IBM Capstone Project

Background

Mr. Arif, a novice businessperson, plans to open up a restaurant in a health-conscious neighborhood in the city of Toronto, nearby the most visited venues in order to gain more customers, and is concerned to avoid competition, which in his opinion could be achieved by either keeping a good distance from other restaurants, or choosing a type of restaurant that is popular in other neighborhoods but non-existent in the chosen neighborhood.

Problem Description

This projects aims to help the businessman find the most suitable location and type of restaurant to start the business.

Data Description

For this project, we would require the following data:

1. Neighborhoods in the city of Toronto.
2. Health-consciousness in the neighborhoods.
3. Most visited venues in those neighborhoods.
4. Locations of existing restaurants in those neighborhoods.
5. Types of restaurants popular in those neighborhoods.

Data Sources

We would use the following sources to collect the data:

1. Wikipedia: to get the data of neighborhoods in Toronto.
2. https://map.toronto.ca/wellbeing: to get the data about the health-consciousness in the neighborhoods.
3. Cognitive class Toronto data: to get the latitudes and longitudes of the neighborhoods.
4. Foursquare: to get the data about the most visited venues as well as locations and types of existing restaurants.
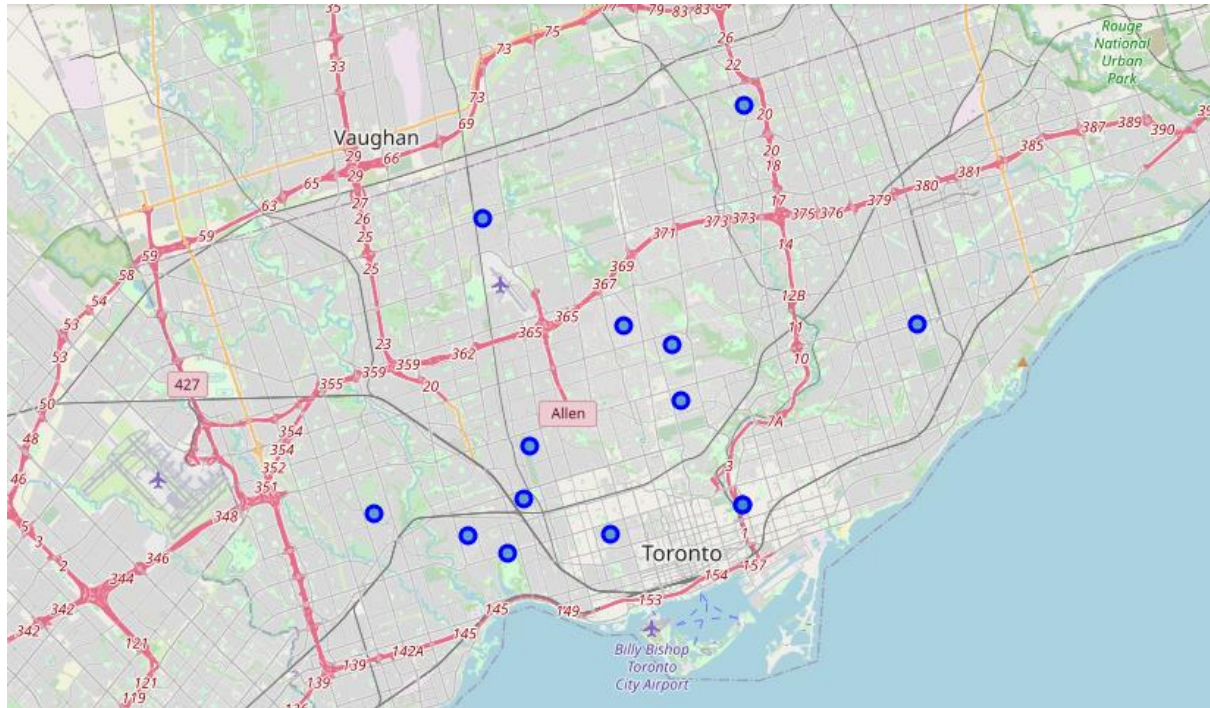
Methodology

We search for the desired location in four steps.

1. First, we shortlist the desired neighborhoods based on their health-consciousness. For this we get the data from the Toronto wellbeing website and use the Healthy Food Index (HFI) as the metric for the health-consciousness. We sort the neighborhoods based on HFI in descending order and shortlist those whose HFI is greater than 45. From this procedure, we end up choosing 13 neighborhoods from 140.

	Neighborhood	Latitude	Longitude	Total_Population	Healthy_Food_Index
0	Caledonia-Fairbank	43.6899	-79.4552	9955	53.48
1	Weston-Pellam Park	43.6716	-79.4577	11098	52.57
2	Lawrence Park North	43.7238	-79.3886	14607	52.03
3	Mount Pleasant East	43.7051	-79.3848	16775	50.40
4	Hillcrest Village	43.8049	-79.3547	16934	48.46
5	Bedford Park-Nortown	43.7303	-79.4114	23236	47.74
6	North Riverdale	43.6698	-79.3554	11916	47.17
7	Ionview	43.7308	-79.2739	13641	47.14
8	York University Heights	43.7664	-79.4774	27593	47.00
9	High Park-Swansea	43.6536	-79.4653	23925	46.53
10	Edenbridge-Humber Valley	43.6671	-79.5280	15535	46.41
11	South Riverdale	43.6698	-79.3554	27876	45.86
12	Palmerston-Little Italy	43.6600	-79.4175	13826	45.81
13	Runnymede-Bloor West Village	43.6593	-79.4838	10070	45.64

2. Second, we get the latitude and longitude coordinates of the selected neighborhoods by searching directly on Google. Thereafter, we use the Foursquare API to search for venues in the neighborhoods within a radius of 1000m. We choose this radius because we find that from the shortlisted neighborhoods, some are near to others within a range of about 2km. Therefore, there may be some restaurants between the two neighborhoods.

3. After the search using the Foursquare API is completed, we look at if there are any restaurants returned by the search. We find various categories of restaurants, which we broadly categorize into four categories of 'Far-Eastern', 'Eastern', 'European' and 'American'. We discuss with our client and he shows more interest in opening an Eastern restaurant. Therefore, we search for the neighborhoods where the Eastern restaurants already exist. Specifically, we search for Indian, Falafel, Middle Eastern and Turkish restaurants. Displaying our results to the client, he prefers the neighborhood of Weston-Pellam Park, which itself does not have a restaurant belonging to Eastern category but is surrounded by other neighborhoods where Eastern restaurants exist like High-Park Swansea, Palmerston-Little Italy and Caledonia-Fairbank.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
82	Mount Pleasant East	43.7051	-79.3848	Marigold Indian Bistro	43.702881	-79.388008	Indian Restaurant
96	Mount Pleasant East	43.7051	-79.3848	Kamasutra	43.703991	-79.374597	Indian Restaurant
177	Bedford Park-Nortown	43.7303	-79.4114	The Copper Chimney	43.736195	-79.420271	Indian Restaurant
307	High Park-Swansea	43.6536	-79.4653	Bukhara indian cuisine	43.651105	-79.477104	Indian Restaurant
383	Palmerston-Little Italy	43.6600	-79.4175	Banjara Indian Cuisine	43.662916	-79.421911	Indian Restaurant
414	Palmerston-Little Italy	43.6600	-79.4175	Madras Masala	43.662959	-79.421646	Indian Restaurant

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
1	Caledonia-Fairbank	43.6899	-79.4552	Babos Dönerpoint	43.693249	-79.461851	Falafel Restaurant
79	Lawrence Park North	43.7238	-79.3886	Extreme Pita	43.721814	-79.376520	Falafel Restaurant
308	High Park-Swansea	43.6536	-79.4653	Ali Baba's	43.651010	-79.477179	Falafel Restaurant

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
135	Hillcrest Village	43.8049	-79.3547	Lazeez BBQ Kebabs, Shawarma, Falafel	43.812754	-79.358048	Middle Eastern Restaurant
259	York University Heights	43.7664	-79.4774	Chaihana	43.768936	-79.468502	Middle Eastern Restaurant

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
219	Ionview	43.7308	-79.2739	Baran's Turkish Restaurant & Bar	43.728978	-79.280811	Turkish Restaurant

4. After the neighborhood is selected, we search for an appropriate location. For this, we discuss with our client some locations in the Weston-Pellam Park, and he points out five locations from which he would like to choose based on some analysis. We create a distance matrix based on an original requirement that the place should be near to a central location while further away from similar restaurants. After creating the distance matrix, we recommend to our client that if he wants to remain closer to the areas where Eastern food is preferred, then he may find some place near the Grocery Store, Shopping Mall or the Organic Grocery. Otherwise, he may search for a place near Bakery or the Fish Market.

	Grocery_Store	Bakery	Fish_Market	Shopping_Mall	Organic_Grocery
High-Park Swansea (Indian)	2.581847	3.957517	3.976506	2.259624	2.593617
Palmerston-Little Italy (Indian)	3.254022	2.985257	3.001971	2.061828	3.266159
Palmerston-Little Italy (Indian)	3.117174	3.093872	3.111153	2.086341	3.129330
Caledonia-Fairbank (Falafel)	2.470720	4.003154	4.022444	2.370989	2.482428
High-Park Swansea (Falafel)	2.159232	3.378753	3.399106	2.836182	2.171395

Saying he would not want to be too far away from the area where people prefer Eastern food, he decides to buy a place near the Shopping Mall.