CAPSTONE PROJECT REPORT

TOPIC: Opening a Lebanese Restaurant in Montreal

Done By: Joseph Saad

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Introduction

I am a Lebanese citizen living in Lebanon. For those of you who have not yet heard of Lebanon, it is a Middle Eastern country on the east of the Mediterranean Sea.

Figure 1: Location of Lebanon

Lebanon with its 4 million citizens has always faced difficulties from economic hardships to wars. Lebanon has a total of 100 billion dollars in debt and is classified third in the world with the ratio of its debt to its GDP at 151%. The unemployment rate was around 6% and the inflation rate around 3% (***tradingeconomic.com***). However, 2019 made things even worse. Starting October 2019, strikes and revolutions have started all around the country. In three months, it has already increased the inflation rate to 33% and increased the unemployment rate to over 25%.

These facts have led to an increase in the immigration rate from Lebanon. In 2019 alone, and up to November, it has been estimated that around 61,924 have left the country. This number is expected to double as the revolution and strikes have not settled down after over three months now.

Figure 2: 2019 Immigration Numbers

As a Lebanese citizen, I was approached by a couple of friends looking for investment ideas to benefit from this fact and at the same time help those immigrants preserve their traditions and habits wherever they end up going.

Since Lebanon is famous for its cuisine, I suggested that the best idea is to open Lebanese restaurants in the countries/areas where these people are immigrating to attend to their huge numbers. However, in order to do that, we need to know the place where most of these Lebanese are going so that our investment will be successful since it will be visited by the maximum number of immigrants possible.

As a result of these facts and ideas, we ended up with the following problem to solve: "**Where is the best place to open a restaurant to cater for the increasing number of Lebanese immigrants?**"

In other words, we need to find the country or city where most immigrants are settling and then once we find it, we should look for the best neighborhood or area to open the restaurant in so that we make sure that a huge percentage of these immigrants will be the customers of the restaurant.

Data

Since we are dealing with immigration, the best resource to find data is the UN. According to the excel sheet downloaded from https://www.un.org/en/development/desa/population/migration/data/estimates2/estimates19.asp, it shows that during 2019, Canada has received 30644 persons from Lebanon. In other words, Canada alone has received more than 49% of the Lebanese immigrants of 2019. As a result, it became obvious that the country we should focus on is Canada because Canada alone caters for half of the Lebanese immigrants which we are aiming to serve and benefit from.

After determining Canada, we need to find out what part of Canada is welcoming this huge number of Lebanese since we can't open restaurants in every city in Canada. According to ***canadianarabinstitute.org***, the city with most Arabs is Montreal with the Lebanese being the first among Arabs.

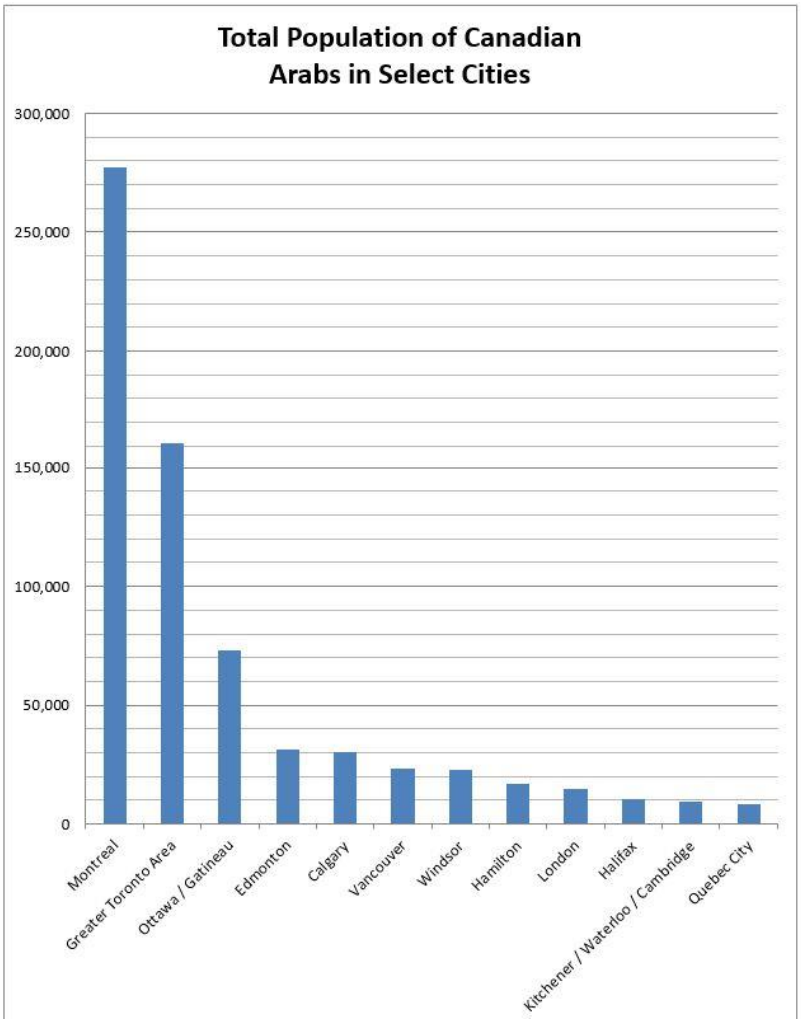

Figure 3: Arabs Distribution in Canada

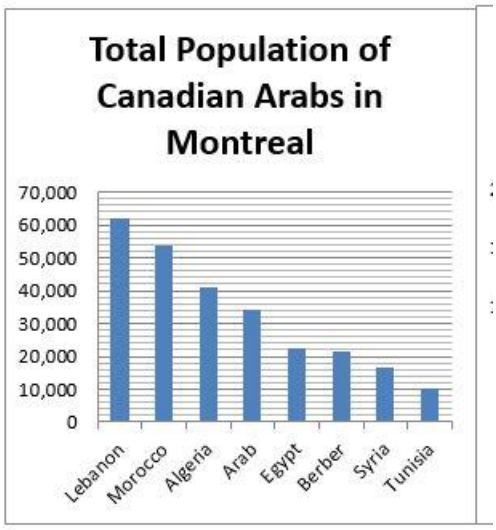

Figure 4: Lebanese percentage among Arabs in Montreal

So now we are sure that Montreal is the city that is welcoming the highest number of Lebanese immigrants. Now we are able to focus on Montreal since it will be the city that will host the restaurant we intend to build to cater for customers and mainly the huge number of Lebanese.

The city is determined, now we need to determine what area/neighborhood is best for opening a restaurant in Montreal so that it would be a successful investment.

In order to do so, we need to find out how many Boroughs and neighborhoods exist in Montreal so that we can analyze them and determine the favorite locations for this restaurant. I was not able to find a finalized table for Montreal's boroughs and neighborhoods, therefore, I relied on the data listed in Wikipedia, to create my own table for Montreal.

According to https://en.wikipedia.org/wiki/Boroughs_of_Montreal, Montreal has 19 Boroughs.

Number (map)	Borough	Population Canada 2016 Census[1]	Area in km²	Density per km²
1.	Ahuntsic-Cartierville	134,245	24.2	5,547.3
2.	Anjou	42,796	13.7	3,123.8
3.	Côte-des-Neiges–Notre-Dame-de-Grâce	166,520	21.4	7,781.3
4.	Lachine	44,489	17.7	2,513.5
5.	LaSalle	76,853	16.3	4,714.9
6.	Le Plateau-Mont-Royal	104,000	8.1	12,839.5
7.	Le Sud-Ouest	78,151	15.7	4,977.8
8.	L'Île-Bizard–Sainte-Geneviève	18,413	23.6	780.2
9.	Mercier–Hochelaga-Maisonneuve	136,024	25.4	5,355.3
10.	Montréal-Nord	84,234	11.1	7,588.6
11.	Outremont	23,954	3.9	6,142.0
12.	Pierrefonds-Roxboro	69,297	27.1	2,557.1
13.	Rivière-des-Prairies–Pointe-aux-Trembles	106,734	42.3	2,523.2
14.	Rosemont–La Petite-Patrie	139,590	15.9	8,779.2
15.	Saint-Laurent	98,828	42.8	2,309.1
16.	Saint-Léonard	78,305	13.5	5,800.4
17.	Verdun	69,229	9.7	7,137.0
18.	Ville-Marie	89,170	16.5	5,404.2
19.	Villeray–Saint-Michel–Parc-Extension	143,853	16.5	8,718.3

Figure 5: Montreal Boroughs

Then I retrieved the neighborhoods of every Borough listed above using: https://en.wikipedia.org/wiki/List_of_neighbourhoods_in_Montreal. I ended up with a total of 42 neighborhoods.

Having the Boroughs and Neighborhoods, I logged to https://worldpostalcode.com/canada/quebec/montreal, to retrieve the postcodes and latitudes and longitudes for each neighborhood as I need to use the latitudes and longitudes to utilize the foursquare location data to get a list of available venues in each neighborhood so that I can have an idea of the list of attractions in each neighborhood.

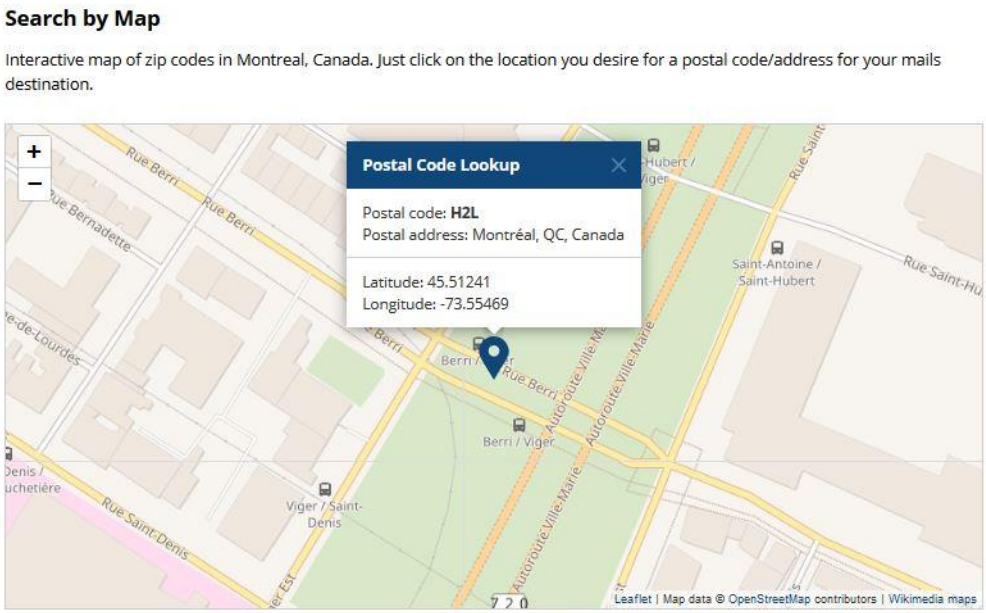

Figure 6: Getting Longitude and Latitude of Neighborhoods

Once I collected the postcode, Borough, Neighborhood, Longitude and Latitude, I merged the data in a csv file called Montreal Neighborhoods. This file contains 5 columns and 42 rows. This csv file will be imported and read in a Jupyter Notebook to analyze the data and supply the latitude and longitude for each neighborhood for the foursquare algorithm to determine the venues which will allow us to specify the best location to open the Lebanese restaurant.

	A	B	C	D	E
1	PostalCode	Borough	Neighborhood	Latitude	Longitude
2	H3L	Ahuntsic-Cartierville	Ahuntsic	45.5553	-73.67139
3	H3M	Ahuntsic-Cartierville	Nouveau-Bordeaux	45.53543	-73.68711
4	H4J	Ahuntsic-Cartierville	Cartierville	45.52899	-73.70293
5	H2Y	Ahuntsic-Cartierville	Saint-Sulpice	45.50453	-73.55515
6	H2B	Ahuntsic-Cartierville	Sault-au-Recollet (Ile de la Visitation)	45.57523	-73.66274
7	H1K	Anjou	Anjou	45.60219	-73.55961
8	H3T	Cote-des-Neiges-Notre-Dame-de-Grace	Cote-des-Neiges	45.49853	-73.62716
9	H4B	Cote-des-Neiges-Notre-Dame-de-Grace	Notre-Dame-de-Grace	45.46711	-73.6225
10	H3W	Cote-des-Neiges-Notre-Dame-de-Grace	Snowdon	45.48899	-73.64058

Figure 7: Part of the CSV file

Methodology

We want to figure out the best neighborhood or area to open a Lebanese restaurant. We prepared the data we need from postcodes, boroughs, neighborhoods and its corresponding latitudes and longitudes. The best approach to handle such a topic is utilizing the foursquare data services to find out what venues exist in these neighborhoods, then applying the machine learning clustering algorithm to cluster these neighborhoods into clusters so that we would be able to distinguish the similar neighborhoods and determine the differences between them.

This way, we can find out what characterizes each neighborhood thus we can eliminate areas that do not fit for restaurants. For example, it is not recommended to open a restaurant in an industrial area full of factories or open a restaurant in an area where no venues or attractions exist.

To implement this, we will create a Jupyter notebook and perform all the stated operations.

We start by creating a data Frame from the csv file we created.

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	H3L	Ahuntsic-Cartierville	Ahuntsic	45.55530	-73.67139
1	H3M	Ahuntsic-Cartierville	Nouveau-Bordeaux	45.53543	-73.68711
2	H4J	Ahuntsic-Cartierville	Cartierville	45.52899	-73.70293
3	H2Y	Ahuntsic-Cartierville	Saint-Sulpice	45.50453	-73.55515
4	H2B	Ahuntsic-Cartierville	Sault-au-Recollet (Ile de la Visitation)	45.57523	-73.66274
5	H1K	Anjou	Anjou	45.60219	-73.55961
6	H3T	Cote-des-Neiges-Notre-Dame-de-Grace	Cote-des-Neiges	45.49853	-73.62716
7	H4B	Cote-des-Neiges-Notre-Dame-de-Grace	Notre-Dame-de-Grace	45.46711	-73.62250
8	H3W	Cote-des-Neiges-Notre-Dame-de-Grace	Snowdon	45.48899	-73.64058
9	H8S	Lachine	Ville Saint-Pierre	45.43297	-73.68113
10	H8R	LaSalle	LaSalle	45.42868	-73.66282

Figure 8: DataFrame Data

We have a total of 43 neighborhoods as shown in the folium map we created:

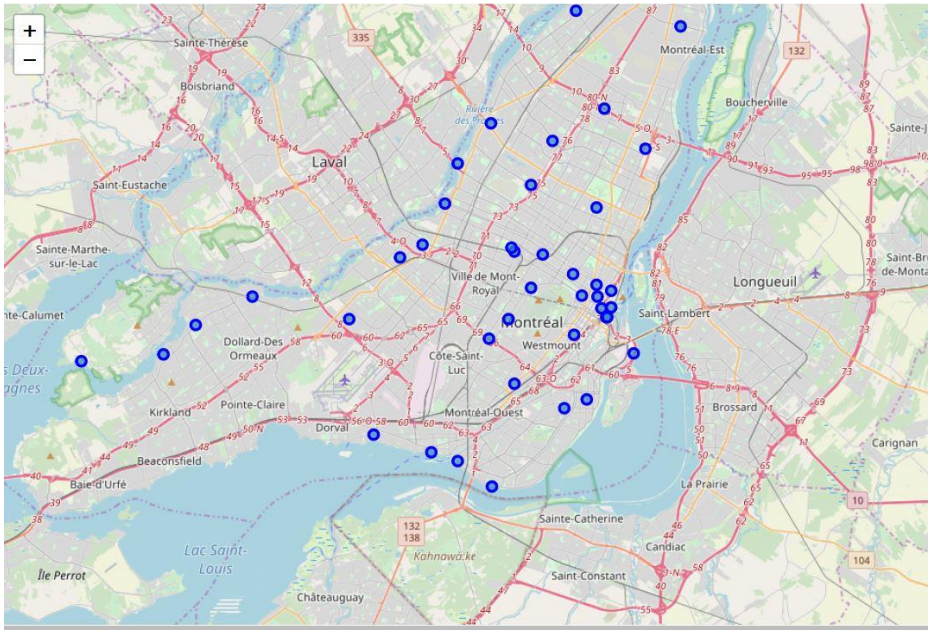

Figure 9: Montreal Neighborhoods Map

Now it is time to call the foursquare data location services. We use our client id and secret and write a method to return the first 100 venues within 500 meters of each neighborhood.

```
print(Montreal_venues.shape)
Montreal_venues.head()
```

```
(1150, 7)
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Ahuntsic	45.5553	-73.67139	IGA	45.556743	-73.668094	Grocery Store
1	Ahuntsic	45.5553	-73.67139	A&W Canada	45.554871	-73.668923	Fast Food Restaurant
2	Ahuntsic	45.5553	-73.67139	Pizza Pizza	45.554562	-73.668458	Pizza Place
3	Ahuntsic	45.5553	-73.67139	Petro-Canada	45.554955	-73.668821	Gas Station
4	Ahuntsic	45.5553	-73.67139	Brasserie au Coin du Métro Henri Bourassa Ltée	45.555406	-73.668371	Deli / Bodega

Figure 10: Montreal Venues

We group the neighborhoods to find the total number of venues returned for each neighborhood:

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Ahuntsic	12	12	12	12	12	12
Anjou	27	27	27	27	27	27
Cartierville	2	2	2	2	2	2
Cite du Multimedia	73	73	73	73	73	73
Citta Italiana	5	5	5	5	5	5
Cote-Saint-Paul	3	3	3	3	3	3
Cote-des-Neiges	46	46	46	46	46	46
DeLorimier	100	100	100	100	100	100
Downtown Montreal	33	33	33	33	33	33
Griffintown	6	6	6	6	6	6
Hochelaga-Maisonneuve	4	4	4	4	4	4
Jeanne-Mance	4	4	4	4	4	4
La Petite-Patrie	62	62	62	62	62	62
LaSalle	5	5	5	5	5	5
Mile End	26	26	26	26	26	26
Milton-Parc	70	70	70	70	70	70

Figure 11: Total Venues for Each Neighborhood

From all these venues returned, we find out 215 unique venue types. So now we need to know the availability and frequency of each venue in each neighborhood. To do so, we create dummies for each venue type and group by the mean of the neighborhoods. We end up with the following data frame (first 5 rows):

	MontrealNeighborhood	Adult Boutique	Art Gallery	Art Museum	Arts & Crafts Store	Arts & Entertainment	Asian Restaurant	Athletics & Sports	Auto Garage	Automotive Shop	BBQ Joint	Baby Store	Bakery	Bank	Bar
0	Ahuntsic	0.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	0.0	0.000000
1	Anjou	0.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.037037	0.000000	0.0	0.000000
2	Cartierville	0.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	0.0	0.000000
3	Cite du Multimedia	0.0	0.013699	0.013699	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.013699	0.0	0.013699
4	Citta Italiana	0.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.000000	0.0	0.000000

Figure 12: Frequency and means of Venues for each Neighborhood

To make this data easy to understand and visualize, we will write a method that compares these numbers and returns the top 10 venues for each neighborhood. We end up with the following data frame (first 5 rows):

	Neighborhood	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	Ahuntsic	Deli / Bodega	Rental Car Location	Bus Station	Fast Food Restaurant	Metro Station	Gas Station	Park	Grocery Store	Restaurant	Coffee Shop
1	Anjou	Clothing Store	Coffee Shop	Burger Joint	Grocery Store	Pizza Place	Restaurant	Electronics Store	Fabric Shop	Fast Food Restaurant	Shop & Service
2	Cartierville	Construction & Landscaping	Kids Store	Yoga Studio	English Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant
3	Cite du Multimedia	Café	French Restaurant	Hotel	Restaurant	Speakeasy	Seafood Restaurant	Portuguese Restaurant	History Museum	Cocktail Bar	Yoga Studio
4	Citta Italiana	Gas Station	Dessert Shop	Hockey Arena	Discount Store	Drugstore	Yoga Studio	Event Space	Food Court	Food & Drink Shop	Food
5	Cote-Saint-Paul	Soccer Stadium	Home Service	Pharmacy	Yoga Studio	Empanada Restaurant	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant	Farmers Market

Figure 13: Top 10 Venues for each Neighborhood

We ended up with a data frame that contains the top 10 venues for each neighborhood. Now it is time to apply the clustering algorithm because what this algorithm does is grouping neighborhoods with similar venues together so that we can distinguish the characteristics of each neighborhood. We need to determine the number of clusters to be generated. The best way to determine this value is to use the Elbow Square Method. This Method tests a range of possible values and displays its result as a continuous line. The point where the slope changes in a notifiable way, would be a better number to use.

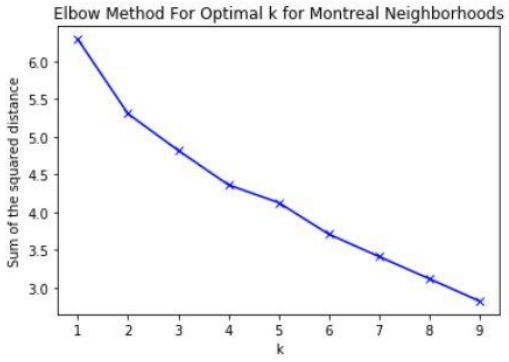

Figure 14: Elbow Square Method

As we can see in the graph, the slope bends obviously at 5 then continues its downward slope, thus it won't matter a lot if we decide on 5 or 6 or greater, but 5 ensures accurate results and less processing overload. So we will set the k to 5 in the clustering function we will create and give it our data to fit and cluster. The output will be as follows:

	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	1
0	H3L	Ahuntsic-Cartierville	Ahuntsic	45.55530	-73.67139	0	Deli / Bodega	Rental Car Location	Bus Station	Fast Food Restaurant	Metro Station	Gas Station	Park	Grocery Store	Restaurant	
1	H3M	Ahuntsic-Cartierville	Nouveau-Bordeaux	45.53543	-73.68711	2	Tennis Court	Yoga Studio	English Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant	
2	H4J	Ahuntsic-Cartierville	Cartierville	45.52899	-73.70293	4	Construction & Landscaping	Kids Store	Yoga Studio	English Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	R
3	H2Y	Ahuntsic-Cartierville	Saint-Sulpice	45.50453	-73.55515	0	Hotel	Café	French Restaurant	Italian Restaurant	Steakhouse	Plaza	Restaurant	Speakeasy	Gift Shop	
4	H2B	Ahuntsic-Cartierville	Sault-au-Recollet (Ile de la Visitation)	45.57523	-73.66274	0	Park	Gas Station	Café	History Museum	Yoga Studio	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	R

Figure 15: Clustering Of Neighborhoods

To visualize it clearly, we plot it using the folium maps:

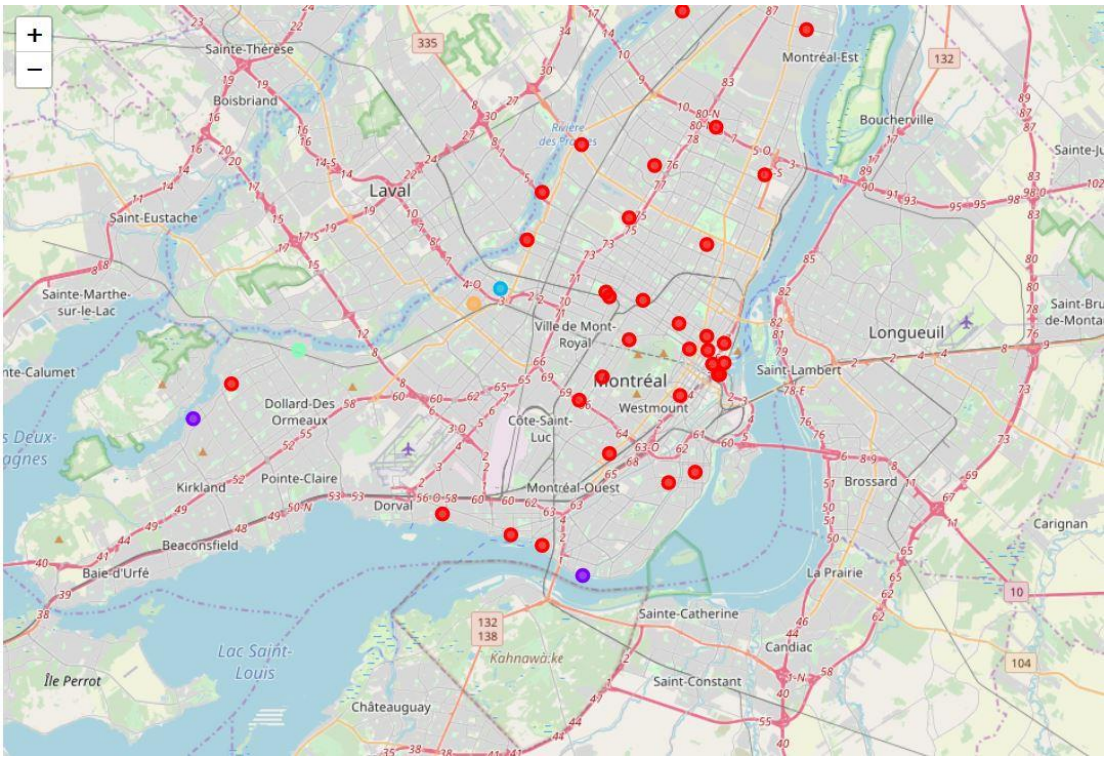

Figure 16: Clusters on Map

We note that most neighborhoods fall into one cluster (the red one) while the remaining neighborhoods fall into the other clusters (the blue, yellow and purple).

Results

In order to visualize what neighborhoods fall into the same cluster, we display the details of each cluster as follows:

```
Montreal_merged.loc[Montreal_merged['Cluster Labels'] == 4, Montreal_merged.columns[[2] + list(range(5, Montreal_merged.shape[1]))]]
```

	Neighborhood	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
2	Cartierville	4	Construction & Landscaping	Kids Store	Yoga Studio	English Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant

Figure 17: Cluster 4 Neighborhoods

We notice that only one neighborhood (Cartierville) is in cluster 4.

```
Montreal_merged.loc[Montreal_merged['Cluster Labels'] == 3, Montreal_merged.columns[[2] + list(range(5, Montreal_merged.shape[1]))]]
```

	Neighborhood	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	Roxboro	3	Hookah Bar	Playground	Train Station	Yoga Studio	Empanada Restaurant	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant

Figure 18: Cluster 3 Neighborhoods

Also cluster 3 contains only one neighborhood (Roxboro).

```
Montreal_merged.loc[Montreal_merged['Cluster Labels'] == 2, Montreal_merged.columns[[2] + list(range(5, Montreal_merged.shape[1]))]]
```

	Neighborhood	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
1	Nouveau-Bordeaux	2	Tennis Court	Yoga Studio	English Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant	Farmers Market

Figure 19: Cluster 2 Neighborhoods

Cluster 2 also has a single neighborhood (Nouveau-Bordeaux).

```
Montreal_merged.loc[Montreal_merged['Cluster Labels'] == 1, Montreal_merged.columns[[2] + list(range(5, Montreal_merged.shape[1]))]]
```

	Neighborhood	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
11	The Plateau	1	Performing Arts Venue	Convenience Store	Fast Food Restaurant	Empanada Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Farmers Market
22	Sainte-Genevieve	1	Performing Arts Venue	Pizza Place	Convenience Store	Diner	Auto Garage	Fast Food Restaurant	Grocery Store	Empanada Restaurant	Food & Drink Shop	Food

Figure 20: Cluster 1 Neighborhoods

Cluster 1 contains two neighborhoods: The Plateau and Sainte-Genevieve.

```
Montreal_merged.loc[Montreal_merged['Cluster Labels'] == 0, Montreal_merged.columns[[2] + list(range(5, Montreal_merged.shape[1]))]]
```

	Neighborhood	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	Ahuntsic	0	Deli / Bodega	Rental Car Location	Bus Station	Fast Food Restaurant	Metro Station	Gas Station	Park	Grocery Store	Restaurant	Coffee Shop
3	Saint-Sulpice	0	Hotel	Café	French Restaurant	Italian Restaurant	Steakhouse	Plaza	Restaurant	Speakeasy	Gift Shop	Sandwich Place
4	Sault-au-Recollet (Ile de la Visitation)	0	Park	Gas Station	Café	History Museum	Yoga Studio	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant
5	Anjou	0	Clothing Store	Coffee Shop	Burger Joint	Grocery Store	Pizza Place	Restaurant	Electronics Store	Fabric Shop	Fast Food Restaurant	Shop & Service
6	Cote-des-Neiges	0	Coffee Shop	Middle Eastern Restaurant	Vietnamese Restaurant	Pharmacy	Pub	Farmers Market	Thai Restaurant	Bar	Convenience Store	Burger Joint
7	Notre-Dame-de-Grace	0	Indian Restaurant	Grocery Store	Café	Pharmacy	Korean Restaurant	Bank	Persian Restaurant	Convenience Store	Pub	Diner
8	Snowdon	0	Rental Car Location	Gym	Hotel	Salon / Barbershop	Italian Restaurant	Gas Station	Park	History Museum	Pizza Place	Fast Food Restaurant
9	Ville Saint-Pierre	0	Italian Restaurant	Café	Cheese Shop	Ice Cream Shop	Pizza Place	Pub	Farmers Market	Mexican Restaurant	Bakery	Falafel Restaurant
10	LaSalle	0	Playground	Fast Food Restaurant	History Museum	Historic Site	Park	Yoga Studio	Empanada Restaurant	Food & Drink Shop	Food	Fish & Chips Shop

Figure 21: Cluster 0 Neighborhoods (First 10 only)

The majority of neighborhoods fall into cluster 0.

A quick overview of these results shows that cluster 0 has a total of 35 neighborhoods while cluster 1 has 2 neighborhoods leaving clusters 2, 3 and 4 with one neighborhood each. It is obvious that neighborhoods of cluster 0 contain a larger selection of venue types than the other clusters and mainly in the area of food courts and restaurants. A detailed analysis of this observation will be discussed in the next section.

Discussion

Let's analyze each cluster and try to find out the observations that can help us reach a solution or decision regarding our topic.

Cluster 4 is abundant in construction and landscaping in addition to kids stores and football stadiums and few food courts. Cluster 3 contains playgrounds and train stations along some restaurants. Cluster 2 includes tennis courts, yoga studios, farmer markets and restaurants. Cluster 1 is famous for its performing arts venues, convenience stores, grocery stores in addition to food places. Cluster 0 which contains most of the neighborhoods contains a huge selection of venues from hotels to parks to banks and mainly a huge selection of food amenities from cafes to pubs to pizza places to fish and ships and a huge selection of different restaurants including Middle Eastern restaurants which are our center of interest. Thus cluster 0 contains every factor that favors opening a new restaurant, from places that are always a destination for people (hotels, parks, and banks) and a huge availability of food locations which increase the percentage of possible customers.

Moreover upon further investigation in cluster 0 neighborhoods, we note that in neighborhood Cote-des-Neiges, Middle Eastern Restaurants are the second most abundant venues. Also in neighborhood Nun's Island, Middle Eastern Restaurants are the 9th most abundant venue.

0	Ahuntsic	0	Deli / Bodega	Rental Car Location	Bus Station	Fast Food Restaurant	Metro Station	Gas Station	Park	Grocery Store	Restaurant	Coffee Shop
3	Saint-Sulpice	0	Hotel	Café	French Restaurant	Italian Restaurant	Steakhouse	Plaza	Restaurant	Speakeasy	Gift Shop	Sandwich Place
4	Sault-au-Recollet (Ile de la Visitation)	0	Park	Gas Station	Café	History Museum	Yoga Studio	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant
5	Anjou	0	Clothing Store	Coffee Shop	Burger Joint	Grocery Store	Pizza Place	Restaurant	Electronics Store	Fabric Shop	Fast Food Restaurant	Shop & Service
6	Cote-des-Neiges	0	Coffee Shop	Middle Eastern Restaurant	Vietnamese Restaurant	Pharmacy	Pub	Farmers Market	Thai Restaurant	Bar	Convenience Store	Burger Joint
7	Notre-Dame-de-Grace	0	Indian Restaurant	Grocery Store	Café	Pharmacy	Korean Restaurant	Bank	Persian Restaurant	Convenience Store	Pub	Diner
8	Snowdon	0	Rental Car Location	Gym	Hotel	Salon / Barbershop	Italian Restaurant	Gas Station	Park	History Museum	Pizza Place	Fast Food Restaurant
9	Ville Saint-Pierre	0	Italian Restaurant	Café	Cheese Shop	Ice Cream Shop	Pizza Place	Pub	Farmers Market	Mexican Restaurant	Bakery	Falafel Restaurant
10	LaSalle	0	Playground	Fast Food Restaurant	History Museum	Historic Site	Park	Yoga Studio	Empanada Restaurant	Food & Drink Shop	Food	Fish & Chips Shop
12	Mile End	0	Coffee Shop	Tennis Court	Art Gallery	Comfort Food Restaurant	Tea Room	Sushi Restaurant	Breakfast Spot	Café	Sandwich Place	Indian Restaurant
13	Milton-Parc	0	Coffee Shop	Café	Pizza Place	Japanese Restaurant	Bar	Hotel	Restaurant	Bakery	Pub	Nightclub
14	DeLorimier	0	Café	Breakfast Spot	Bakery	French Restaurant	Japanese Restaurant	Portuguese Restaurant	Burger Joint	Bar	Restaurant	Record Shop
15	Jeanne-Mance	0	Pharmacy	Pizza Place	Asian Restaurant	Yoga Studio	Empanada Restaurant	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant
16	Griffintown	0	Park	Pizza Place	Soccer Field	Asian Restaurant	Restaurant	Yoga Studio	Electronics Store	Food	Fish & Chips Shop	Fast Food Restaurant
18	Saint-Henri	0	Café	French Restaurant	Hotel	Restaurant	Speakeasy	Seafood Restaurant	Portuguese Restaurant	Cocktail Bar	History Museum	Polish Restaurant
19	Cote-Saint-Paul	0	Soccer Stadium	Home Service	Pharmacy	Yoga Studio	Empanada Restaurant	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant	Farmers Market
20	Ville-Emard	0	Park	Playground	Metro Station	Fast Food Restaurant	Yoga Studio	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Farmers Market
23	Hochelaga-Maisonneuve	0	Coffee Shop	Restaurant	Park	Yoga Studio	Empanada Restaurant	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant	Farmers Market
24	Montreal-Nord	0	Fast Food Restaurant	Comedy Club	Caribbean Restaurant	Yoga Studio	English Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop
25	Outremont	0	Park	Café	Diner	Metro Station	Bakery	Sandwich Place	Yoga Studio	Event Space	Food Court	Food & Drink Shop
26	Pierrefonds	0	Adult Boutique	Asian Restaurant	Dive Bar	Track	English Restaurant	Football Stadium	Food Court	Food & Drink Shop	Food	Fish & Chips Shop
28	Pointe-aux-Trembles	0	Fast Food Restaurant	Pharmacy	Discount Store	Sandwich Place	Coffee Shop	Grocery Store	Yoga Studio	Empanada Restaurant	Food & Drink Shop	Food
29	Riviere-des-Prairies	0	Pool	Liquor Store	Comedy Club	Grocery Store	Food Court	Food & Drink Shop	Food	Fish & Chips Shop	Fast Food Restaurant	Farmers Market
30	La Petite-Patrie	0	Café	Bar	French Restaurant	Vietnamese Restaurant	Diner	Thrift / Vintage Store	Pizza Place	Sushi Restaurant	Coffee Shop	Asian Restaurant
31	Rosemont	0	Park	Portuguese Restaurant	Dog Run	Furniture / Home Store	Supermarket	Grocery Store	Kids Store	Bus Stop	Pet Store	Convenience Store
33	Citta Italiana	0	Gas Station	Dessert Shop	Hockey Arena	Discount Store	Drugstore	Yoga Studio	Event Space	Food Court	Food & Drink Shop	Food
34	Nuns' Island	0	Grocery Store	Indian Restaurant	Café	Breakfast Spot	Bakery	Sandwich Place	Pizza Place	Pharmacy	Middle Eastern Restaurant	Mexican Restaurant
35	Downtown Montreal	0	Hotel	Coffee Shop	Vietnamese Restaurant	French Restaurant	Pub	Bar	Café	Karaoke Bar	Nightclub	Library
36	Cite du Multimedia	0	Café	French Restaurant	Hotel	Restaurant	Speakeasy	Seafood Restaurant	Portuguese Restaurant	History Museum	Cocktail Bar	Yoga Studio

Figure 22: Middle Eastern Restaurants in Cluster 0

So based on all these observations, it is easy to say that the best place to open a restaurant is in neighborhoods belonging to cluster 0 since they contain all possible attractions for people and are the destination for restaurant seekers. Moreover, we can also easily deduce that the more favorable neighborhoods in this cluster are neighborhoods "Cote-des-Neiges" and "Nun's Island" since they are already abundant in Middle Eastern Restaurants and a thus a known destination for the Lebanese people who we are interested in. And definitely there should be no fear of competition among these restaurants because for sure they can't handle an increase in 30,000 customers in a single year.

So the final answer to our question of where to open a restaurant in Montreal would simply be to open a restaurant in Cote-des-Neiges or Nun's Island first, and if interested in opening more branches in other areas, the remaining neighborhoods of cluster 0 are definitely the favorable locations for this investment plan.

Conclusion

Our aim in this report was to come up with a successful investment capable of generating profits but at the same time providing a service for people in need. In our report we are hoping to be able to serve the 30,000 Lebanese and counting who are emigrating from Lebanon by providing them with the same cuisine they are used to in their home country.

Collecting some Canadian geographical data, utilizing foursquare data services, and by applying a known machine learning algorithm, we were able to narrow our search for a suitable restaurant location from the whole Canadian area of 9.985 million square kilometers down to two favorable neighborhoods in Montreal.

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