Peer-graded Assignment: Capstone Project - The Battle of Neighborhoods (Week 2)

The Project Report

Project Title: Exploring Montreal's Food Diversity

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1. Introduction and Business Description (Week -1)

Problem Background and Importance

I currently reside in Montreal and am positively charged by its vibrant environment and surroundings. Montreal is metropolitan city in the province of Quebec on the Island of Montreal in Canada. Its population in 2019 was 4,195,523. It has been projected to grow to 4,377,306 by 2025 and 4,572,740 by 2030 (http://worldpopulationreview.com/world-cities/montreal-population/). The main city has a population density of 4,517 people per square kilometer. Montreal has diverse ethnic groups including French, Italian, Irish, English, Scottish, and Spanish. Its visible minorities are black, Arab, Latin Americans, South Asians and Chinese.

To narrate multitude opportunities and scope of its evolving life style, I refer to a report (https://toolkit.mtl.org/en/studies-reports-and-statistics) published by Montreal Tourism. It is truly number one city, one may agree, from various perspectives including:

• 1st in North America and 20th in the world for hosting international events; 1st in North America and 10th in the world for reputation, 11th in the world for food diversity with 58 different types of cuisine

• 1st among smart cities in Canada and 2nd in North America, 2nd in the world for millennials, 1st university city in North America and 4th in the world

• 1st in Canada for the number of the world's most sought-after hotels, 1st in the Americas and 15th in the world for hosting international meetings

• Canada's top city for hosting major sporting events,

• Home to one of the North America's top 10 airports

• Home to one of the world's coolest neighborhoods: little Italy.

• 2nd among North America's top 15 cities for quality of life.

• Famous Jazz festival attracts enormous number of tourists from across the globe during July - August.

• More than one in every ten Canadians lives in the Montreal Metropolitan Area. https://canadapopulation.org/montreal-population/#Montreal_Metropopulation

Quebec culture is known for fine quality of dining with a style and the society is vibrant. Investment must be kept maintained or enhanced to keep up with above distinction of Montreal. Such ventures will support the peace and prosperities of Montreal, Quebec and Canada. These above factors, among others, will encourage the new entrepreneurs to open investments in the restaurants of generality or specialty, and for which they will need the scoping study, with some aspects provided in this project.

Problem Description*:*

The purpose of this project is to provide a descriptive picture of food diversity in Montreal and its neighborhoods, and understand the factors, which can explain the diversity, along with any possible dependencies among these factors

Target Audience

This project is targeted to the entrepreneurs who could be a start-up for opening a normal restaurant, a restaurant with specialty, or operation of nodes of its supply chain, of course at the place of significance in terms of low competition and operating cost, as well as to the clients [audience or stakeholders] of these selective places. as well as at the profitable related

Success Criteria

The identified venues with restaurants representing diverse foods and clusters of venues associated with specialty foods.

Click the following link to see the visuals [Source: internet]
https://www.tripsavvy.com/montreal-restaurants-4139153
https://www.tripsavvy.com/montreal-4139156

2. Data description and sources of data (Week 1)

Data description and approach of data harvesting*:*

1. While moving on a number of paths to look for data, I came across link: https://www.geonames.org/postal-codes/CA/QC/quebec.html which contains the information on the first segment of the Canadian postal code, place (i.e. the neighborhood), its longitude and latitude, and Admin2 (Borough) it belongs to.

2. I scraped this html file using BeautifulSoul and obtained the tabular data.

3. Data from above link were wrangled in terms of seeing the spatial locations of various boroughs and neighborhoods and filtering out some neighborhoods/boroughs which were seen too far away from the downtown Montreal on the map.

4. Thus, the basic spatial data was cleaned and saved in a dataframe "neighborhoods" and was subjected to the analysis described in the Methodology section.

3 Methodology

Methodology involved a series of the following steps.

1. Examining the list and map of the neighborhood and this examination also provided feedback on dropping some neighborhoods which were far away from Montreal region;

used *geopy* library to get the latitude and longitude values of Montreal and created a map of Montreal with circles superimposed on neighborhoods.

2. Used Foursquare to retrieve the venues information. Exploration of venues was done within 500 meters radius circle around a neighborhood, Southwest Downtown Montreal.

3. Tested independence of venue and neighborhood (assumptions ignored) using contingency chi-square test

4. Neighborhood x venue specificity was studied in terms of:
   a. frequency of top five venues and up to ten most common venues neighborhood-wise;
   b. cluster of the neighborhoods;
   c. up to 10 most common venues neighborhood-wise in each cluster.

Map 1. Montreal area
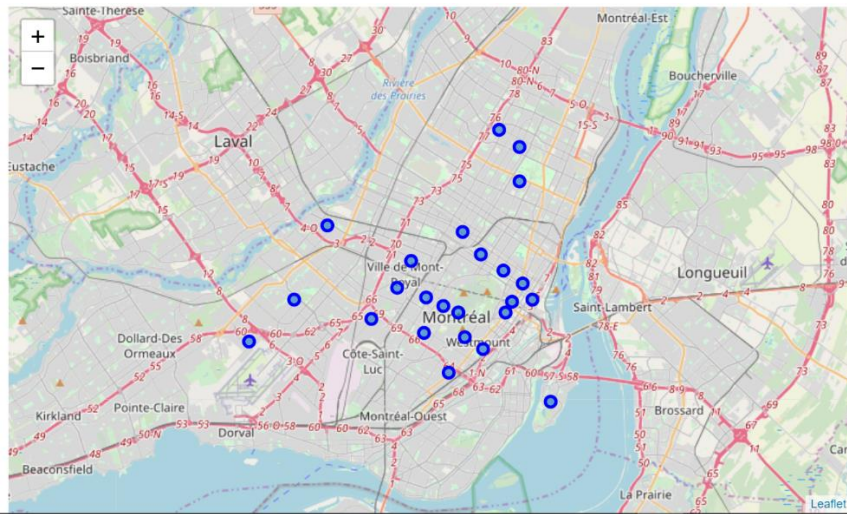
4 Results

1. Explored within 500 m radius circle and 100 (at the limit) venues were returned by the Foursquare. There are 174 unique categories.

2. The type of business (venue) was found not independent of the neighborhood (P = 1.89 x 10^{-39}). This indicates a point in examining neighborhood-wise. However, based on overall the neighborhoods, the ten most frequent venues were:
   a. "Cafe', Hotel, French restaurant, Bar and Coffee Shop", Park, Restaurant, Pizza Place, Bakery, Clothing Store"
   b. Cafe' and Coffee Shop are within top ten; entrepreneur may look for general coffee places as well as specialty coffee shops.
   c. French Restaurant and Restaurant appear in top ten, shows the popularity of specialty restaurants.

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d. Cafe is number 1 and Hotel is 2 which is easy to understand considering the nature of Montreal.

The venues with lower appearances are in these neighborhoods:
e. Donut Shop, Electronics Store, Empanada Restaurant, English Restaurant, Accessories Store
f. These reflect a message to investors on updating the facilities in these specialties.

3. In specific neighborhoods, the frequency and popularity/commonality of venues vary. For instant, the five most frequent venues/businesses were:
   - Burger Joint (0.17), Metro Station (0.17), Café (0.17), French Restaurant (0.17), Pharmacy (0.17) in Côte-des-Neiges East neighborhood
   - Flower Shop (0.25), Portuguese Restaurant (0.25), Sushi Restaurant (0.25), Park (0.25), Pastry Shop in Côte-des-Neiges North,
   - Portuguese Restaurant in Côte-des-Neiges North
   - Italian Restaurant in Downtown Montreal South & West
   - Hotel, coffee shops and clothing venues in Downtown Montreal East among others.

4. The detailed picture of Neighborhood x Venue is in the following table (Table 1) which provides the specific link between the two factors. This table will help make decision on the choices to the entrepreneurs on general as well as specialty activities.

   The identification strength of a venue – neighborhood may vary with the area explored by setting a different radius. However, the most common venue in Montreal downtown neighborhoods are Café' and hotels.

   The data strongly support narratives for food diversity in Montreal region. Among the foods of popularity, there is a strong diversity in the specialty restaurants such as French, Japanese (Shushi), Portuguese, English, Mediterranean, Spanish, Chinese, Indian, Sri Lankan, Vietnamese, Filipino cuisines among others.

Table 1. Up to ten most common venues neighborhood-wise

	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	Côte-des-Neiges East	Burger Joint	Pharmacy	Café	College Bookstore	Metro Station	French Restaurant	Discount Store	English Restaurant	Empanada Restaurant	Electronics Store
1	Côte-des-Neiges North	Portuguese Restaurant	Sushi Restaurant	Flower Shop	Park	Coworking Space	Discount Store	Empanada Restaurant	Electronics Store	Convenience Store	Dumpling Restaurant
2	Côte-des-Neiges Northeast	Park	Food & Drink Shop	Supermarket	Sushi Restaurant	Grocery Store	Dim Sum Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop	Dog Run
3	Côte-des-Neiges Southwest	Convenience Store	Bus Station	Business Service	Furniture / Home Store	Falafel Restaurant	Empanada Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop	Dog Run
4	Downtown Montreal East	Hotel	Coffee Shop	Café	Clothing Store	Sandwich Place	Cosmetics Shop	Gym	Gastropub	Deli / Bodega	Men's Store
5	Downtown Montreal North	Hotel	French Restaurant	Café	Plaza	Cocktail Bar	Chinese Restaurant	Restaurant	Asian Restaurant	Sandwich Place	Italian Restaurant
6	Downtown Montreal Northeast	Café	Hotel	French Restaurant	Concert Hall	Bar	Pizza Place	Coffee Shop	Restaurant	Brewery	Breakfast Spot
7	Downtown Montreal	Café	Art Museum	Hotel	Italian Restaurant	French Restaurant	Pub	Pizza Place	Middle Eastern Restaurant	Burger Joint	Clothing Store

	South & West										
8	Downtown Montreal Southeast	Convenience Store	Mediterranean Restaurant	Soccer Field	Park	Cupcake Shop	Cycle Studio	Empanada Restaurant	Cosmetics Shop	Electronics Store	Dumpling Restaurant
9	Jean-Talon West	Sandwich Place	Restaurant	Burger Joint	Dessert Shop	Empanada Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop	Dog Run	Discount Store
10	Mount Royal Central	Basketball Court	Gym / Fitness Center	Women's Store	Diner	English Restaurant	Empanada Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop	Dog Run
11	Mount Royal North	Discount Store	Pharmacy	Shopping Mall	Asian Restaurant	Bookstore	Gym	Liquor Store	Women's Store	Empanada Restaurant	Electronics Store
12	Notre-Dame-de-GrÔce Northeast	Grocery Store	Accessories Store	Pizza Place	Athletics & Sports	Diner	Sushi Restaurant	Park	Dim Sum Restaurant	Empanada Restaurant	Electronics Store
13	Notre-Dame-de-GrÔce Southwest	Café	Indian Restaurant	BBQ Joint	Bakery	Korean Restaurant	Pizza Place	Persian Restaurant	Pub	Park	Diner
14	Plateau Mont-Royal South Central	Café	Bar	Yoga Studio	Clothing Store	Bagel Shop	Coffee Shop	Deli / Bodega	Bakery	Gastropub	Pizza Place
15	Plateau Mont-Royal Southeast	Café	Portuguese Restaurant	Bakery	Bar	Japanese Restaurant	Breakfast Spot	French Restaurant	Burger Joint	Steakhouse	Ice Cream Shop
16	Plateau Mont-Royal West	Bar	Restaurant	Beer Store	Café	Cocktail Bar	Pizza Place	Breakfast Spot	Coffee Shop	Donut Shop	Camera Store

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17	Rosemont Central	Fast Food Restaurant	Gym / Fitness Center	Business Service	Park	Thai Restaurant	Grocery Store	Dance Studio	Diner	Electronics Store	Cosmetics Shop
18	Rosemont North	Dessert Shop	Bar	Pharmacy	Turkish Restaurant	Park	Sushi Restaurant	Empanada Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop
19	Rosemont South	Portuguese Restaurant	Deli / Bodega	Bus Station	Business Service	Chinese Restaurant	Convenience Store	Pet Store	Cycle Studio	Dog Run	Empanada Restaurant
20	Saint-Laurent Central	Restaurant	Bank	Furniture / Home Store	Home Service	Rental Service	Juice Bar	Gym	Coffee Shop	Dumpling Restaurant	Donut Shop
21	Saint-Laurent Southeast	Construction & Landscaping	Business Service	Fast Food Restaurant	Falafel Restaurant	English Restaurant	Empanada Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop	Dog Run
22	Saint-Laurent Southwest	Park	Women's Store	Diner	English Restaurant	Empanada Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop	Dog Run	Discount Store
23	Westmount East	Park	Athletics & Sports	Tennis Court	Scenic Lookout	Women's Store	Dim Sum Restaurant	Empanada Restaurant	Electronics Store	Dumpling Restaurant	Donut Shop
24	Westmount West	Vietnamese Restaurant	Department Store	Coffee Shop	Filipino Restaurant	Sri Lankan Restaurant	Gym	Fast Food Restaurant	Art Gallery	Cycle Studio	Dog Ru

5. Clustering of neighborhoods

Explored within a limit of 5 clusters, clusters of the neighborhoods were obtained as shown in the map (Map 2) and the associated up to ten most common venues in the associated notebook. There were two clusters comprising singletons while most of the downtown neighborhoods are clustered together, as can be expected from the geospatial positions of the neighborhoods.

Cluster 1: Saint-Laurent Southeast (1 neighborhood)
Cluster 2: Côte-des-Neiges Southwest (3 neighborhoods)
Cluster 3: Côte-des-Neiges Northeast (4 neighborhoods)
Cluster 4: Mount Royal Central (1 neighborhood)
Cluster 5: Montreal Downtown (16 neighborhoods)

Map 2. Clustering of neighborhoods in Montreal area
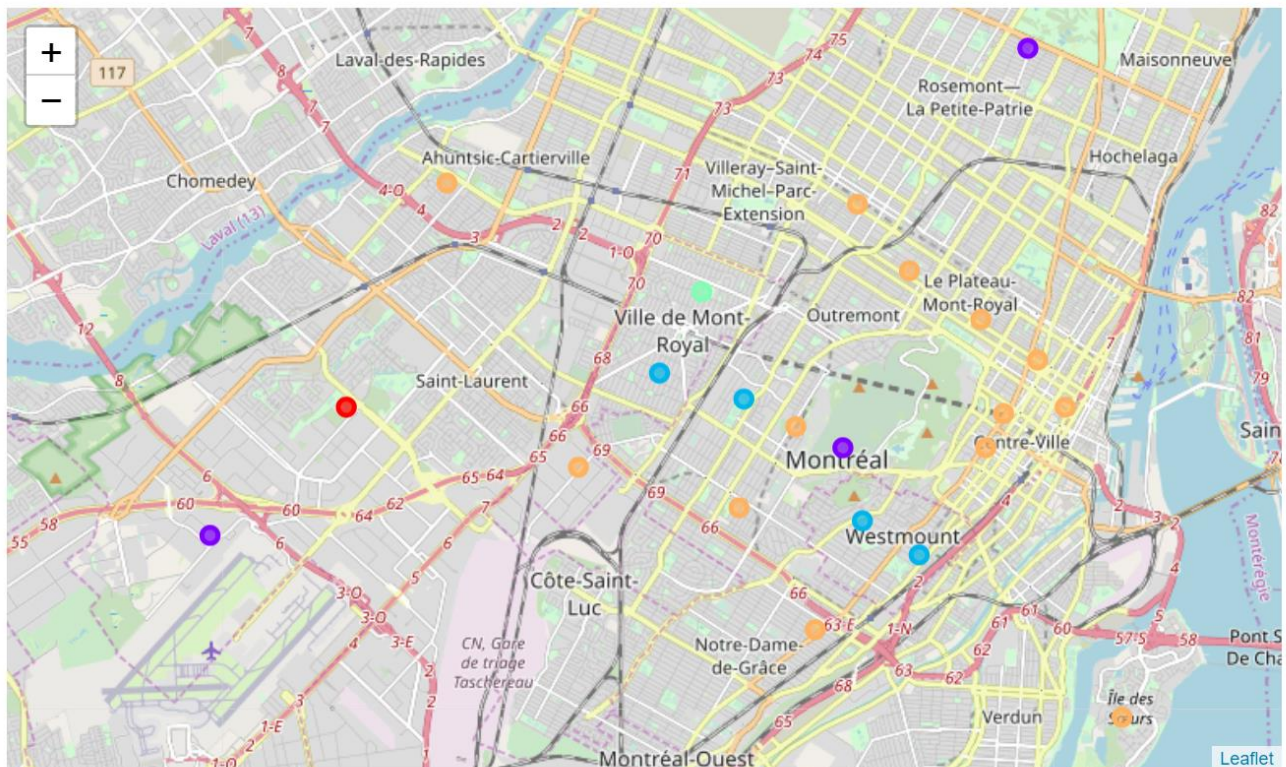
5 Discussion

The position of Montreal is unique from various perspective of its welcoming nature to entrepreneurs to explore it rich French cultural heritage and ease of doing business in Montreal and Quebec. This study mainly focused on businesses in the areas around downtown Montreal and shorter extension around it. As we find there is tremendous diversity in the venues within

and across the neighborhoods. These numbers and names in the Table 1 and other tables in the notebook clearly provide a picture to choose the popular or specialty venues and possibly do the scoping study to further consider the investment.

6 Recommendations

1. The tables of the common venues of importance may be considered for exploring any investment in the area of interest to Montreal population and tourists.

2. Investors may consider further enhancing the food diversity in the specialty restaurants such as French, Japanese (Shushi), Portuguese, English, Mediterranean, Spanish, Chinese, Indian, Sri Lankan, Vietnamese, Filipino cuisines among others.

3. Since majority of such activities are in largest cluster, the suitable neighborhood/location in this cluster may be considered.

7 Conclusion

The assignment on the exploration of diversity of food and restaurants in wider Montreal area. The study undertook a number of tools and techniques including, scraping of web page using BeautifulSoup, pandas and other libraries in Python to harvest the data in dataframe and prepare for analysis. The Foursquare was used to extract the venues information in the neighborhoods of Montreal. It was found significant association between the neighborhood and venue. There was substantial diversity in the venues over the neighborhoods. It would be worth exploring effects on employment and economics contributed by these venues in the invidual neighborhoods and montreal region overall.

The analysis details are available in the links to the Notebook and a summary in a presentation file on Github repository.