

Finding suitable Locations for a Restaurant

In Downtown Toronto,
Canada

The Objective

- ❖ The objective is to find optimum locations to open a new restaurant in Downtown Toronto, close to the city centre, in an area that is not already too densely packed with restaurants.
- ❖ Restaurants, among other places of entertainment and public gatherings are expected to have a good business period in the coming months after nearly 20 months of pandemic scare and repeated lockdowns.
- ❖ The project will be of great use to stakeholders looking to bounce back after being pushed out of business, and to those looking to cash in on the forthcoming boom.

Data Acquisition

- ❖ The list of boroughs and neighbourhoods in Toronto city can be found on this [Wikipedia page](#), and organised into a data fame by scraping the webpage and extracting relevant data.
- ❖ Location data corresponding to the postal codes in Toronto can be found [here](#).
- ❖ Remaining data about restaurants in each neighbourhood is collected using Foursquare's Places API, covered in detail later on.

Data Cleaning

- ❖ Some erroneous borough names have been replaced.
- ❖ The goal is to open a restaurant in Downtown Toronto, so, a new data frame is created containing data from Downtown Toronto only, as shown in the image here.

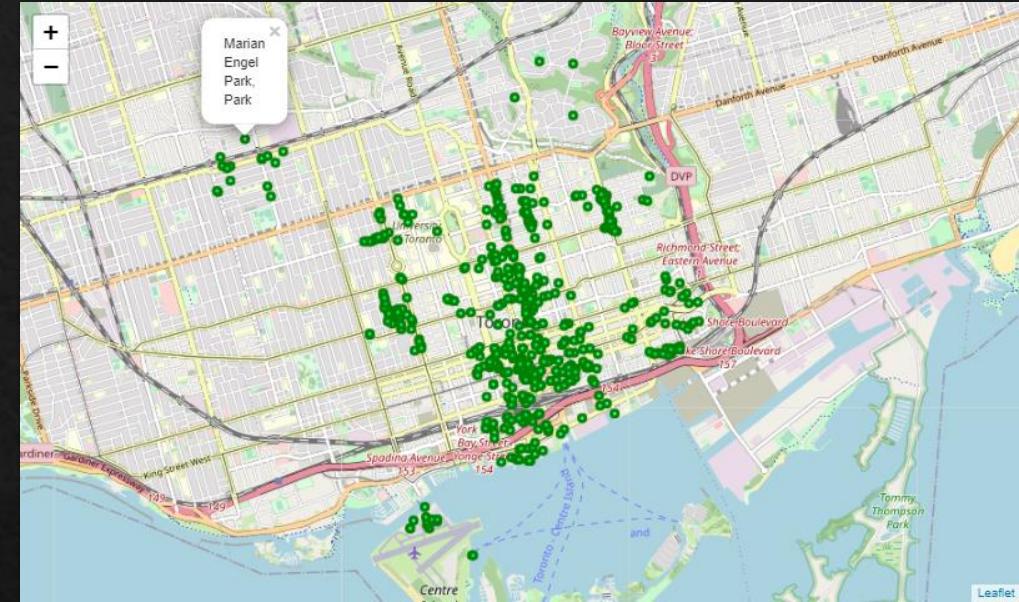
	Postal Code	Borough	Neighbourhood	Latitude	Longitude
0	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
1	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
2	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
3	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306
4	M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383
5	M6G	Downtown Toronto	Christie	43.669542	-79.422564
6	M5H	Downtown Toronto	Richmond, Adelaide, King	43.650571	-79.384568
7	M5J	Downtown Toronto	Harbourfront East, Union Station, Toronto Islands	43.640816	-79.381752
8	M5K	Downtown Toronto	Toronto Dominion Centre, Design Exchange	43.647177	-79.381576
9	M5L	Downtown Toronto	Commerce Court, Victoria Hotel	43.648198	-79.379817
10	M5S	Downtown Toronto	University of Toronto, Harbord	43.662696	-79.400049
11	M5T	Downtown Toronto	Kensington Market, Chinatown, Grange Park	43.653206	-79.400049
12	M5V	Downtown Toronto	CN Tower, King and Spadina, Railway Lands, Har...	43.628947	-79.394420
13	M4W	Downtown Toronto	Rosedale	43.679563	-79.377529
14	M4X	Downtown Toronto	St. James Town, Cabbagetown	43.667967	-79.367675
15	M5X	Downtown Toronto	First Canadian Place, Underground city	43.648429	-79.382280
16	M4Y	Downtown Toronto	Church and Wellesley	43.665860	-79.383160

Exploring the neighbourhoods

- ❖ Foursquare's Places API enables users to access its massive location database.
- ❖ It was used here to get a list of 50 venues within a radius of 500 meters of the coordinates in our data frame, by making API calls for every set of coordinates in the Downtown Toronto data frame (16 calls).
- ❖ The returned data was used to create another data frame containing the name of the venue, its type, and its coordinates, and the points were visualised on a map of Downtown Toronto.

	Postal Code	Latitude	Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	M5A	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
1	M5A	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
2	M5A	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	M5A	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant
4	M5A	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa
...
711	M4Y	43.66586	-79.383160	The Yoga Sanctuary	43.661499	-79.383636	Yoga Studio
712	M4Y	43.66586	-79.383160	Rooster Coffee House	43.669654	-79.379871	Coffee Shop
713	M4Y	43.66586	-79.383160	Wow! Sushi	43.668514	-79.386686	Sushi Restaurant
714	M4Y	43.66586	-79.383160	Coffee Island	43.664271	-79.386972	Coffee Shop
715	M4Y	43.66586	-79.383160	Cawthra Square Dog Park	43.666583	-79.380040	Dog Run

716 rows × 7 columns



Exploring the neighbourhoods

- ❖ The image on the left shows the data frame of venues in Downtown Toronto.
- ❖ The image on the right shows these venues on a map of Downtown Toronto.

Filtering out the Restaurants

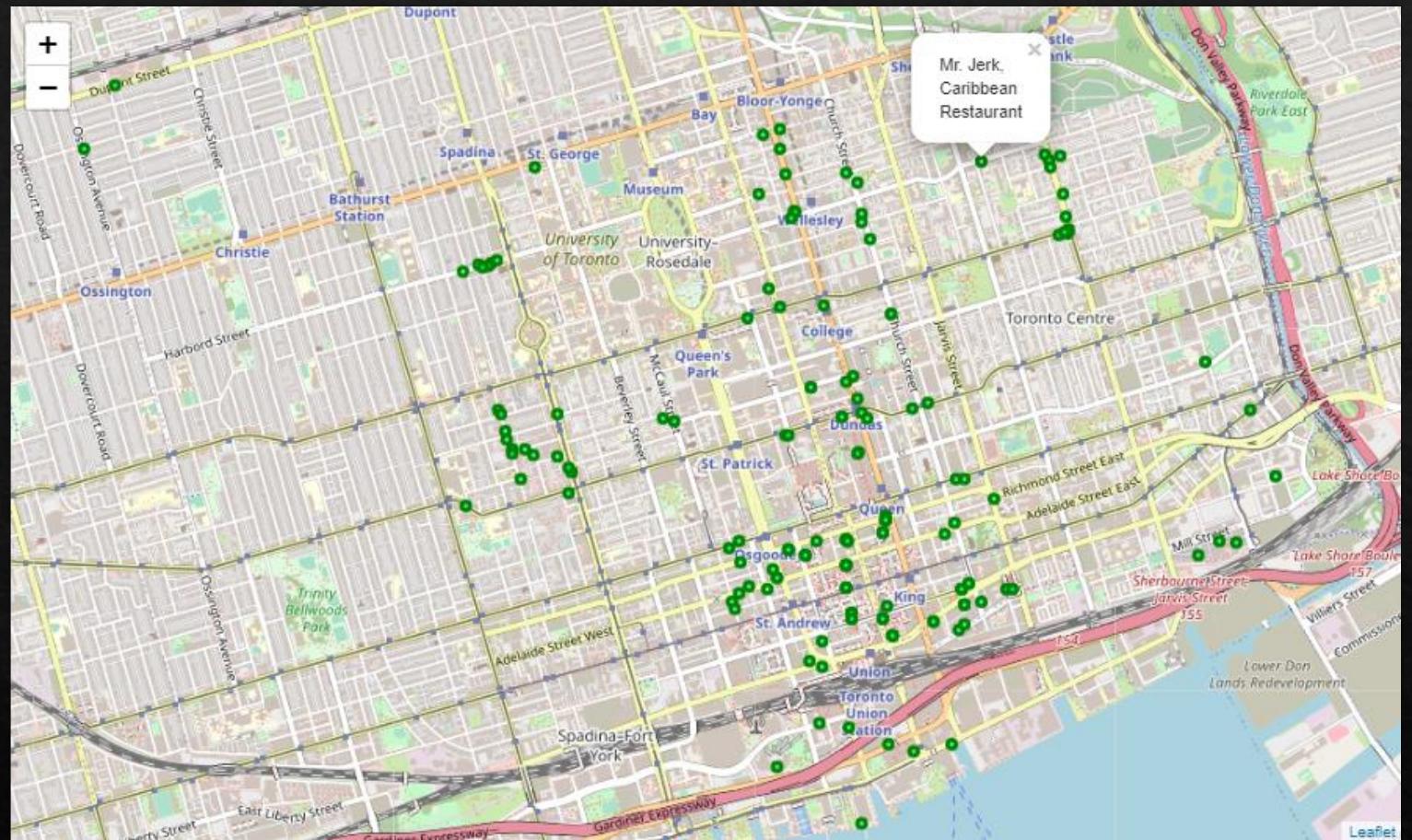
- ❖ A loop was run through the previous data frame to search for the term ‘restaurant’ in it and extract the data.
- ❖ The resulting data was inserted into another data frame consisting of the restaurant’s name, location and type, as shown in the image here.

	Latitude	Longitude	Postal Code	Restaurant Latitude	Restaurant Longitude	Restaurant Name	Restaurant Type
0	43.65426	-79.360636	M5A	43.656369	-79.356980	Impact Kitchen	Restaurant
1	43.65426	-79.360636	M5A	43.650565	-79.357843	Cluny Bistro & Boulangerie	French Restaurant
2	43.65426	-79.360636	M5A	43.650601	-79.358920	EI Catrin	Mexican Restaurant
3	43.65426	-79.360636	M5A	43.649970	-79.360153	Izumi	Asian Restaurant
4	43.65426	-79.360636	M5A	43.653475	-79.355458	Copper Branch	Vegetarian / Vegan Restaurant
...
160	43.66586	-79.383160	M4Y	43.667872	-79.385659	Kothur Indian Cuisine	Indian Restaurant
161	43.66586	-79.383160	M4Y	43.664665	-79.380641	Loaded Pierogi	Polish Restaurant
162	43.66586	-79.383160	M4Y	43.668759	-79.385694	Wish	Restaurant
163	43.66586	-79.383160	M4Y	43.663894	-79.380210	Kawa Sushi	Japanese Restaurant
164	43.66586	-79.383160	M4Y	43.668514	-79.386686	Wow! Sushi	Sushi Restaurant

165 rows × 7 columns

Filtering out the Restaurants

- ❖ This image here shows the restaurants from our data frame, on a map of Downtown Toronto



Clustering the Restaurants

- ❖ To determine the optimal locations for a new restaurant, a density-based clustering approach is used, as our business problem does not specify any specific type (or cuisine) for our restaurant. So, the goal is to simply find locations which are not too densely packed with restaurants.
- ❖ Clusters with a minimum of 5 restaurants within a radius of 250 meters from each other are considered as the benchmark.
- ❖ Denser areas would mean cutthroat competition, whereas sparse areas could mean there may not be as many customers. Both situations are bad for business, and the full potential of our restaurant may not be realised.

Clustering the Restaurants

- ❖ The Restaurants are clustered using Scikit-Learn's DBSCAN algorithm.
- ❖ According to the parameters mentioned in the previous slide, the following results were obtained, as shown in the image here.



Results and Conclusion

- ❖ 6 clusters were formed with several restaurants remaining outliers, i.e., which could not be put into any of the clusters.
- ❖ A region too dense with restaurants would be too competitive. When faced with too many choices, consumers tend to default to their one regular choice and it may not be the new restaurant we intend to open, which would be bad for our business.
- ❖ An outlier area, on the other hand, might not be competitive enough, i.e., there may not be enough customers, or that it may not be a well-developed commercial area, which is again bad for business.
- ❖ A restaurant in these areas can work, but we'd rather stay on the safe side. Hence, we shall pick locations from either low-density clusters, or from outliers that are decently close enough to each other, as suitable places for our restaurant.

Results and Conclusion

- ❖ Hence, as per our selection criteria the following locations make good candidates for our final list:
 - ❖ Richmond.
 - ❖ St. James Town.
 - ❖ Bay Street.
 - ❖ Church and Wellesley.
 - ❖ Harbourfront and Union Station.
- ❖ All the above locations are very close to the centre of Downtown Toronto, and in areas that are not too dense, but just dense enough with restaurants.
- ❖ These shortlisted locations shall now be subjected to follow-up studies to determine the best location for our new restaurant.