NextGen Vegan Restaurant

Battle of the Neighborhoods Capstone Final Report
April 2020

Introduction:

NextGen is a vegan restaurant that aims to recreate healthier versions of common 'comfort', and 'bar' foods. ***NextGen's*** menu is kept simple and affordable to attract younger crowds and those always on the go. Its mission is to make health foods easily accessible and to educate patrons on the importance of making better food choices daily.

Problem Background:

NextGen was an idea that began based on the rising obesity rates in Canada. According to an article on 'Obesity in Canada' (https://en.wikipedia.org/wiki/Obesity_in_Canada), the rising health concern is that obesity is projected to become the leading cause of preventable morbidity and mortality. In 2004, the Canadian Community Health Survey found that 29% of Canadians 18 and older were obese. In the same year, Ontario, which is one of the three most populated Canadian provinces, was found to have an obesity rate of 22.7%. The article also highlighted the following:

-Obesity in populated areas tends to affect young adults ages 16-21.

-Individuals partaking in extensive learning often binge on food.

-Stress leads people to overeat in effort to cope with their problems.

The Canadian obesity rates have increased significantly over the past 30 years and what was a health concern is now deemed an epidemic.

Problem Description:

NextGen is looking to open a location in Toronto, Ontario Canada. Toronto is the capital of Ontario and the largest city in Canada. Given that the city is heavily populated with an estimated 6.1 million residents, Toronto could be an ideal location. To ascertain the best area to set up shop, ***NextGen*** is looking into venues that may drive high traffic, low competition and in close proximity to locations visited by target audience (i.e. universities, gyms, bars, shopping malls)

Target Audience:

NextGen's target market is centered on young adults aged 16-25. Although the hope is to inspire and serve customers of all ages, by targeting a younger crowd, ***NextGen*** hopes to expose patrons to healthy standards as early as possible.

The Data:

Data Description:

Based on the target audience and observations in the Obesity in Canada article, universities will be used as a location focal point. Data gathered from the following webpages below have been used to determine the top 3 universities in Toronto Canada:

-University of Toronto

-York University

-Ryerson University

Top 3 Toronto Universities webpages:

https://www.4icu.org/ca/ontario/

https://www.edarabia.com/universities/toronto/

https://blog.padmapper.com/2018/10/18/the-8-best-colleges-in-toronto/

Foursquare location data will be utilized for location longitude and latitude analyzation.

https://foursquare.com/

Data Problem Solving:

The Toronto geographical coordinates data will be used as input for the Foursquare API. Using the search_query, the top 3 universities will be queried to pin-point location data. Once the universities have been located, the Foursquare API will be used to locate venues that may be surrounding the universities. The venues to be investigated include:

-Gyms

-Bars

-Shopping Malls

These venues were selected based on ***NextGen's*** mission to encourage young adults in a wide variety of backdrops to eat healthy. This gives fitness enthusiasts, bar hoppers and student shoppers a chance to eat healthy on the go. Using a cluster map, the university with the highest number of surrounding venues will determine ***NextGen's*** restaurant location.

Methodology:

Cluster analysis was used to determine a top ranked university in which NextGen would open their new restaurant near. This technique was used in order to find the university with the highest number of surrounding venues which included gyms, bars and shopping malls.

Gathering and Cleaning the data:

Before cluster analysis could be executed, the locations to be explored needed to be defined and located using the Foursquare API.

Universities:

A search query was used to pull all universities in Toronto. After the query was executed, a dataframe consisting of 19 columns was returned with a 'name' column that contained all locations with the keyword, 'university'. To clean the data, it was important to first reduce the size of the dataframe by only selecting columns that would be essential in pin-pointing the universities to be selected: University of Toronto, Ryerson University and York University.

Figure: University Dataframe (before cleaning)

name	categories	referralId	hasPerk	location.lat	location.lng	location.labeledLatLngs	location.d
University Centre Gym	[{'id': '4bf58dd8d48988d175941735', 'name': 'G...	v-1587928442	False	43.653571	-79.386979	[{'label': 'display', 'lat': 43.653571, 'lng':...	245
Dundas University Health Clinic	[{'id': '4bf58dd8d48988d104941735', 'name': 'M...	v-1587928442	False	43.654196	-79.388166	[{'label': 'display', 'lat': 43.65419587934101...	349
University Centre	[{'id': '4bf58dd8d48988d124941735', 'name': 'O...	v-1587928442	False	43.653907	-79.386764	[{'label': 'display', 'lat': 43.65390719043468...	232

Figure 2: University Dataframe (after 1st cleaning)

	name	categories	lat	lng	labeledLatLngs	distance	cc	country	formattedAddress	address
0	University Centre Gym	Gym / Fitness Center	43.653571	-79.386979	[{'label': 'display', 'lat': 43.653571, 'lng':...	245	CA	Canada	[Canada]	NaN
1	Dundas University Health Clinic	Medical Center	43.654196	-79.388166	[{'label': 'display', 'lat': 43.65419587934101...	349	CA	Canada	[104-438 University Avenue, Toronto ON M4P 2K8...	104-438 University Avenue
2	University Centre	Office	43.653907	-79.386764	[{'label': 'display', 'lat': 43.65390719043468...	232	CA	Canada	[393 University Ave. (at Armoury St.), Toronto...	393 University Ave.

Once the essential columns were established, all NaN values were removed. This had to be done in order to ensure the dataframe would remain uniform across all locations as they were to be merged for clustering and map rendering. However, after completing this step in the cleaning, the dataframe returned did not include the University of Toronto record that was in the original output. To progress the project, a replacement address had to be used in order to capture this university. To do this, it was discovered that in the field containing the name 'Dundas & University' was located on the University of Toronto's campus, as were many other locations that returned a 'University Ave' address. The replacement identifier was also approximately a 3-minute driving distance from the official campus address. Incorporating this university into the dataframe then called for an additional step of formatting to make the university dataframe uniform. First, in the name column, 'Dundas & University was renamed to The University of Toronto. Next, in the category section, 'Intersection' was renamed to 'University'. This completed the university dataframe (shown below).

Figure: The University Dataframe

	name	categories	lat	lng	address	postalCode	state
12	OCAD University	University	43.652803	-79.391074	100 McCaul St	M5T 1W1	ON
31	Ryerson University	University	43.657935	-79.380490	350 Victoria St.	M5B 2K3	ON
39	University of Toronto	University	43.654620	-79.389150	University Ave	M5G 1V1	ON

As shown in the dataframe above, Ontario College of Art and Design University (OCAD University) was included to replace the original 3rd ranked York University. York University did not appear in the original search query results and the potentially associated locations included NaN values. OCAD University was selected because in comparison to the remaining universities in the dataframe after NaN values were removed, OCAD was ranked the highest, coming in at number 5. Trent University (ranked 4th), was also not included in the original search query results.

Gyms:

The search query was then used to locate gyms in Toronto. In order to capture most centers that fit into the gym category, the terms used to search were: ‘Fitness’ and ‘Training’. The results returned a dataframe with 19 columns, which needed to be reduced to match the university dataframe and include only essential location information. After the first cleaning, the dataframe needed to be cleaned to exclude NaN values and make all categories uniform by renaming all values to ‘Gym’. Included in this renaming was one location record originally categorized as an ‘Athletics & Sports’ center. This was included in the dataframe and renamed ‘Gym’ as it is was venue that offered fitness activities. Once complete, the following dataframe was returned:

Figure: The Gym Dataframe

	name	categories	address	lat	lng	postalCode	state
0	Fitness Centre	Gym	Sheraton Centre	43.650985	-79.384002	M5H 2M9	ON
1	Fitness Centre	Gym	525 Bay St.	43.654690	-79.381739	M5G 2L2	ON
2	GoodLife Fitness Toronto Bell Trinity Centre	Gym	483 Bay St	43.653436	-79.382314	M5G 2C9	ON
4	doubletree fitness center (Doubletree Fitness ...	Gym	108 Chestnut Street	43.654603	-79.386204	M5G 1R3	ON
5	Busy Bee Fitness Experts	Gym	319 Merton Street	43.653944	-79.383370	M4S 1A5	ON
6	GoodLife Fitness Toronto Plaza	Gym	100 Yonge St	43.649742	-79.378537	M5C 2W1	ON
9	Google Toronto Fitness Centre	Gym	111 Richmond St W, 11F	43.650319	-79.383782	M5H 2G4	ON
10	GoodLife Fitness Toronto McCaul and Queen	Gym	21 McCaul St	43.651148	-79.389683	M5T 1V7	ON
11	GoodLife Fitness Toronto 137 Yonge Street	Gym	137 Yonge St	43.651242	-79.378068	M5C 1W6	ON
12	Flex - Personal Training Delivered to You	Gym	250 Yonge St	43.654196	-79.381714	M5B 2M6	ON
14	Medx Precision Fitness	Gym	100-80 Richmond St W	43.651429	-79.382356	M5H 2A4	ON
16	Great West Life Fitness Centre	Gym	02 - 190 Simcoe St	43.652721	-79.381328	M5T 3M3	ON
18	New Element Training	Gym	439 University Ave	43.654297	-79.387679	M5G 1T6	ON
23	Hilton Precor Fitness	Gym	145 Richmond St. W	43.649126	-79.385323	M5H 2L2	ON
26	grange fitness	Gym	32 Grange Rd	43.651920	-79.391255	M5T 1C3	ON
27	Goodlife Fitness	Gym	139 Yonge Street	43.651203	-79.378760	M5C	ON

Bars:

Like the previous dataframes, the search query was used to find bars in Toronto. The search term used was simply ‘Bar’. The same methodology used above was applied to clean the dataframe. First, all unnecessary columns were removed as 19 columns were returned. NaN values were then removed to make the dataframe uniform and to ensure the location data was dependable. Next, to capture a wide variety of venues that could be associated with beverages and the ‘bar’ scene, the bar definition had to be expanded based on the locations returned. This definition expanded to include the following categories: Sports Bar, Nightclub, Cocktail Bar, Hotel Bar, Pub, Jazz Club and Karaoke Bar. After these categories were selected in addition to categories

directly named ‘Bar’, the dataframe was cleaned once again to make the category names equal to ‘Bar’.

Figure: The Bar Dataframe

	name	categories	address	lat	lng	postalCode	state
2	Blue Stone Grill & Bar	Bar	372 Bay St.	43.651187	-79.381139	M5H 1M7	ON
4	Bar+ Karaoke Lounge	Bar	360 Yonge St.	43.658338	-79.381902	M5B 1S5	ON
5	Pantages Lounge & Bar	Bar	200 Victoria St.	43.654493	-79.379000	M5B 1W8	ON
7	St. Louis Bar & Grill	Bar	595 Bay St #A09	43.656562	-79.382737	M5G 2C2	ON
8	The Rex Hotel Jazz & Blues Bar	Bar	194 Queen St W	43.650505	-79.388577	M5V 1Z1	ON
19	St. Louis Bar & Grill	Bar	595 Bay St.,Unit A08	43.655992	-79.383463	M5G 2C2	ON
20	Bar Senator	Bar	249 Victoria Street	43.655380	-79.379088	M5B 1V8	ON
26	Bar+ Karaoke	Bar	360 Yonge St	43.657968	-79.381907	M6S 1Z9	ON
28	T|Bar	Bar	33 Gerrard Street West	43.658727	-79.383047	M5G 1Z4	ON
30	Bar Adelaide	Bar	325 Bay Street	43.649800	-79.380160	M5H	ON
34	Champagne Bar	Bar	Pusateri’s @ Saks Fith Avenue	43.652209	-79.379316	M5C 1X7	ON
35	Tundra Bar	Bar	145 Richmond St W	43.649999	-79.385607	M5H 2L2	ON
39	Shark Club Sports Bar & Grill	Bar	10 Dundas St E	43.656745	-79.380484	M5B 0A1	ON
41	The Vegas Bar	Bar	22 Duncan St.	43.649962	-79.386945	M5H 3G8	ON

Shopping Malls:

Once more, the Foursquare API search query was utilized to search for the last venue: Shopping Malls. The search term used was ‘Shopping’. This term was used as it returned the majority of results when compared to search terms equal to ‘mall’ or ‘shopping mall’. The dataframe returned contained 19 columns and therefore had to be cleaned to match the first three dataframes and include only necessary columns to determine location. This dataframe did not include any NaN values, so this step was skipped. The next step focused on only including categories with the term ‘Shopping Mall’ as the returned dataframe included a department store (shown below).

Figure: Dataframe after unnecessary columns removed:

	name	categories	address	lat	lng	postalCode	state
0	Saks Fifth Avenue Club - Personal Shopping	Department Store	176 Yonge Street	43.651810	-79.379192	M5C 2L7	ON
1	TD Centre Shopping Concourse	Shopping Mall	66 Wellington St W	43.647184	-79.380932	M5K 1A1	ON
2	CF Toronto Eaton Centre	Shopping Mall	220 Yonge St	43.654540	-79.380677	M5B 2H1	ON

The resulting dataframe returned included two shopping malls in Toronto.

Figure: The Shopping Mall Dataframe:

	name	categories	address	lat	lng	postalCode	state
1	CF Toronto Eaton Centre	Shopping Mall	220 Yonge St	43.654540	-79.380677	M5B 2H1	ON
2	TD Centre Shopping Concourse	Shopping Mall	66 Wellington St W	43.647184	-79.380932	M5K 1A1	ON

Merging the Dataframes:

The four cleaned dataframes that captured universities, gyms, bars and shopping malls in Toronto, had to be merged in order to view the location of the venues in relation to the universities. To merge the dataframe a pandas concatenation function was used and returned the following dataframe:

Figure: Merged Dataframe

	address	categories	lat	lng	name	postalCode	state
12	100 McCaul St	University	43.652803	-79.391074	OCAD University	M5T 1W1	ON
31	350 Victoria St.	University	43.657935	-79.380490	Ryerson University	M5B 2K3	ON
39	University Ave	University	43.654620	-79.389150	University of Toronto	M5G 1V1	ON
2	372 Bay St.	Bar	43.651187	-79.381139	Blue Stone Grill & Bar	M5H 1M7	ON
4	360 Yonge St.	Bar	43.658338	-79.381902	Bar+ Karaoke Lounge	M5B 1S5	ON
5	200 Victoria St.	Bar	43.654493	-79.379000	Pantages Lounge & Bar	M5B 1W8	ON
7	595 Bay St #A09	Bar	43.656562	-79.382737	St. Louis Bar & Grill	M5G 2C2	ON
8	194 Queen St W	Bar	43.650505	-79.388577	The Rex Hotel Jazz & Blues Bar	M5V 1Z1	ON
19	595 Bay St.,Unit A08	Bar	43.655992	-79.383463	St. Louis Bar & Grill	M5G 2C2	ON
20	249 Victoria Street	Bar	43.655380	-79.379088	Bar Senator	M5B 1V8	ON
26	360 Yonge St	Bar	43.657968	-79.381907	Bar+ Karaoke	M6S 1Z9	ON
28	33 Gerrard Street West	Bar	43.658727	-79.383047	T|Bar	M5G 1Z4	ON
30	325 Bay Street	Bar	43.649800	-79.380160	Bar Adelaide	M5H	ON
34	Pusateri's @ Saks Fith Avenue	Bar	43.652209	-79.379316	Champagne Bar	M5C 1X7	ON
35	145 Richmond St W	Bar	43.649999	-79.385607	Tundra Bar	M5H 2L2	ON
39	10 Dundas St E	Bar	43.656745	-79.380484	Shark Club Sports Bar & Grill	M5B 0A1	ON
41	22 Duncan St.	Bar	43.649962	-79.386945	The Vegas Bar	M5H 3G8	ON
1	220 Yonge St	Shopping Mall	43.654540	-79.380677	CF Toronto Eaton Centre	M5B 2H1	ON
2	66 Wellington St W	Shopping Mall	43.647184	-79.380932	TD Centre Shopping Concourse	M5K 1A1	ON
0	Sheraton Centre	Gym	43.650985	-79.384002	Fitness Centre	M5H 2M9	ON

1	525 Bay St.	Gym	43.654690	-79.381739	Fitness Centre	M5G 2L2	ON
2	483 Bay St	Gym	43.653436	-79.382314	GoodLife Fitness Toronto Bell Trinity Centre	M5G 2C9	ON
4	108 Chestnut Street	Gym	43.654603	-79.386204	doubletree fitness center (Doubletree Fitness ...	M5G 1R3	ON
5	319 Merton Street	Gym	43.653944	-79.383370	Busy Bee Fitness Experts	M4S 1A5	ON
6	100 Yonge St	Gym	43.649742	-79.378537	GoodLife Fitness Toronto Plaza	M5C 2W1	ON
9	111 Richmond St W, 11F	Gym	43.650319	-79.383782	Google Toronto Fitness Centre	M5H 2G4	ON
10	21 McCaul St	Gym	43.651148	-79.389683	GoodLife Fitness Toronto McCaul and Queen	M5T 1V7	ON
11	137 Yonge St	Gym	43.651242	-79.378068	GoodLife Fitness Toronto 137 Yonge Street	M5C 1W6	ON
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16	02 - 190 Simcoe St	Gym	43.652721	-79.381328	Great West Life Fitness Centre	M5T 3M3	ON
18	439 University Ave	Gym	43.654297	-79.387679	New Element Training	M5G 1T6	ON
23	145 Richmond St. W	Gym	43.649126	-79.385323	Hilton Precor Fitness	M5H 2L2	ON
26	32 Grange Rd	Gym	43.651920	-79.391255	grange fitness	M5T 1C3	ON
27	139 Yonge Street	Gym	43.651203	-79.378760	Goodlife Fitness	M5C	ON

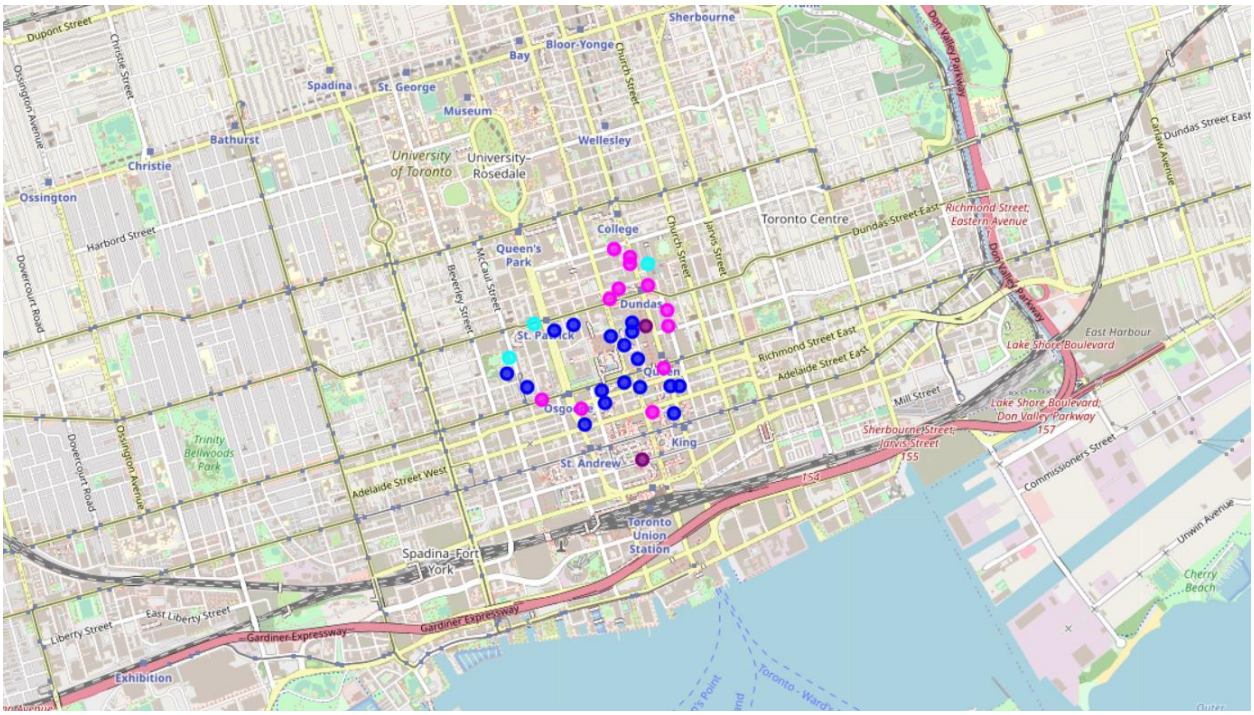
Creating the Cluster Map:

To create the cluster map, the latitude and longitude of Toronto Canada was hard coded in the cell. The variable map_clusters is an instance of a map generated using the folium module. Its intent is to display the area of interest. The implementation proceeded to loop through the locations of interest as designated by the coordinates of gyms, universities, bars and shopping malls. An array was created to hold the colors that correspond to the points of interests. A loop was done through the data and the circle markers were drawn on the map to show the points of interest. The generated map served as the data visualization of the cluster analysis of venues and was used to determine the best location to open NextGen restaurant.

Results:

The map below depicts the returned clusters of venues near the University of Toronto, Ryerson University and OCAD University. All markers were assigned a color based on their category. The Universities are the markers in the color ‘Cyan’ (aqua colored). Gyms are the markers that are dark blue colored. Bars make up the pink colored markers. And Shopping Malls are the 2 markers that are purple colored.

Figure: Cluster Map



Discussion:

Upon inspection, the cluster map shows a cyan colored marker towards the left of the map, which represents OCAD University. The middle cyan colored marker represents The University of Toronto. And the upper right cyan colored marker represents Ryerson University. Looking at the clusters it was noted that Ryerson University appears to have the highest number of venues clustered around its campus. OCAD University appears to have the second highest number and the University of Toronto came in last, with the least amount of surrounding venues. Given that Ryerson University came out on top, the venues that gave it the highest surrounding numbers were all bars. Ryerson was the furthest university from a gym location. However, it was the closet to a shopping mall venue in comparison to the other universities.

Regarding NextGen and the business premises to target younger crowds with affordable, healthy foods, NextGen could do well if they open a restaurant near Ryerson University. Their menu items put a spin on healthier renditions of common ‘comfort’ and ‘bar’ foods. To capture the bar crowd around Ryerson University, NextGen may do well to increase the amount of bar foods they offer. In addition to this, they may have to consider adjusting their hours of operation in order to accommodate the bar crowd and various crowds during the week. This could resemble an earlier opening and closing time Monday through Wednesday, and then set extended hours Thursday through Saturday. It should also be considered that a university campus customer base may lead to slow periods while the university is closed for breaks during spring, summer and winter. An altered menu and advertising off-campus may help draw a larger crowd to help maintain normal business hours and steady customer traffic. Furthermore, now that the cluster analysis has shown that most nearby venues are bars, the type of bars in close proximity could be further investigated. A few bar venues in the dataframe included ‘Hotel Bars’, ‘Night Clubs’,

‘Jazz Clubs’ and a high-end Champagne Bar. These locations may or may not be visited by the target audience of young adults aged 16-25. However, if NextGen is situated near any of the aforementioned bars, the diversity in bar types could help fill in their customer base when the university goes on break each season.

Conclusion:

NextGen has the potential to become a profitable restaurant if located near Ryerson University. Given the right access to its target audience, the number of surrounding bar venues and Ryerson’s proximity to a shopping mall, the location could acquire a large customer base. If NextGen remains flexible with its hours of operation to accommodate the bar crowd, they could stand a chance against restaurant competitors that serve less healthy, but popular options. Additionally, NextGen may try to further investigate the type of bars that are situated near Ryerson. If they can attract a more mature crowd, they have a chance to be successful during seasonal university breaks when many university students leave the campus. This could help the business remain open throughout the year.

Citations:

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