“Hummus, Falafel & Beyond”

Arabic Cuisine Restaurant Start-Up Project in Toronto

Data Analysis & Visualization

INTRODUCTION & BACKGROUND

Arab cuisine has been always known for its variety and richness. The food is plentiful with so many different, delicious options to appeal to every palette. Trying Arabic cuisine is a crucial aspect of any visit to the Middle East. However, with lots of Arabs spreading around the world, Arabic food spread with them and Arabic restaurants started to open in most parts of the world to cater to the demand of this cuisine and in some areas starting to introduce such a cuisine.

With the increasing number of Arabs population in Canada, especially in Toronto, Arabic restaurants' numbers increased, but still, statistics shows a shortage in the number of such restaurants to fulfil the demand in Toronto.

In this paper, we will discuss, analyze and reach to a conclusion on whether to open another Arabic Cuisine Restaurant in Toronto and in which borough.

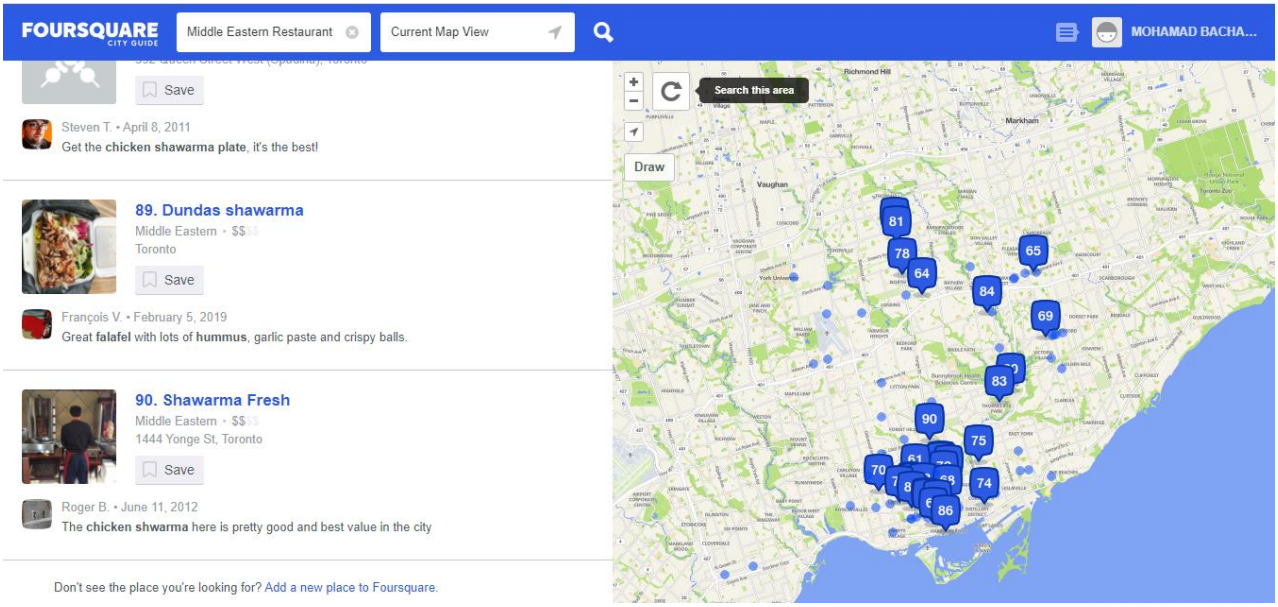
I used **Forsquare API** to get the data of Arabic restaurants in the city of Toronto, their details and location within the city.

- **Opportunity:** Shortage in the number of Arabic restaurants in the city of Toronto created the opportunity to open an Arabic restaurant in the neighborhood.
- **Mission:** To provide the best Arabic Ethnic food in town that remind the people with their mama's homemade food.
- **Solution:** Opening an Arabic restaurant in a borough that has shortage in such a cuisine with dine-in and delivery service.

THE PROBLEM

Searching for Arabic restaurants in Toronto is extremely easy, it is as simple as write down "Arabic Restaurants" in the search box in Forsquare.com or by using their app and you will get a list of all restaurants serving Arabic food in the city of Toronto. However, the list is showing 90 restaurants serving the city, but not all of them are original ethnic restaurants. Many of these restaurants are serving couple, or few, Arabic dishes. Taking in our consideration Toronto's population of 6,197,000, I believe there is a shortage in the number of Arabic restaurants serving the population in the city in general.

The other observation is the concentration of the restaurants. Most of them are in the city center with no obvious presence of Arabic restaurants in other areas/districts, as shown in the illustration below. This created an opportunity to open Arabic restaurant with delivery service in addition to the dine-in option.



DATA DESCRIPTION & AQUISITION

It is the most populous city in Canada and the largest urban and metro area, with a population density of 4,149.5 people per square kilometer (10,750/sq mi). The metro area of the city sprawls outward to a total surface area of 5,905.71 km2 (2,280.21 sq mi).

In 2013, Toronto's population overtook Chicago's, taking its place as the 4th largest city in North America with a population of 2.79 million to Chicago's 2.7 million. Toronto added 38,000 people in 2013, compared to just 11,000 in Chicago. Toronto's growing population and economy is also leading to more people choosing to stay in the city rather than leave to surrounding areas.

For the past five years, the population growth in the Toronto metropolitan area has outpaced the national average, during which time most of the economy was hit hard by the economic downturn.

Over the next 20 years, Toronto is expected to continue its moderate growth, surpassing 3 million by 2026, and reaching nearly 3.2 million in 2036.

Year	Population	Growth Rate (%)	Growth
2035	7,087,519	0.83%	58,232
2034	7,029,287	0.84%	58,547
2033	6,970,740	0.85%	58,902
2032	6,911,838	0.87%	59,297
2031	6,852,541	0.88%	59,701
2030	6,792,840	0.89%	60,084
2029	6,732,756	0.90%	60,372
2028	6,672,384	0.91%	60,497
2027	6,611,887	0.92%	60,426
2026	6,551,461	0.93%	60,175
2025	6,491,286	0.93%	59,856
2024	6,431,430	0.93%	59,472
2023	6,371,958	0.93%	58,984
2022	6,312,974	0.93%	58,403
2021	6,254,571	0.93%	57,840
2020	6,196,731	0.93%	57,327

From demographics perspective, foreign-born people account for nearly half of the population of Toronto. This gives Toronto the second-highest percentage of foreign-born residents of all world cities after Miami. Unlike Miami, Toronto has no dominant culture or nationality, which also makes it one of the world's most diverse cities. 49% of the city's population belong to a visible minority group (compared to 14% in 1981), and visible minorities are expected to hit a majority of 63% of the Toronto CMA population by 2017. According to the 2016 Census, the racial composition of Toronto was:

- White: 50.2%
- East Asian: 12.7% (10.8% Chinese, 1.4% Korean, 0.5% Japanese)
- South Asian: 12.3%
- Black: 8.5%
- Southeast Asian: 7.0% (5.1% Filipino)
- Latin American: 2.8%
- West Asian: 2.0%

- Arab: 1.1%
- Aborginal: 0.7% (0.5% First Nations, 0.2% Metis)
- Two or more races: 1.5%
- Other race: 1.3%

Based on the above illustrated facts and projections I decided to use Toronto in my project since it is a city with a high population, population density and population diversity, and definitely a lot of potential for new ethnic restaurant.

- I used **Forsquare API** to get the data of Arabic restaurants in the city of Toronto, their details and location within the city. I cleaned the data and reduced it to required information.
- I used www.worldpopulationreview.com to get the data of Toronto Population Data (Urban Area).

METHODOLOGY

I installed beautifulsoup4 from Python library to reach to Postal Codes of Canada and the source was https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M. Here is the head list.

[11]:

	PostalCode	Borough	Neighborhood
0	M1A	Not assigned	Not assigned
1	M2A	Not assigned	Not assigned
2	M3A	North York	Parkwoods
3	M4A	North York	Victoria Village
4	M5A	Downtown Toronto	Regent Park, Harbourfront

Then removed the unassigned data:

[13]:

	PostalCode	Borough	Neighborhood
0	M3A	North York	Parkwoods
1	M4A	North York	Victoria Village
2	M5A	Downtown Toronto	Regent Park, Harbourfront
3	M6A	North York	Lawrence Manor, Lawrence Heights
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government

[14]:
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df.shape
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[14]:
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(103, 3)
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Then created a table to reach to latitude and longitude information and merged it with the postal code list. The source was https://cocl.us/Geospatial_data wikipedia.org. Here is the head list.

[16]:

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494

[17]:
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df_to.shape
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[17]:
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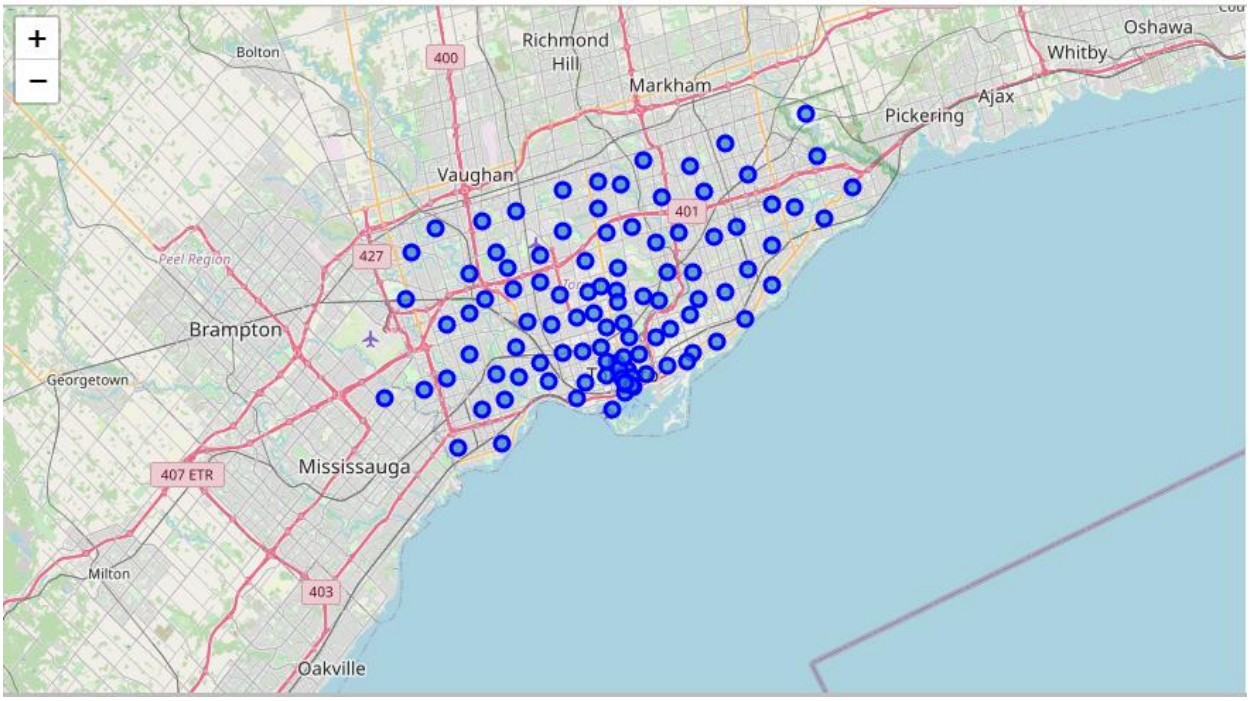
(103, 5)
```

I used python folium library to visualize geographic details of Toronto and its boroughs and I used latitude and longitude values to get the visual as below:



Then listed the neighborhoods in downtown Toronto borough and visualize them, as the following:

[21]:

	PostalCode	Borough	Neighborhood	Latitude	Longitude
0	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
1	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494
2	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
3	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
4	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306

I used Foursquare API to explore the boroughs and segment them. I designed the limit as 100 venue and the radius 500 meter for each borough from their given latitude and longitude information. Here is a head of the list Venues name, category, latitude and longitude information from Forsquare API.

[29]:

	name	categories	lat	lng
0	Roselle Desserts	Bakery	43.653447	-79.362017
1	Tandem Coffee	Coffee Shop	43.653559	-79.361809
2	Cooper Koo Family YMCA	Distribution Center	43.653249	-79.358008
3	Body Blitz Spa East	Spa	43.654735	-79.359874
4	Impact Kitchen	Restaurant	43.656369	-79.356980

In summary, 45 venues were returned by Foursquare. Here is a merged table of boroughs and venues.

[33]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
1	Regent Park, Harbourfront	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
2	Regent Park, Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	Regent Park, Harbourfront	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa
4	Regent Park, Harbourfront	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant

We notice that Garden District, Ryerson, Harbourfront East, Union Station, Toronto Islands, Commerce Court, Victoria Hotel, First Canadian Place, Underground city and Toronto Dominion Centre, Design Exchange how reached the 100 limit of venues.

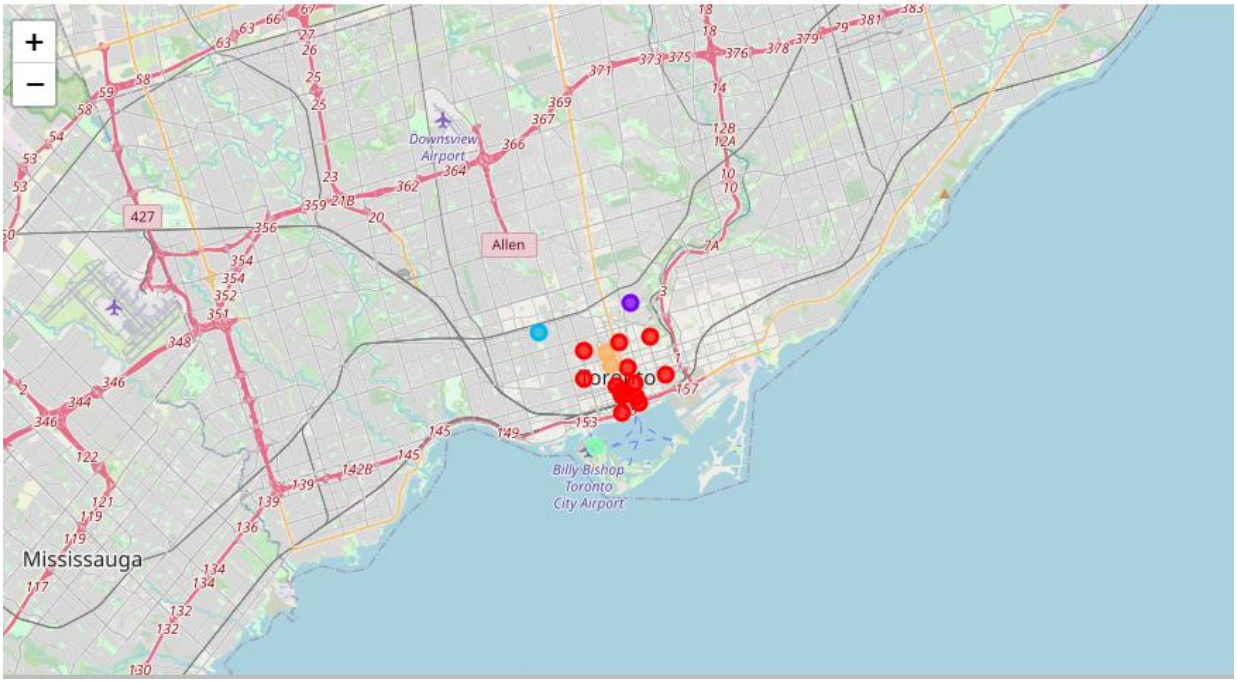
On the other hand; Rosedale, Christie and CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport are below 20 venues in our given coordinates with Latitude and Longitude.

In summary, there were 209 unique categories returned by Foursquare. I created a table grouping the venues according to the neighborhood, then I created a table listing top 10 venue category for each neighborhood. Here is the head list.

[41]:

	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	Berczy Park	Coffee Shop	Bakery	Cocktail Bar	Beer Bar	Restaurant	Pharmacy	Seafood Restaurant	Farmers Market	Cheese Shop	Pub
1	CN Tower, King and Spadina, Railway Lands, Har...	Airport Service	Airport Terminal	Plane	Harbor / Marina	Sculpture Garden	Boat or Ferry	Rental Car Location	Bar	Coffee Shop	Boutique
2	Central Bay Street	Coffee Shop	Sandwich Place	Café	Italian Restaurant	Bubble Tea Shop	Burger Joint	Thai Restaurant	Salad Place	Japanese Restaurant	Portuguese Restaurant
3	Christie	Grocery Store	Café	Park	Baby Store	Nightclub	Coffee Shop	Restaurant	Italian Restaurant	Athletics & Sports	Candy Store
4	Church and Wellesley	Coffee Shop	Japanese Restaurant	Sushi Restaurant	Restaurant	Gay Bar	Yoga Studio	Pub	Men's Store	Mediterranean Restaurant	Café

I run K-Means to cluster the neighborhoods into 5 clusters, then mapped the clusters as below:



Then merged table with cluster labels as per below:

[45]:

	Borough	Cluster Labels	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	Downtown Toronto	0	Coffee Shop	Bakery	Park	Theater	Breakfast Spot	Café	Pub	Gym / Fitness Center	Bank	Brewery
2	Downtown Toronto	0	Clothing Store	Coffee Shop	Bubble Tea Shop	Middle Eastern Restaurant	Japanese Restaurant	Italian Restaurant	Cosmetics Shop	Hotel	Café	Theater
3	Downtown Toronto	0	Café	Coffee Shop	Gastropub	Cocktail Bar	Italian Restaurant	Seafood Restaurant	Gym	Hotel	Department Store	Creperie
4	Downtown Toronto	0	Coffee Shop	Bakery	Cocktail Bar	Beer Bar	Restaurant	Pharmacy	Seafood Restaurant	Farmers Market	Cheese Shop	Pub
7	Downtown Toronto	0	Coffee Shop	Café	Restaurant	Clothing Store	Hotel	Bakery	Gym	Thai Restaurant	Deli / Bodega	Pizza Place
8	Downtown Toronto	0	Coffee Shop	Aquarium	Café	Hotel	Scenic Lookout	Fried Chicken Joint	Restaurant	Italian Restaurant	Brewery	Sporting Goods Shop
9	Downtown Toronto	0	Coffee Shop	Hotel	Café	Restaurant	Salad Place	Bakery	Seafood Restaurant	Japanese Restaurant	Italian Restaurant	Sporting Goods Shop
10	Downtown Toronto	0	Coffee Shop	Restaurant	Café	Hotel	Italian Restaurant	Gym	American Restaurant	Japanese Restaurant	Seafood Restaurant	Cocktail Bar

RESULTS

Cluster Label 4 is showing the following:

[49]:

	Borough	Cluster Labels	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
1	Downtown Toronto	4	Coffee Shop	Sushi Restaurant	Diner	Yoga Studio	Sandwich Place	Distribution Center	Japanese Restaurant	Beer Bar	Italian Restaurant	Burrito Place
5	Downtown Toronto	4	Coffee Shop	Sandwich Place	Café	Italian Restaurant	Bubble Tea Shop	Burger Joint	Thai Restaurant	Salad Place	Japanese Restaurant	Portuguese Restaurant

DISCUSSION

It is obvious according to cluster label 4 that there are many common venues, specifically food related venues, in downtown borough but there is no common Arabic restaurant or even Middle Eastern.

CONCULSION

As a result, I recommend opening an Arabic cuisine restaurant with delivery service in addition to the dine-in option, as per the analysis done above due to the shortage of this type of restaurants in Toronto downtown.