640	Office
3	Roselawn	43.711695	-79.416936	Hotel Gelato	43.703478	-79.414311	Café
4	Roselawn	43.711695	-79.416936	Hotel Wibke	43.707730	-79.395858	Speakeasy

The locations of all existing Laundromats or laundry services in the Toronto city region need to be extracted to survey the competition. Secondly, the locations of travel accommodations such as hotels, hostels and motels in the region will be obtained. This is to estimate the number of visitors that would frequently require the Laundromat services, based on the assumption that the clientele of the Laundromat would be mainly comprised of travellers.

2.2 Business Understanding

Our main goal is to get optimum location for new Laundromat business in Toronto City for ABC Company.Various factors need to be studied and various questions need to be answered in order to decide on the Location such as :

- Toronto Population
- Toronto City Demographics
- Are there any Hotels nearby so that the service can be extended to the Hotel dwellers with quality and cost?
- Are there any venues the locations of travel accommodations such as hostels and motels in the region so that the travellers can avail this service?
- Who are the competitors in that location?
- Types of Services of the competitors
- Segmentation of the Borough - both demographic and psychographic (lifestyle)

2.3 Analytic Approach

Toronto city neighbourhood has a total of 11 boroughs and 103 neighborhoods

 In order to search for locations of the existing Laundromats and hotels in the city of Toronto, it is necessary to find the coordinates of the neighbourhoods in Toronto for querying the Foursquare API. Hence, the following steps were taken.

- The Wikipedia page (https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M_) was scraped using the BeautifulSoup library to build a pandas dataframe listing the boroughs and neighborhoods in Toronto. The dataframe was cleaned and processed appropriately.

	PostalCode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Harbourfront
3	M6A	North York	Lawrence Heights, Lawrence Manor
4	M7A	Queen's Park	Queen's Park

- Next, the geographical coordinates of each neighborhood was obtained from the csv downloaded from http://cocl.us/Geospatial_data.

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

- The postal codes for each of the neighborhoods were matched to the information from the csv file and the original pandas dataframe was updated to list the corresponding geographical coordinate for each neighborhood.

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Heights, Lawrence Manor	43.718518	-79.464763
4	M7A	Queen's Park	Queen's Park	43.662301	-79.389494

- To limit the range of the data, only the Central Toronto borough was investigated as this is the centre of Toronto where the tourists are centered. The neighbourhoods from the borough of Central Toronto were extracted and listed in a dataframe.

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M4N	Central Toronto	Lawrence Park	43.728020	-79.388790
1	M5N	Central Toronto	Roselawn	43.711695	-79.416936
2	M4P	Central Toronto	Davisville North	43.712751	-79.390197
3	M5P	Central Toronto	Forest Hill North, Forest Hill West	43.696948	-79.411307
4	M4R	Central Toronto	North Toronto West	43.715383	-79.405678

- The Foursquare API was then used to query each of the neighbourhood for the keywords {laundromats, laundry} and {hotel, hostel, motel}. The resulting locations for each venue were tabulated and stored in a new dataframe and visualised using Folium.

Laundromat information

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
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4	Roselawn	43.711695	-79.416936	Hotel Wibke	43.707730	-79.395858	Speakeasy

- In order to see the aggregation of the Laundromats and hotels, hierarchical clustering was used to cluster the Laundromats and hotels separately. Hierarchical clustering was used because there was no need for a cluster number to be selected and can be purely based on the distance between the venues. The resulting clusters were plotted on a Folium map.
- A better visualisation was performed by obtaining the cluster centres for each group of Laundromat and hotel. The cluster centres were plotted on a Folium map, with the circle marker weighted corresponding to the number of venues in the specific cluster.

3 Results

From this venues data we filtered and used only the data for Central Toronto borough.

**3.1 Neighborhood hierarchical clustering to cluster the Laundromats and hotels**

In order to see the aggregation of the Laundromats and hotels, unsupervised machine learning hierarchical clustering algorithm has been used to cluster the Laundromats and hotels separately. Hierarchical clustering was used because there was no need for a cluster number to be selected and can be purely based on the distance between the venues. Laundromat distance Matrix is charted below.

```
[[0.         0.47310571 0.3710759  ... 0.8358833  0.75830948 0.37579332]
 [0.47310571 0.         0.29121879 ... 0.7289435  0.40192747 0.49889405]
 [0.3710759  0.29121879 0.         ... 0.96253584 0.69132031 0.60775833]
 ...
 [0.8358833  0.7289435  0.96253584 ... 0.         0.45895701 0.47154443]
 [0.75830948 0.40192747 0.69132031 ... 0.45895701 0.         0.55083028]
 [0.37579332 0.49889405 0.60775833 ... 0.47154443 0.55083028 0.        ]]
```

Hotel distance Matrix is charted below.
```
[[0.         0.11496622 0.00561036 ... 0.70466877 0.63880283 0.63874749]
 [0.11496622 0.         0.11058236 ... 0.7590232  0.64457599 0.65807007]
 [0.00561036 0.11058236 0.         ... 0.70337434 0.63521127 0.63570043]
 ...
 [0.70466877 0.7590232  0.70337434 ... 0.         0.31381699 0.23710913]
 [0.63880283 0.64457599 0.63521127 ... 0.31381699 0.         0.07677343]
 [0.63874749 0.65807007 0.63570043 ... 0.23710913 0.07677343 0.        ]]
```

Hierarchical Clustering is depicted below.
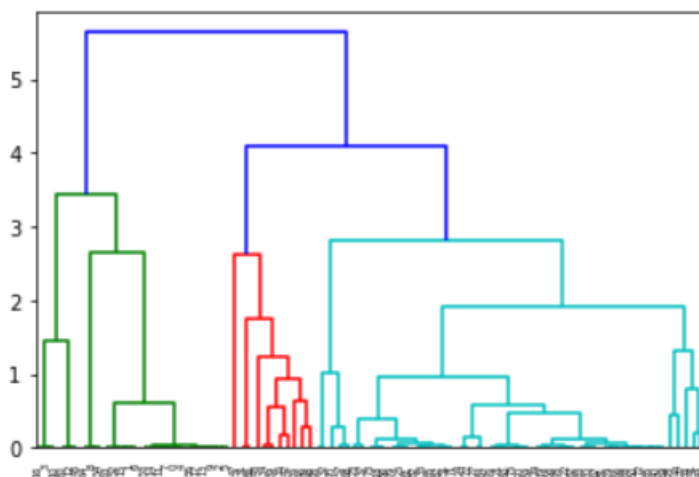
3.2 Analysis

- The neighbourhoods falling under Central Toronto amount to 9 neighbourhoods in total. The Laundromats and hotels around these neighbourhoods were explored.
- A total of 106 Laundromats and 87 hotels were found after performing the query on Foursquare API around these neighbourhoods.

Red: Laundromats
Blue: hotels
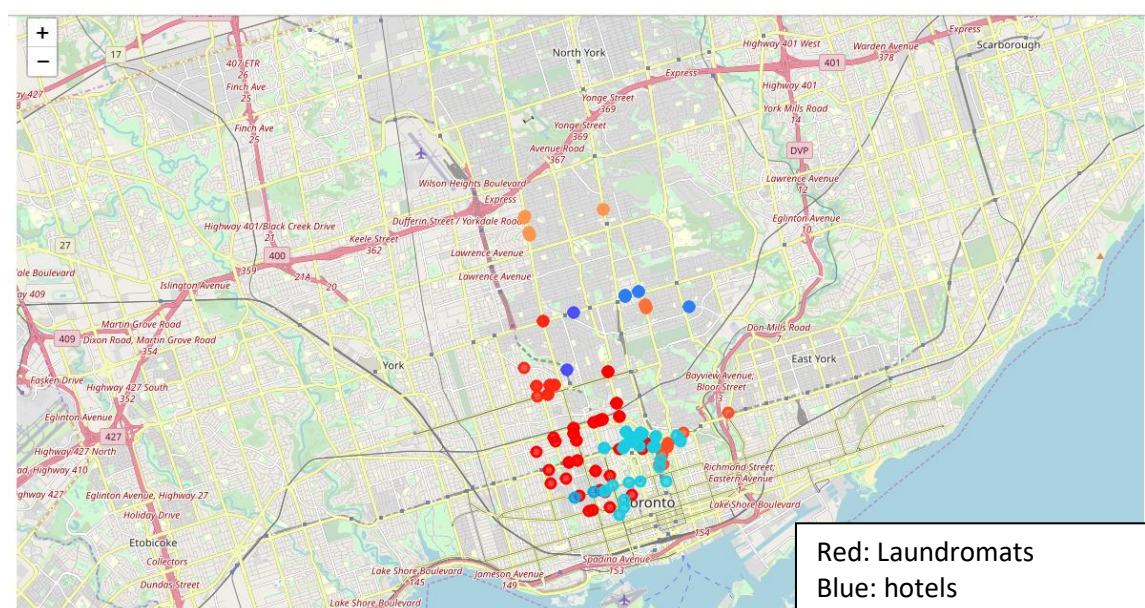
- Hierarchical clustering on the Laundromats and hotels have produced a total of 5 clusters of Laundromats and 4 clusters of hotels .

```
Laundromat clusters:
   Venue Latitude  Venue Longitude  Number of Venues
0        43.7271          -79.4236                11
1         43.705          -79.3884                12
2        43.6683           -79.379                12
3        43.6897          -79.4228                20
4        43.6769          -79.4002                29
5        43.6632          -79.4126                28
Hotel clusters:
   Venue Latitude  Venue Longitude  Number of Venues
0        43.6959          -79.4155                 6
1        43.7075          -79.3911                20
2        43.6578          -79.4022                11
3        43.6696          -79.3909                52
```

4 Discussions

- It can be observed that the Laundromat and hotel clusters are generally overlapping or close to each other. This observation makes sense as the Laundromats depend on the tourist population for supporting its business.
- A large concentration of Laundromats and hotels alike can be found surrounding The Annex neighbourhood. This can be seen in the large clusters shown in the Folium map.
- Conversely, there is a relatively smaller hotel concentration at the Forest Hill neighbourhood with only a very sparse number of Laundromats serving it. The closest cluster of Laundromats is located further away in the neighbourhood of Humewood.
- There is a small cluster of Laundromats in the neighbourhood of Caribou park which does not have any neighbouring hotel clusters. Upon closer inspection, this is probably due to the fact that there is are boarding schools and hospitals in that region, which serve as the Laundromats' clientele.

Red: Laundromats
Blue: hotels
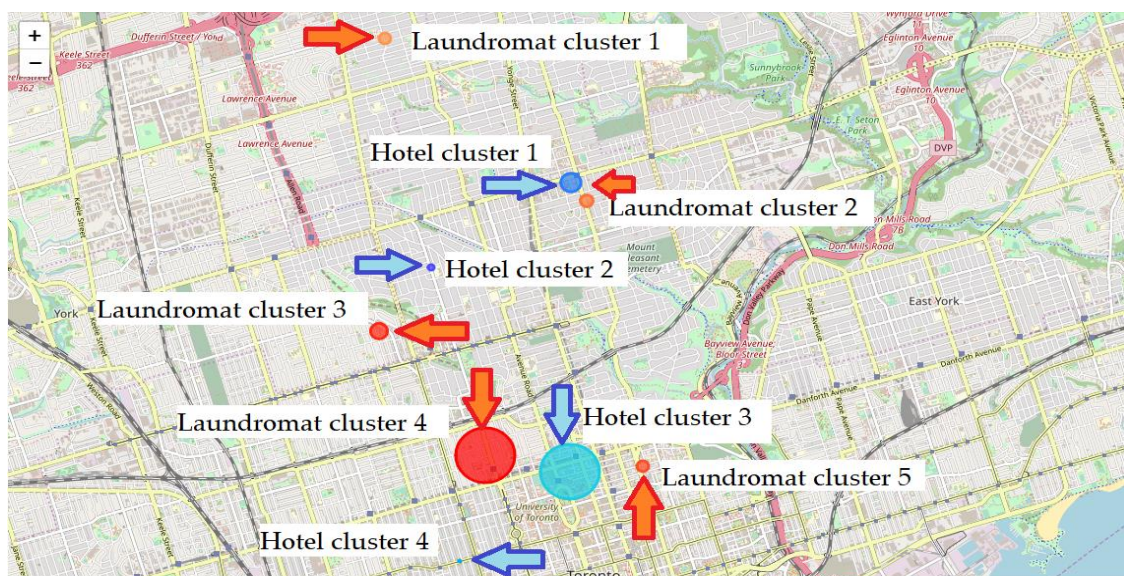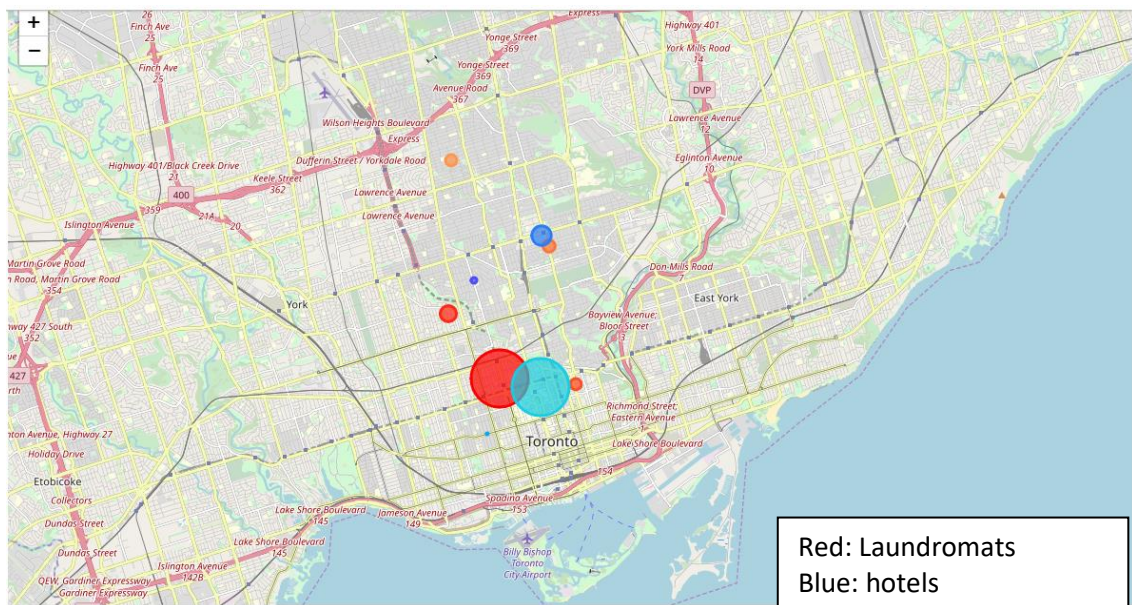
5 Conclusion

To answer the initial question of 'What is the best/most optimal place to set up a Laundromat in the city of Toronto that is in close proximity to travel accommodations and preferably at a distance from other competing Laundromats?', the most suitable place for setting up a new Laundromat is in the neighborhood of Forest Hill in Central Toronto. This area can be shown in the above screenshot as the region of Hotel cluster 2. This is due to the lack of Laundromats in its close proximity while still having a decent number of hotels. This is however applicable for the clients who are in mid cap range.

If the client can go for high level investment and can take risk, it is advisable to open a Laundromat service in The Annex neighborhood as there is a large concentration of hotels surrounding that area and all big competitors are present there.
To combat the competition differentiation in services the following features are recommended for implementation.

- Wide range of washers and dryers including some of the largest front load washers around
- Clean and bright facility
- 2 change machines
- All large washers should accept quarters, loonies and toonies
- Lot of seating arrangement
- Car parking facility and limited hour free parking reimbursement
- Availability of multiple folding tables
- Washer/Dryer transfer service for busy customers
- Security cameras monitoring location 24 hours a day, for customers' safety and comfort
- Collection from Home Services

More so it should have residential laundry wash and fold, commercial laundry and linen service and pricing should be competitive, transparent and affordable. Based on demographic and psychographic segmentation different pricing packages like Silver, Gold, Platinum may be adopted. Services can further be explored in Restaurants, Medical Clinics, Dental Offices, Day Cares, Dress & Suits Rentals, Salons, Spas, Fitness Clubs, Business Clubs, Schools, Senior Homes, Furnished Apartments and Offices.

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Further reading

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