DETERMINING THE BEST LOCATION FOR A CARIBBEAN RESTAURANT

Introduction

Background

Canada has one of the highest immigration rates per capita amongst developed nations. Toronto is one of the most multicultural cities in the world, and is listed as one of the leading technology job markets. Toronto is known to have one of the strongest economies of all the Canadian cities with job opportunities across a variety of fields. Its diverse population has made it a melting pot of cultures and cuisines which serves to attract new immigrants. Like other Canadian cities, all citizens and permanent residents have access to universal healthcare.

John is a budding Data Analyst, however there are not many job offerings for him in Jamaica. In searching for jobs globally, he has seen many opportunities in Toronto. Consequently, he has decided to migrate to Toronto with his family. His wife is a chef and is interested in opening a Jamaican restaurant. In preparing for the move, they would like to find a neighbourhood with a high Caribbean population and provide possible locations to open a Jamaican restaurant.

Problem

This project aims to explore neighbourhoods in Toronto and identify the neighbourhoods with high Caribbean populations to determine the best location for a new Caribbean restaurant.

Interest

This project categorises neighbourhoods based on ethnicity, this will be of interest to:

- Persons who want to find neighbourhoods similar to their ethnicity either to live or for business prospects.
- Persons interested in finding Caribbean restaurants in Toronto

Data Acquisition & Cleaning

Data Sources

1. List of Toronto neighbourhoods and postal codes : “List of Postal code of Canada: M” (https://en.wikipedia.org/w/index.php?title=List_of_postal_codes_of_Canada:_M&oldid=945633050)

2. Boundaries of Toronto Neighbourhoods from Toronto’s Open Data Portal : https://ckan0.cf.opendata.inter.prod-toronto.ca/download_resource/a083c865-6d60-4d1d-b6c6-b0c8a85f9c15?format=csv&projection=4326

3. Neighbourhood Profiles based on the 2016 Census of Population data from Statistics Canada from Toronto’s Open Data Portal: https://ckan0.cf.opendata.inter.prod-toronto.ca/download_resource/ef0239b1-832b-4d0b-a1f3-4153e53b189e?format=csv)

4. Venues for each neighbourhood : Foursquare's explore API

Data Cleaning

1. Scrape Neighbourhood table from Wikipedia page "List of Postal code of Canada: M" using the Beautiful Soup python library. Neighbourhoods with no Boroughs were removed and the column Postcode was removed.

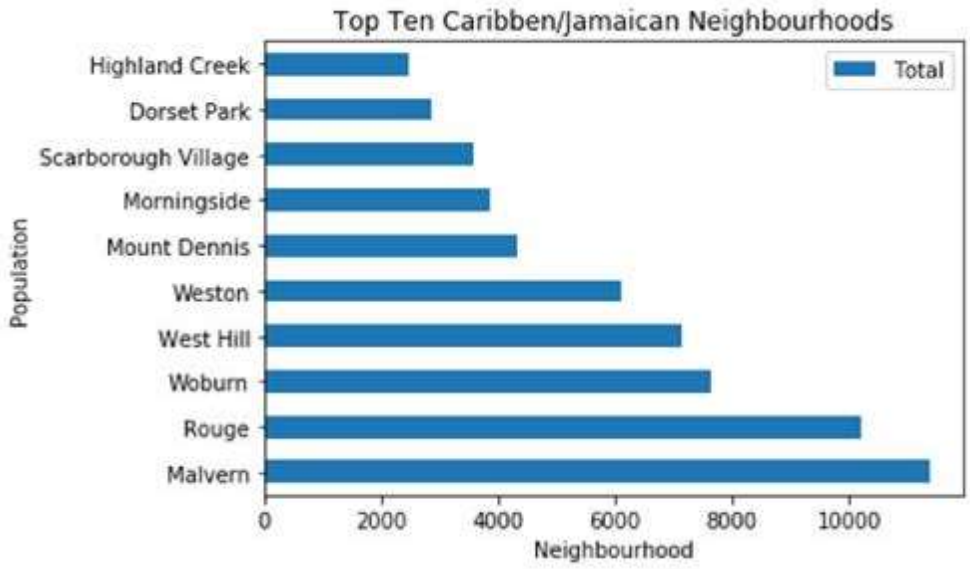
2. Geographical Coordinates were added to list of neighbourhoods using data in the Boundaries of Toronto Neighbourhoods csv file. The columns extracted were, AREA_SHORT_CODE, AREA_NAME, LONGITUDE, LATITUDE, with AREA_SHORT_CODE being renamed to Neighbourhood Number and AREA_NAME to Neighbourhood. This was merged with previous dataset to assign Boroughs for the respective Neighbourhoods.

3. Ethnic origin of the neighbourhoods was obtained from the Neighbourhood profiles csv file. Rows labelled Jamaica and Caribbean origins were extracted to a dataframe and the neighbourhoods were sorted from highest to lowest. This dataframe was then merged with previous dataframe to assign coordinates for the Caribbean neighbourhoods.

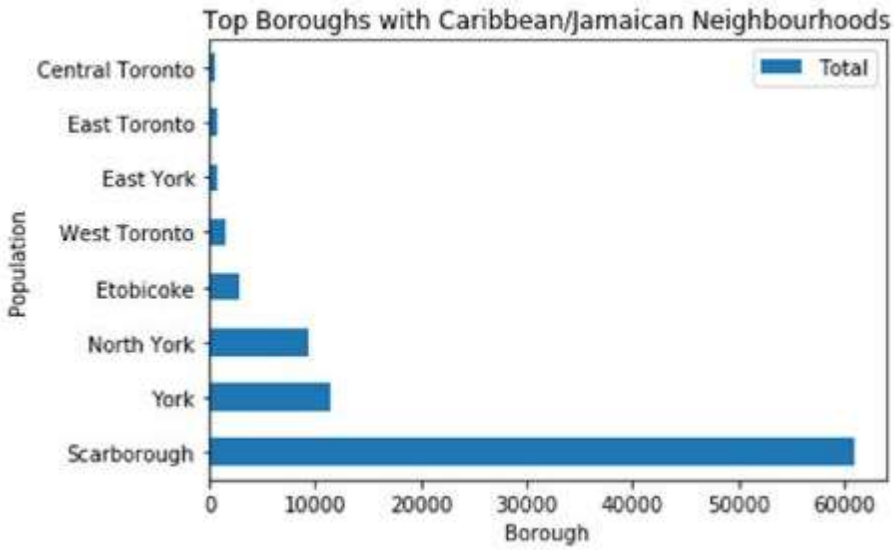
Methodology

Exploratory Data Analysis

In order to determine the most ideal area for a new Jamaican/Caribbean restaurant, the Jamaican/Caribbean population in Toronto was analysed for each neighbourhood. The idea is that the more densely populated Jamaican/Caribbean neighbourhoods would offer the most support for such a restaurant versus an area with low or no Jamaican/Caribbean natives. This will help to determine the feasibility or potential profitability of the restaurant. The following represents the top 5 neighbourhoods with people of Jamaican/Caribbean origin,



This can also be categorized by borough,



We can also view Jamaican/Caribbean population spread on a folio map,

Foursquare API was used to identify Caribbean Restaurants in Toronto. After identifying Caribbean restaurants in Toronto, the relationship between the location of the restaurant and the ethnicity of origin of the population was explored to determine if there is a relationship between the location and the ethnicity of the population. The neighbourhoods with top ten most restaurants are shown below,

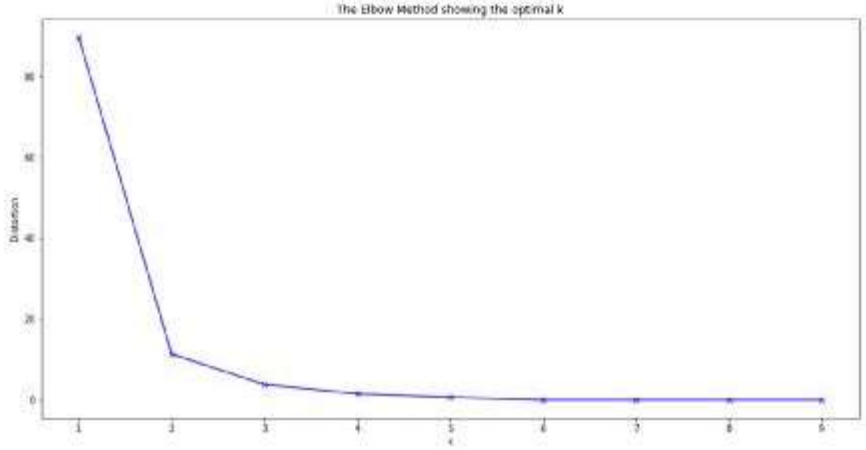
	Neighbourhood Number	Neighbourhood	Total	Percentage	Borough	Caribbean Restaurant
11	129.0	Agincourt North	2295.0	0.08	Scarborough	5
0	132.0	Malvern	11375.0	0.42	Scarborough	4
15	130.0	Milliken	1575.0	0.06	Scarborough	4
2	137.0	Woburn	7635.0	0.28	Scarborough	4
6	135.0	Morningside	3855.0	0.14	Scarborough	4
22	53.0	Henry Farm	940.0	0.03	North York	4
8	126.0	Dorset Park	2855.0	0.10	Scarborough	4
26	48.0	Hillcrest Village	715.0	0.03	North York	3
23	52.0	Bayview Village	905.0	0.03	North York	3
10	21.0	Humber Summit	2315.0	0.08	North York	2

This was also analysed Borough,

	Borough	Caribbean Restaurant
5	Scarborough	30
4	North York	14
7	York	2
6	West Toronto	1
0	Central Toronto	0
1	East Toronto	0
2	East York	0
3	Etobicoke	0

Machine Learning

K Nearest Neighbour was used to cluster Toronto neighbourhoods. The first step was to determine the best K i.e. number of clusters to use for the dataset, using the elbow method.



From the above, K=3 is the best value. The map below illustrates the clustered neighbourhoods,

Let’s examine each cluster,

Cluster 0

This cluster contains the neighbourhoods with the most Caribbean Restaurants.

	Neighbourhood Number	Postcode_x	Borough_x	AREA_NAME	LONGITUDE	LATITUDE	Cluster Labels	Neighbourhood_y	Total_y	Postcode_y	Borough_y	Caribbean Restaurant
0	132.0	M1B	Scarborough	Malvern (132)	-79.222517	43.809558	0	Malvern	0.42	M1B	Scarborough	4
2	137.0	M1G	Scarborough	Woburn (137)	-79.228588	43.766740	0	Woburn	0.28	M1G	Scarborough	4
6	135.0	M1E	Scarborough	Morningside (135)	-79.207041	43.782399	0	Morningside	0.14	M1E	Scarborough	4
8	126.0	M1P	Scarborough	Dorset Park (126)	-79.278908	43.758274	0	Dorset Park	0.10	M1P	Scarborough	4
11	129.0	M1V	Scarborough	Agincourt North (129)	-79.266712	43.805441	0	Agincourt North	0.08	M1V	Scarborough	5
15	130.0	M1V	Scarborough	Milliken (130)	-79.276009	43.820691	0	Milliken	0.06	M1V	Scarborough	4
22	53.0	M2J	North York	Henry Farm (53)	-79.341241	43.771144	0	Henry Farm	0.03	M2J	North York	4
23	52.0	M2K	North York	Bayview Village (52)	-79.377117	43.776361	0	Bayview Village	0.03	M2K	North York	3
26	48.0	M2H	North York	Hillcrest Village (48)	-79.354804	43.802983	0	Hillcrest Village	0.03	M2H	North York	3

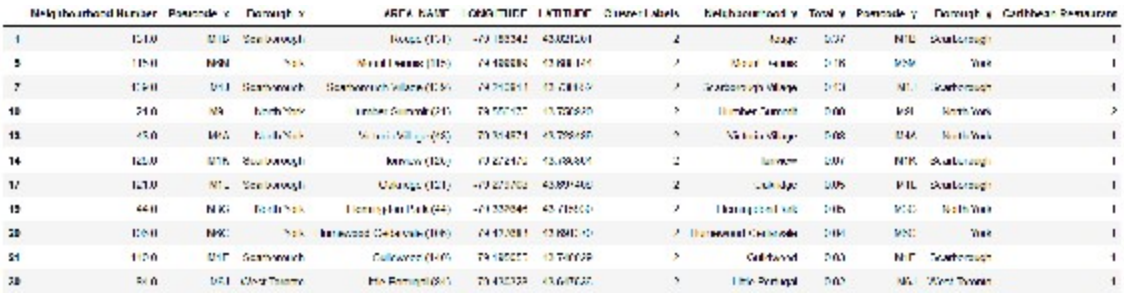
Cluster 1

This cluster contains the neighbourhood with no Caribbean Restaurants.

	Neighbourhood Number	Postcode x	Borough x	AREA NAME	LONGITUDE	LATITUDE	Cluster Labels	Neighbourhood y	Total y	Postcode y	Borough y	Caribbean Restaurant
3	[illegible]	[illegible]	Scarborough	West Hill (136)	[illegible]	[illegible]	1	West Hill	[illegible]	[illegible]	Scarborough	0
4	113.0	M9N	York	Weston (113)	70.515723	13.702710	1	Weston	0.22	M9N	York	0
5	134.0	[illegible]	Scarborough	Highland Creek (134)	[illegible]	[illegible]	1	Highland Creek	[illegible]	M1C	Scarborough	0
12	124.0	[illegible]	Scarborough	Kennedy Park (124)	[illegible]	[illegible]	1	Kennedy Park	0.08	M1K	Scarborough	0
16	123.0	M1M	Scarborough	Cliffcrest (123)	[illegible]	[illegible]	1	Cliffcrest	[illegible]	M1M	Scarborough	0
18	18.0	M8V	Etobicoke	New Toronto (18)	[illegible]	[illegible]	1	New Toronto	0.06	M8V	Etobicoke	0
24	[illegible]	M6R	West Toronto	Roncesvalles (86)	-79.442[illegible]	[illegible]	1	Roncesvalles	[illegible]	[illegible]	West Toronto	0
25	55.0	[illegible]	East York	Thorncliffe Park (55)	[illegible]	[illegible]	1	Thorncliffe Park	[illegible]	[illegible]	East York	0
27	19.0	M8W	Etobicoke	Long Branch (19)	-79.533[illegible]	[illegible]	1	Long Branch	[illegible]	M8W	Etobicoke	0
28	[illegible]	M4E	East Toronto	The Beaches (63)	[illegible]	[illegible]	1	The Beaches	[illegible]	M4E	East Toronto	0
29	34.0	M3H	North York	Bathurst Manor (34)	-79.456[illegible]	[illegible]	1	Bathurst Manor	0.02	M3H	North York	0
31	102.0	M5P	Central Toronto	Forest Hill North (102)	[illegible]	[illegible]	1	Forest Hill North	[illegible]	M5P	Central Toronto	0
32	20.0	M8W	Etobicoke	Alderwood (20)	79.541011	18.601087	1	Alderwood	0.02	M8W	Etobicoke	0
33	[illegible]	M9C	Etobicoke	Markland Wood (12)	[illegible]	[illegible]	1	Markland Wood	0.01	M9C	Etobicoke	0
34	37.0	M2R	North York	Willowdale West (37)	70.427558	18.771210	1	Willowdale West	0.01	M2R	North York	0

Cluster 2

This cluster contains neighbourhoods with a low number of Caribbean Restaurants.



Results

Based on the analysis, the following was observed:

- Scarborough has the largest Jamaican/Caribbean population amongst all the boroughs in Toronto.
- The most densely populated Jamaican/Caribbean neighbourhoods are Malvern, Rouge, Glenfield-Jane Heights, Woburn, West Hill, West Humber-Claireville, Mount Olive-Silverstone-Jamestown, Downsview-Roding, Weston and Black Creek.
- The most Caribbean Restaurants were located in Agincourt North, however it has a low percentage of persons of Jamaican/Caribbean origin.
- Of the most densely populated Jamaican/Caribbean neighbourhoods, Malvern and Woburn were the only ones with Caribbean Restaurants.

Discussion

Scarborough presents itself as the best location for a new Jamaican/Caribbean restaurant based on the presence of a high Jamaican/Caribbean population. Malvern is the top neighbourhood and there are four restaurants identified in this community.

Based on the results, the location of a Caribbean Restaurant in a particular neighbourhood is not depended on the magnitude of the Jamaican/Caribbean population. However, this holds true when we analyse the data by Borough. Although Scarborough has the largest number of Caribbean Restaurants and may seem out rightly quite competitive, there are many neighbourhoods within Scarborough with little or no Caribbean Restaurants. This provides an opportunity to invest in a restaurant in another densely populated area such as Rouge or Glenfield-Jane Heights.

The main limitation of data was that the Foursquare API did not include a classification for Jamaican Restaurants, only Caribbean Restaurants. For the purpose of this analysis, this was used to determine the number of restaurants. However, this category of restaurants could include restaurants of other Caribbean nationalities.

This analysis provides a preliminary assessment on the feasibility of a Jamaican/Caribbean restaurant in Toronto. It is a great foundation for a look into the landscape of Toronto neighbourhoods and with

improvements can provide a deeper analysis on the viability of a Jamaican/Caribbean restaurant in Toronto.

Conclusion

Many aspects of the python library was used to gather, manipulate, analyse and visualise data based on our business problem. Additional visualisation was done using folium maps and machine learning techniques were used to predict output. The Foursquare API location data was used to explore locations in Toronto allowing us to identify neighbourhoods of interest.

The dataset can be used by anyone interested in opening a restaurant based on other ethnicities or any other business in the Toronto area by making small changes. This analysis can be enhanced by the use of additional data sources such as crime or earnings data to further explore consumer behaviour.