A dark blue vertical bar runs along the left edge of the page. A blue arrow-shaped banner points to the right from this bar, containing the date. Below the banner, several thin, curved lines in shades of blue and grey sweep upwards from the bottom left corner.

6/22/2019

Restaurant Recommendation Report

IBM / Coursera Capstone Project -
The Battle of Neighborhoods (Week
2)

Diego Silva de Melo
IBM SPECIALIZATION (COURSERA)

1. Introduction & Background

The ABC company operates in the Foodservice Industry with presence in many countries all around the world. The next step in its business development is to open a new restaurant in Toronto (Canada). There are several reasons to support investment in a restaurant in Canada. According to the latest Foodservice Industry Forecast from Restaurants Canada, commercial foodservice sales are forecast to reach \$75 billion in 2019 — a 4.4 percent increase over 2018. Also, the economy in Canada is showing fully operational capacity, surpassing unemployment rates, inflation stable and the business and consumer confidence are high due to the newly signed trade between the United States, Mexico, and Canada. Therefore, it is a great time to invest and consolidate a new business in Toronto.

2. Business Problem

With regards to the steps toward this new investment, the ABC company's stakeholders need to identify the best location to open the new restaurant. A restaurant's location is as crucial to its success. Also, it is essential to consider what type of restaurant would be best in a given area. To find the best met considering the region to be selected, some additional attributes should be considered in the analyses such as the age of the public target and income. A comprehensive study of the mentioned demographics and possible areas to open a new business have to be performed and presented to the stakeholder's appreciation and approval.

3. Target Audience

This study entails providing with relevant information to the stakeholders of ABC company regarding the determination of the target customers of the new restaurant and its possible best location.

4. Data description

As per the project objectives, the neighborhoods in the city of Toronto will be examined and segmented into clusters. The dataset that contains the information for developing the required analyses is Toronto Neighbourhood Profiles. According to the City of Toronto website:

"The Census of Population is held across Canada every 5 years and collects data about age and sex, families and households, language, immigration and internal migration, ethnocultural diversity, Aboriginal peoples, housing, education, income, and labor. City of Toronto Neighbourhood Profiles use this Census data to provide a portrait of the demographic, social, and economic characteristics of the people and households in each City of Toronto neighborhood. The profiles present selected highlights from the data, but these accompanying data files provide the full data set assembled for each neighborhood."

Wikipedia is the source of additional information such as the postcodes of Toronto. The data will be scraped and wrangled from Wikipedia's page to a data frame in which the data analysis will base the location search. Also, a dataset that has the geographical coordinates of each postal code will be included in the neighborhood data frame for further clustering and Foursquare API calls.

Foursquare.com is a reliable location information provider that will be used to leverage features of each region for various types of venues and its relevant information to meet the objectives of this project, which is to determine the restaurant customers that best fit the necessity of the region.

K-Clustering is an unsupervised machine learning technique that will be applied to segment and cluster these neighborhoods to understand their similarities and their relevant characteristics for this project.

Data 1:

Retrieved from: https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M

This link provides a list of postal codes in the city of Toronto in the province of Ontario. The data will be scraped and wrangled from Wikipedia's page to a data frame

	Postcode	Borough	Neighbourhood
0	M1B	Scarborough	Rouge, Malvern
1	M1C	Scarborough	Highland Creek, Rouge Hill, Port Union
2	M1E	Scarborough	Guildwood, Morningside, West Hill
3	M1G	Scarborough	Woburn
4	M1H	Scarborough	Cedarbrae

Data 2:

Retrieved from: <https://www.toronto.ca/city-government/data-research-maps/open-data/open-data-catalogue/#8c732154-5012-9afe-d0cd-ba3ffc813d5a>

The city of Toronto website offers an Open Data Catalogue in which a dataset, including the neighborhood's profile, will be used providing relevant information for analyses.

	Category	Topic	Data Source	Characteristic	City of Toronto	Agincourt North	Agincourt South-Malvern West	Alderwood	Annex	Brimley
0	Neighbourhood Information	Neighbourhood Information	City of Toronto	Neighbourhood Number	NaN	129	128	20	95	42
1	Neighbourhood Information	Neighbourhood Information	City of Toronto	TSNS2020 Designation	NaN	No Designation	No Designation	No Designation	No Designation	No Designation
2	Population	Population and dwellings	Census Profile 98-316-X2016001	Population, 2016	2,731,571	29,113	23,757	12,054	30,526	27
3	Population	Population and dwellings	Census Profile 98-316-X2016001	Population, 2011	2,615,060	30,279	21,988	11,904	29,177	26
4	Population	Population and dwellings	Census Profile 98-316-X2016001	Population Change 2011-2016	4.50%	-3.90%	8.00%	1.30%	4.60%	2.5%

Data 3:

Retrieved from: http://cocl.us/Geospatial_data

The link IS CSV file that has the geographical coordinates of each postal code of the Toronto. The geographic coordinates data is provided in the third link below.

The information of the coordinates will be applied to the application of clustering for better geographical understanding and visualization of the data.

	Postcode	Borough	Neighbourhood	Latitude	Longitude
0	M1B	Scarborough	Rouge, Malvern	43.806686	-79.194353
1	M1C	Scarborough	Highland Creek, Rouge Hill, Port Union	43.784535	-79.160497
2	M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711
3	M1G	Scarborough	Woburn	43.770992	-79.216917
4	M1H	Scarborough	Cedarbrae	43.773136	-79.239476

Link Foursquare:

<https://developer.foursquare.com/>

The Foursquare API service is the primary source of data for a detailed comprehension of restaurants located in each neighborhood

5. Methodology

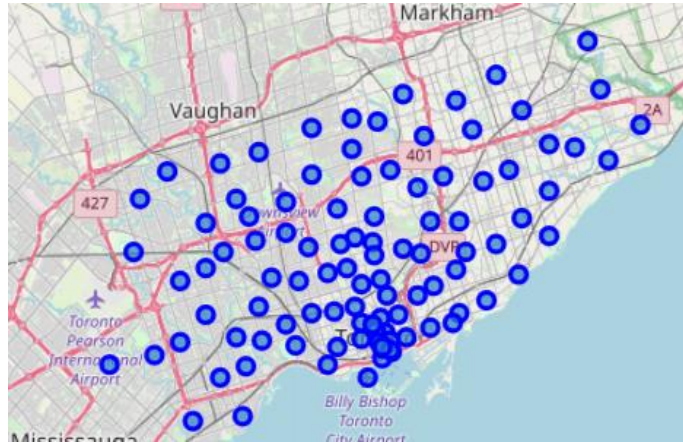
The methodology used in this recommendation tool is described according to the following steps:

- **Data preparation**

The data is prepared accordingly to provide the information and further analyzes of the Toronto region with regards the neighborhood profiles, restaurants, and the people that are living there.

- **Explore Neighborhoods in Toronto**

In this step of the analyses, the Foursquare API calls to explore the neighborhoods and segment them. Foursquare provided information about restaurants in Toronto with a geographical location that enabled to build a map for a better analysis.



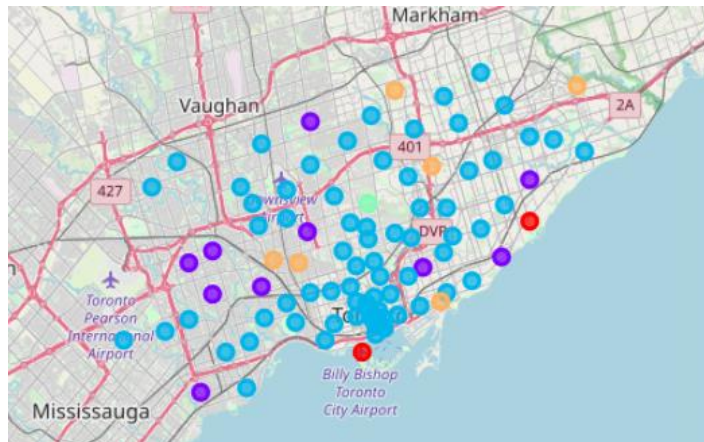
- **Analyze Each Neighborhood**

In this stage, a detailed analysis of each neighborhood is developed to identify the top 10 most common venues for each one of them. The result is reached through the application of python codes to extract the target information.

	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	Adelaide, King, Richmond	Café	Restaurant	Sandwich Place	American Restaurant	Salad Place	Steakhouse	Burger Joint	Deli / Bodega	Asian Restaurant	Thai Restaurant
1	Agincourt	Chinese Restaurant	Sandwich Place	Breakfast Spot	Wings Joint	Fast Food Restaurant	Doner Restaurant	Donut Shop	Dumpling Restaurant	Eastern European Restaurant	Empanada Restaurant
2	Agincourt North, L'Amoreaux East, Milliken, St...	Asian Restaurant	Wings Joint	Fish & Chips Shop	Doner Restaurant	Donut Shop	Dumpling Restaurant	Eastern European Restaurant	Empanada Restaurant	Ethiopian Restaurant	Falafel Restaurant
3	Albion Gardens, Beaumond Heights, Humbergate, ...	Pizza Place	Fast Food Restaurant	Fried Chicken Joint	Japanese Restaurant	Sandwich Place	Ethiopian Restaurant	Dim Sum Restaurant	Diner	Doner Restaurant	Donut Shop
4	Alderwood, Long Branch	Pizza Place	Sandwich Place	Burger Joint	German Restaurant	Gastropub	Dim Sum Restaurant	Diner	Doner Restaurant	Donut Shop	Dumpling Restaurant

- **Cluster Neighborhoods**

K-Clustering is an unsupervised machine learning technique that was applied to segment and cluster these neighborhoods to understand their similarities and their relevant characteristics for this project. The objective was segmented restaurants though this clustering tool to understand its distribution along the region of Toronto.

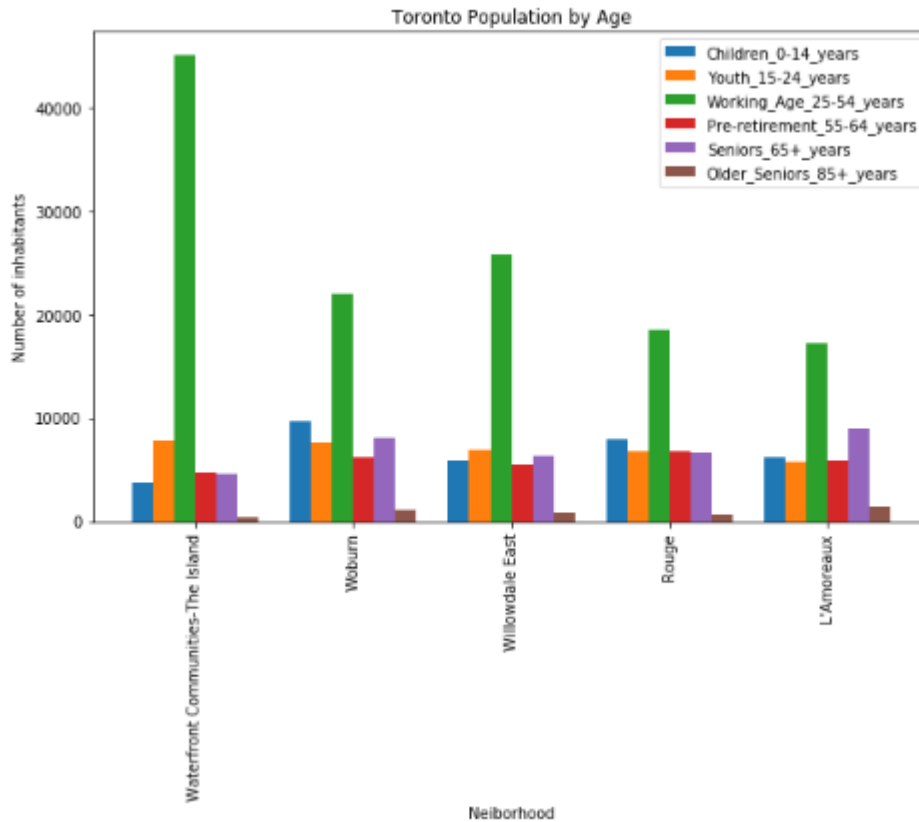


- **Examine Clusters**

The final step is the analysis and interpretation of the information provided.

6. Results

The results show that a large number of people are leaving in the area called Waterfront Communities-The Island, which occupies a swath of the far downtown core that abuts – and includes – a portion of Lake Ontario. People between 25 to 54 years (working age) account for the significant age demography of the area. The result is showed in the chart below:



Another important information is about what types of restaurants there are in that area. Some of the most popular venues can be visualized in the following word cloud.



The Waterfront Communities-The Island is an area that shows more potential success for a new restaurant because of the concentration of the significant working age people. A high number of them are Millennials: Born between 1980 to 1994 and they are known to have the following habits:

- Eats out more often than the general population, with 53% going out to eat at least once a week
- Prefers fresh, natural ingredients
- Prioritizes sustainability and ethics
- Prefers fast casual and fine dining over traditional fast food like McDonald's
- Most likely to look at a restaurant's menu online

The area has numerous fast food restaurants, cafés shops, donut shops, doner restaurants, and pizza restaurant. Therefore, a restaurant that provides healthy food is the best choice for this area.

7. Discussion

The data provided a possible good recommendation to open a new restaurant by analyzing the venues in the Toronto area and the main target customers. However, when it comes to open a new business many other facts should be taken into consideration, and some of them are, for example, market trends, competitors around the area, marketing, the team, restaurant concept, menu, food price, parking availability and so forth.

8. Conclusion

Although through the data provided it was possible to draw a conclusion where would be more appropriate to open a restaurant, in a real-life situation addition data should be included to cover other aspects that may or may not impact its success. Toronto has a vast commercial area with a large number of restaurants, and a small detail can have a massive impact on new business.