

Determine location for a new upmarket Sushi Restaurant in the City of Toronto Project

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Everybody loves Sushi!



<https://d.newsweek.com/en/full/1566488/sushi-stock.jpg>



https://cdn.shopify.com/s/files/1/1793/7903/products/Screenshot_2019-06-16_at_5.18.14_PM_345x@2x.png?v=1562449732



<https://media-cdn.tripadvisor.com/media/photo-s/17/38/85/a8/sushis.jpg>

Well, almost. Demand for the most sought after Blue-fin Tuna, used in making Sashimi have a typical market price of almost two million dollars for 200 tuna each weighing around 250 lbs. That's just USD 40/lb which is surely expensive, but in January 2020, a single tuna weighing 608lb sold for over USD 1.7 m which is USD.2796/lb

Interesting fact: Bloomberg has a cost of living gauge called Sushinomics index which reflects the changes in a city's demographics, spending power, business growth and wealth flows. Essentially, the pricier the Sushi, the wealthier the city.

No doubt it is an exotic dish, one that people love to indulge in when times are good.



Importance of location

Location is one of the most important factors in the success of any customer-facing business.

The location of a business, like a restaurant, has a direct affect on:

- The number of customers that it attracts; higher traffic ensures more customers to the business.
- Creating a brand and image attracting a certain class of customer as some parts of a city have a higher reputation than others.
- Repeat customers; high number depends on being located in a high-demand part of a city.



How to determine location

Traditional method

- Doing market research by conducting surveys through the phone or internet of a large enough number of potential customers.
- This requires a lot of time and effort and the data collected is mostly subjective.

Data analysis method

- A truer, quicker and cheaper solution of identifying the best location is by doing an objective analysis.
- Analyzing data on cities, popularity of venues, density of population, location of neighborhoods, etc can provide a fast and less expensive result.

Data analysis approach (overview)

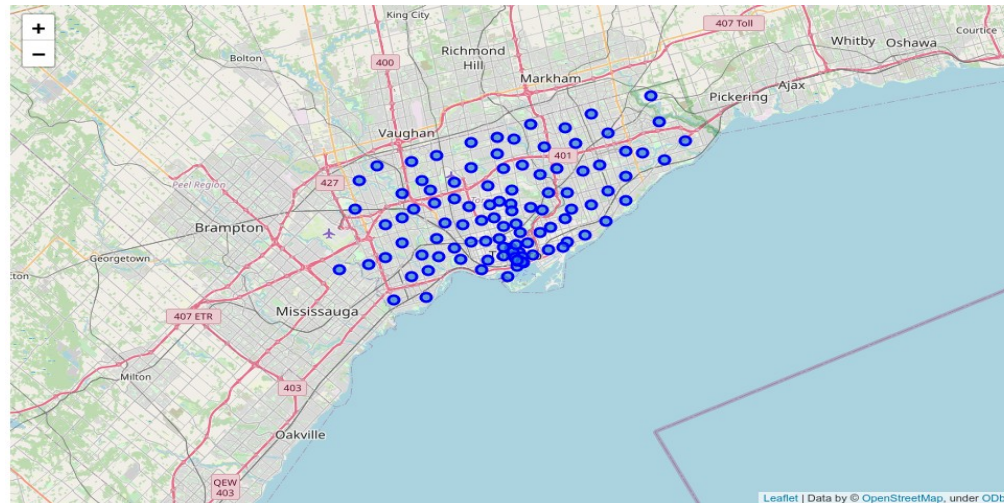
To do data analysis, relevant data has to be obtained.

This project used the following methodology:

- Collecting two datasets; geospatial data containing latitude and longitude data for postal codes (http://cocl.us/Geospatial_data)
- Scraped data (using the BeautifulSoup4 library) from the Wikipedia table for postal codes and neighborhoods ('https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:M');
- The two datasets were merged using the postal code as the common key to obtain a single dataset that contained columns for Neighborhood, Borough, Latitude and Longitude.
- After cleaning, deleting 'non-assigned' postal codes and dropping the postal code column which is not needed for analysis, the final dataset was written out to the file csv.

Data analysis/visualization - 1

The dataset was run through the Folium API to get a geographical representation, ie a map. The map showed that the GPS coordinates were indeed situated in the province of Toronto, centered in the core of the city.



Data analysis/visualization - 2

The dataset was run through the Foursquare API to get all the nearby venues based on the neighborhoods in the dataset.

Out[17]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Parkwoods	43.753259	-79.329656	Brookbanks Park	43.751976	-79.332140	Park
1	Parkwoods	43.753259	-79.329656	TTC stop #8380	43.752672	-79.326351	Bus Stop
2	Parkwoods	43.753259	-79.329656	Variety Store	43.751974	-79.333114	Food & Drink Shop
3	Parkwoods	43.753259	-79.329656	Corrosion Service Company Limited	43.752432	-79.334661	Construction & Landscaping
4	Victoria Village	43.725882	-79.315572	Victoria Village Arena	43.723481	-79.315635	Hockey Arena
5	Victoria Village	43.725882	-79.315572	Tim Hortons	43.725517	-79.313103	Coffee Shop
6	Victoria Village	43.725882	-79.315572	Portugril	43.725819	-79.312785	Portuguese Restaurant
7	Victoria Village	43.725882	-79.315572	Pizza Nova	43.725824	-79.312860	Pizza Place
8	Regent Park, Harbourfront	43.654260	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
9	Regent Park, Harbourfront	43.654260	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
10	Regent Park, Harbourfront	43.654260	-79.360636	Morning Glory Cafe	43.653947	-79.361149	Breakfast Spot

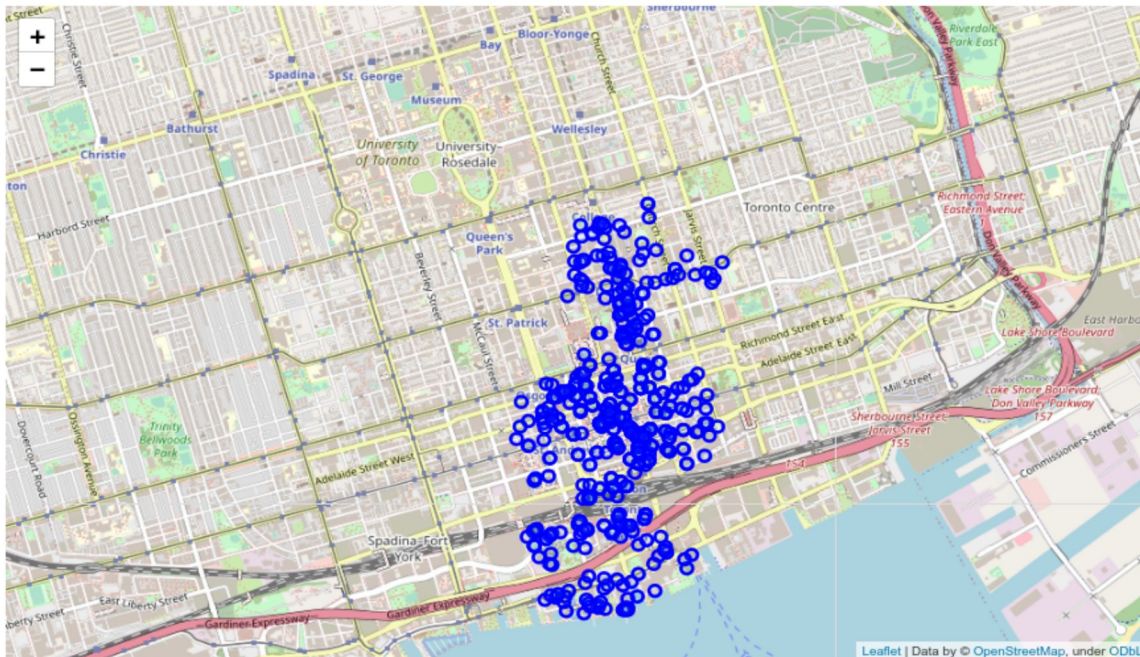
Data analysis/visualization - 3

The dataframe obtained was manipulated to obtain the 10 most common venues by customer ranking using information retrieved in the Foursquare json file.

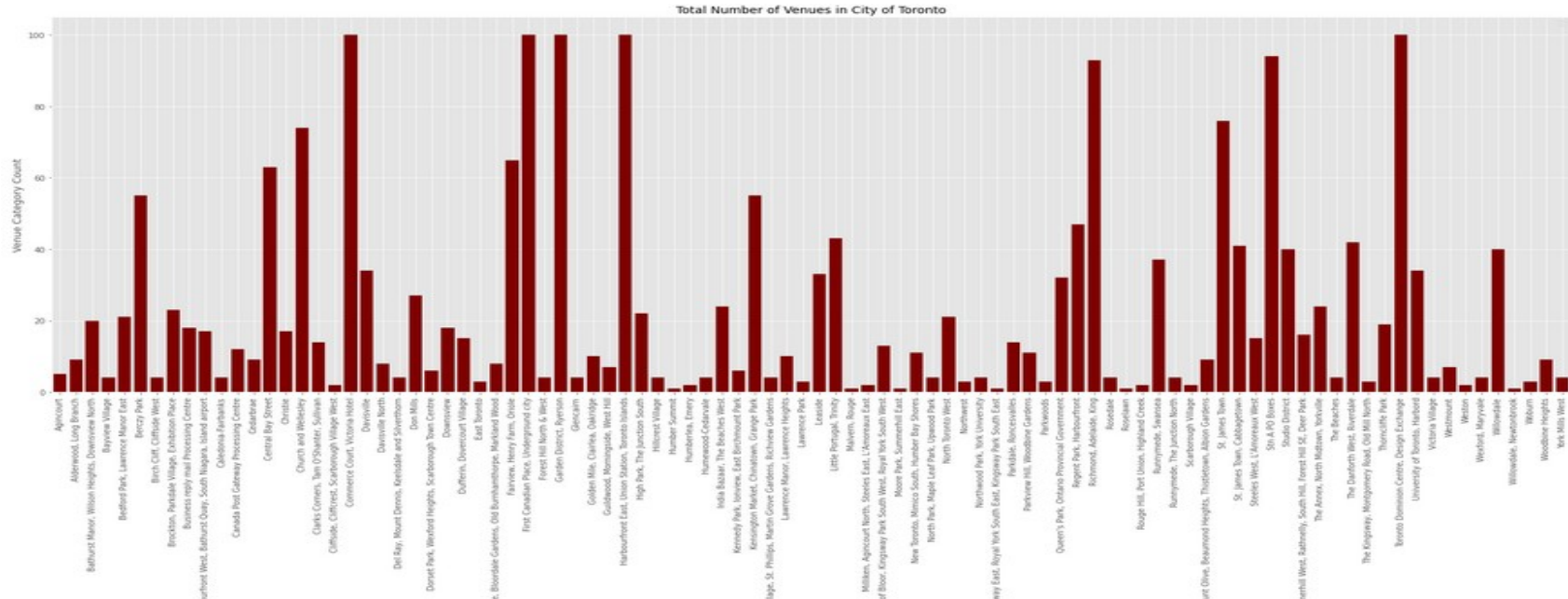
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Agincourt	Lounge	Skating Rink	Clothing Store	Breakfast Spot	Latin American Restaurant	Ethiopian Restaurant	Electronics Store	Event Space	Eastern European Restaurant	Dessert Shop
1	Alderwood, Long Branch	Pizza Place	Skating Rink	Gym	Coffee Shop	Pub	Pharmacy	Pool	Sandwich Place	Diner	Deli / Bodega
2	Bathurst Manor, Wilson Heights, Downsview North	Coffee Shop	Bank	Middle Eastern Restaurant	Frozen Yogurt Shop	Sandwich Place	Bridal Shop	Diner	Restaurant	Deli / Bodega	Ice Cream Shop
3	Bayview Village	Japanese Restaurant	Café	Bank	Chinese Restaurant	Dim Sum Restaurant	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Women's Store
4	Bedford Park, Lawrence Manor East	Coffee Shop	Sandwich Place	Italian Restaurant	Thai Restaurant	Comfort Food Restaurant	Pharmacy	Pizza Place	Café	Pub	Butcher

Data analysis/visualization - 4

The dataframe obtained thus far was manipulated to separate data on the basis of most number of venues. The neighborhood with the most number of venues is a prime location attracting more customers. The more customers coming to a location ensures more business. The neighborhoods of interest are those that have the most venues. Folium API returned the map below based on the lat/long values for the top five venues which are all located together in one part of the city.



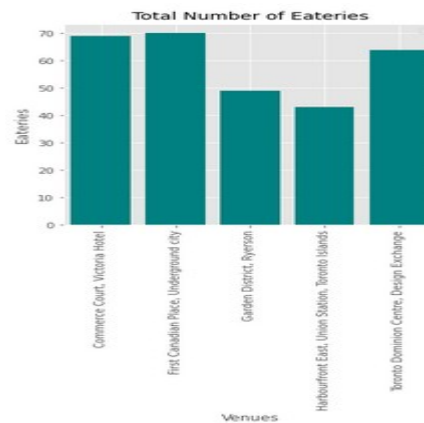
The neighborhoods of interest are those that have the most venues. A bar chart is used to see those neighborhoods with the most number of venues. The chart below shows that there are five neighborhoods that have the most number of venues.



Data exploration - 1

Obtaining the data that only pertains to eateries will show which location is frequented by more people looking for a place to eat. The neighborhood with the most number of eateries is the people's choice. A dataframe was created to compare the five neighborhoods as below.

	Neighborhood	Eateries
0	Commerce Court, Victoria Hotel	69.0
1	First Canadian Place, Underground city	70.0
2	Garden District, Ryerson	49.0
3	Harbourfront East, Union Station, Toronto Islands	43.0
4	Toronto Dominion Centre, Design Exchange	64.0

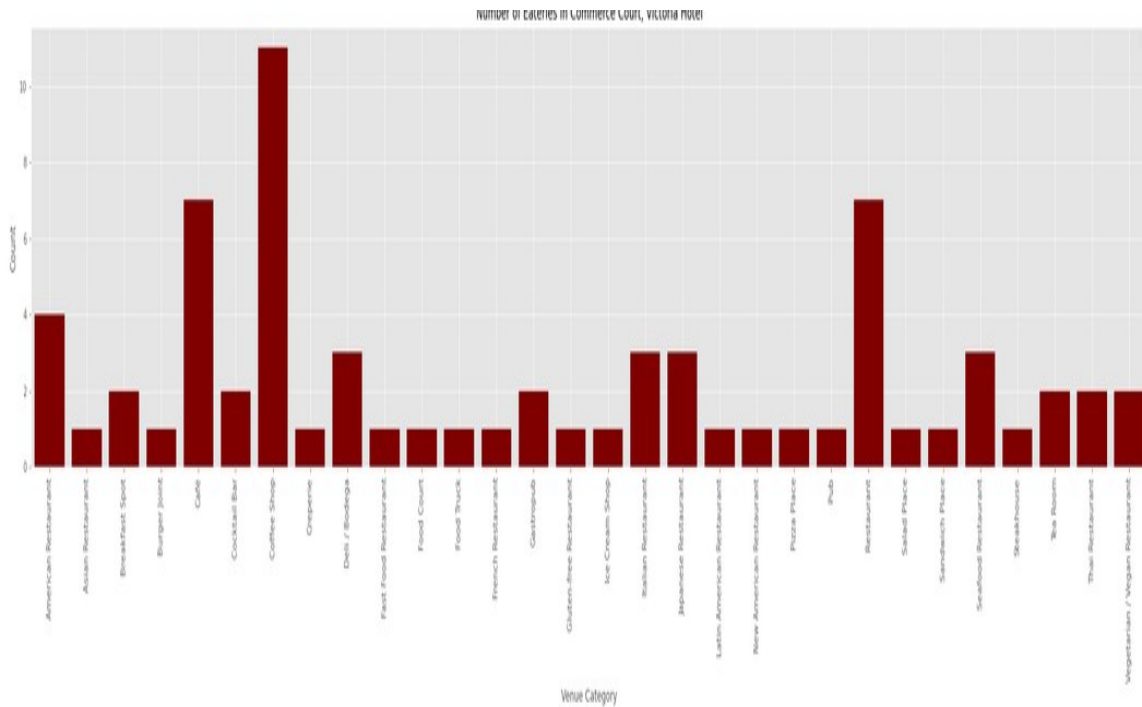


The data above shows that Commerce Court and First Canadian Place are the people's choice when it comes to eating out.

For each of the five neighborhoods we can further explore the data to see which locations have what type of restaurants, which is seen in the next slides.

Data exploration - 2

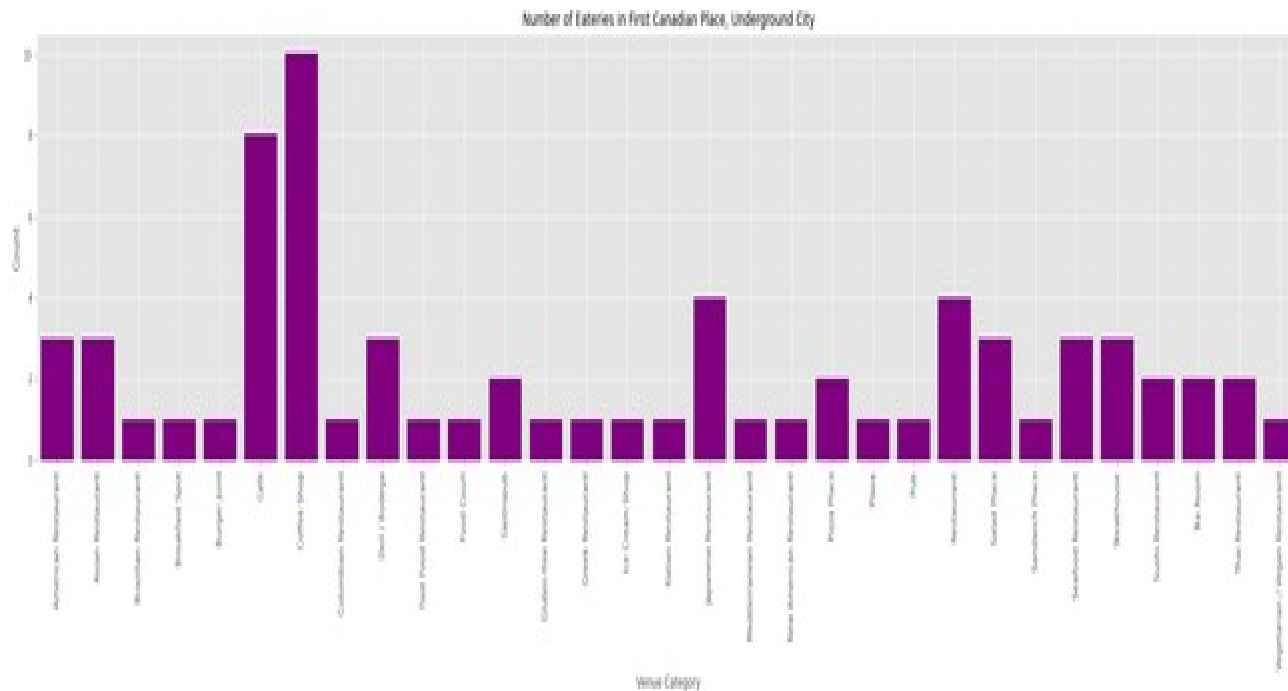
. Exploring eateries in the neighborhood of Commerce Court, Victoria Hotel



	Venue Category	Count
0	American Restaurant	4
1	Asian Restaurant	1
2	Breakfast Spot	2
3	Burger Joint	1
4	Café	7
5	Cocktail Bar	2
6	Coffee Shop	11
7	Creperie	1
8	Deli / Bodega	3
9	Fast Food Restaurant	1
10	Food Court	1
11	Food Truck	1
12	French Restaurant	1
13	Gastropub	2
14	Gluten-free Restaurant	1
15	Ice Cream Shop	1
16	Italian Restaurant	3
17	Japanese Restaurant	3
18	Latin American Restaurant	1
19	New American Restaurant	1
20	Pizza Place	1
21	Pub	1
22	Restaurant	7
23	Salad Place	1
24	Sandwich Place	1
25	Seafood Restaurant	3
26	Steakhouse	1
27	Tea Room	2
28	Thai Restaurant	2
29	Vegetarian / Vegan Restaurant	2

Data exploration - 3

. Exploring eateries in the neighborhood of First Canadian Place, Underground city

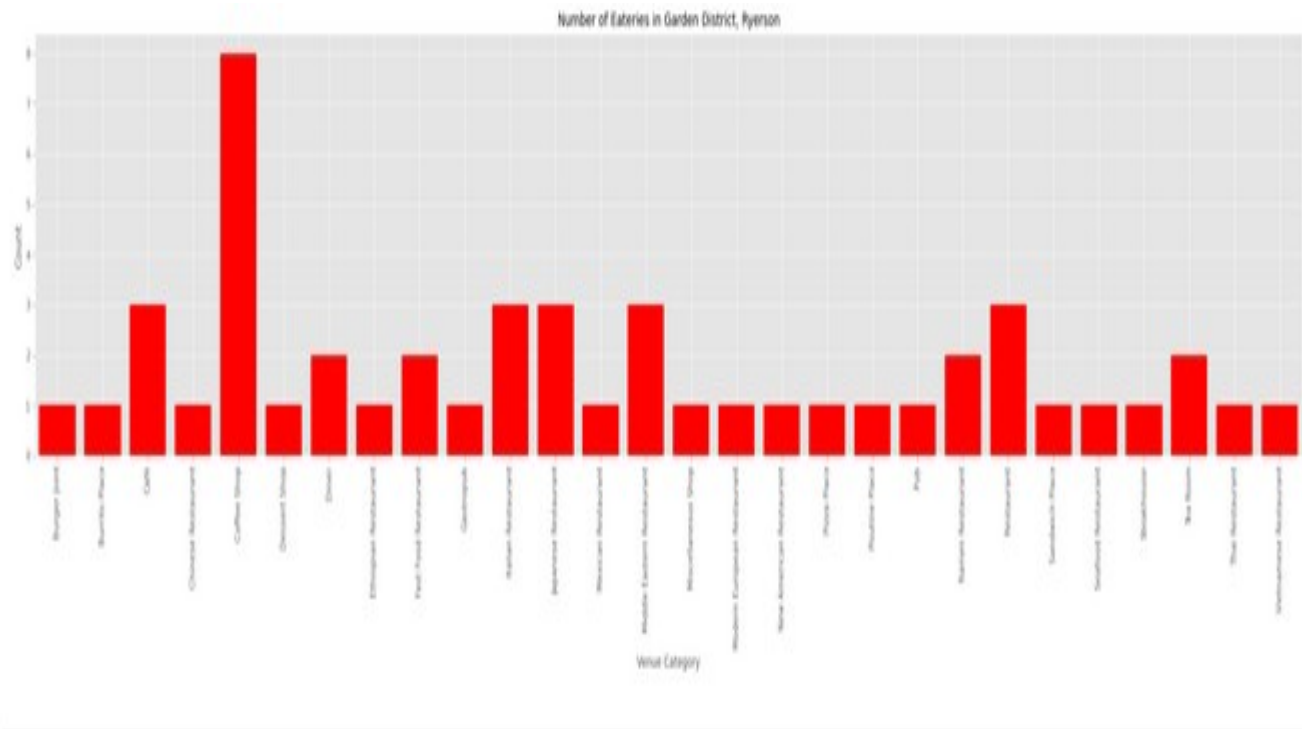


	Venue Category	Count
0	American Restaurant	3
1	Asian Restaurant	3
2	Brazilian Restaurant	1
3	Breakfast Spot	1
4	Burger Joint	1
5	Cafe	5
6	Coffee Shop	10
7	Colombian Restaurant	1
8	Deli / Bodega	3
9	Fast Food Restaurant	1
10	Food Court	1
11	Gastropub	2
12	Gluten-free Restaurant	1
13	Greek Restaurant	1
14	Ice Cream Shop	1
15	Italian Restaurant	1
16	Japanese Restaurant	4
17	Mediterranean Restaurant	1
18	New American Restaurant	1
19	Pizza Place	2
20	Plaza	1
21	Pub	1
22	Restaurant	4
23	Salad Place	3
24	Sandwich Place	1
25	Seafood Restaurant	3
26	Steakhouse	3
27	Sushi Restaurant	2
28	Tea Room	2
29	Thai Restaurant	2
30	Vegetarian / Vegan Restaurant	1

Author: Suresh Jacob (2020)

Data exploration - 4

. Exploring eateries in the neighborhood of Garden district, Ryerson

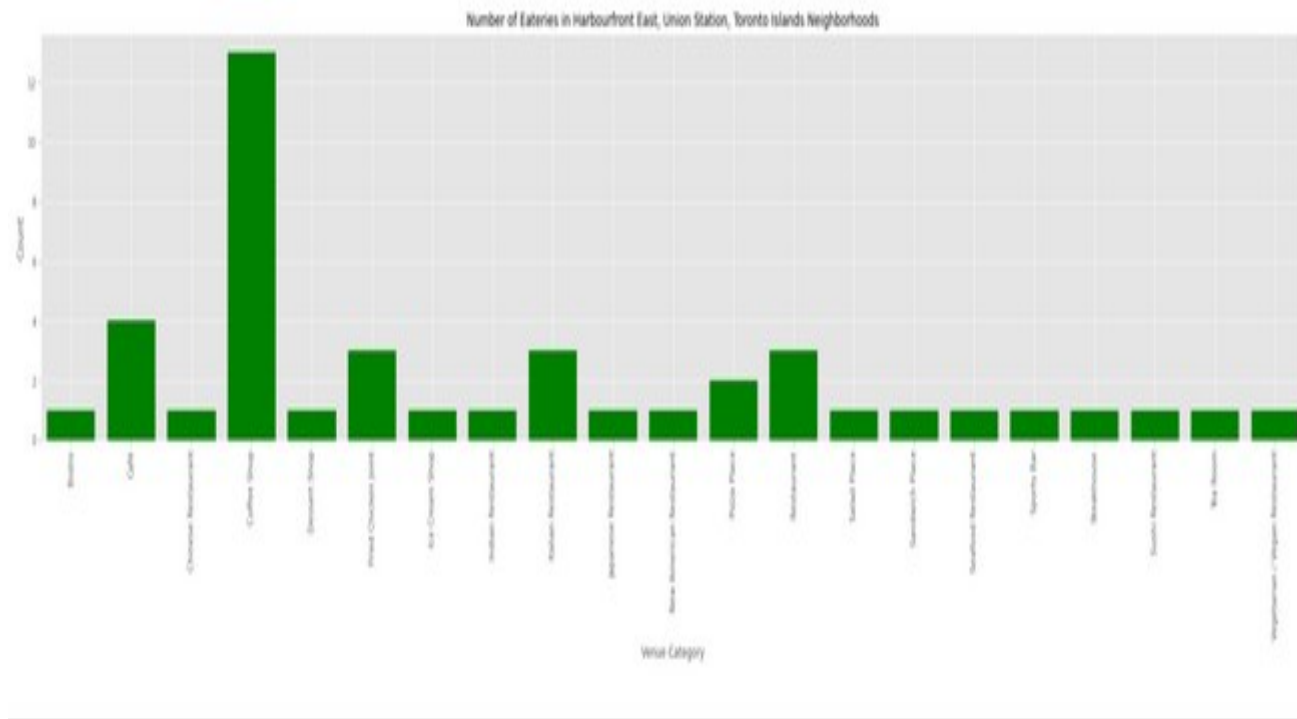


	Venue Category	Count
0	Burger Joint	1
1	Burrito Place	1
2	Café	3
3	Chinese Restaurant	1
4	Coffee Shop	5
5	Dessert Shop	1
6	Diner	2
7	Ethiopian Restaurant	1
8	Fast Food Restaurant	2
9	Gastropub	1
10	Italian Restaurant	3
11	Japanese Restaurant	3
12	Mexican Restaurant	1
13	Middle Eastern Restaurant	3
14	Miscellaneous Shop	1
15	Modern European Restaurant	1
16	New American Restaurant	1
17	Pizza Place	1
18	Poutine Place	1
19	Pub	1
20	Ramen Restaurant	2
21	Restaurant	3
22	Sandwich Place	1
23	Seafood Restaurant	1
24	Steakhouse	1
25	Tea Room	2
26	Thai Restaurant	1
27	Vietnamese Restaurant	1

Author: Suresh Jacob (2020)

Data exploration - 5

. Exploring eateries in the neighborhood of Harbourfront east, Union station, Toronto Islands

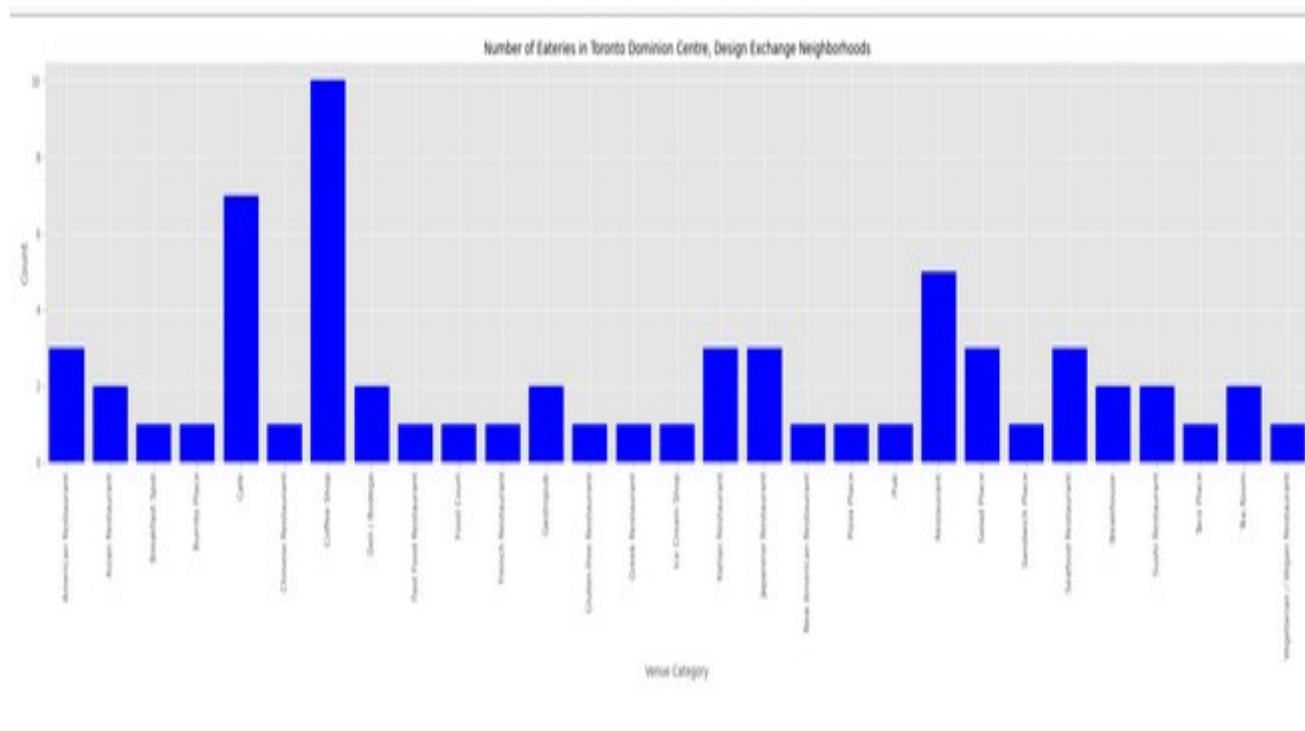


	Venue Category	Count
0	Bistro	1
1	Café	4
2	Chinese Restaurant	1
3	Coffee Shop	13
4	Dessert Shop	1
5	Fried Chicken Joint	3
6	Ice Cream Shop	1
7	Indian Restaurant	1
8	Italian Restaurant	3
9	Japanese Restaurant	1
10	New American Restaurant	1
11	Pizza Place	2
12	Restaurant	3
13	Salad Place	1
14	Sandwich Place	1
15	Seafood Restaurant	1
16	Sports Bar	1
17	Steakhouse	1
18	Sushi Restaurant	1
19	Tea Room	1
20	Vegetarian / Vegan Restaurant	1

Author: Suresh Jacob (2020)

Data exploration - 6

. Exploring eateries in the neighborhood of Toronto Dominion Centre, Design Exchange



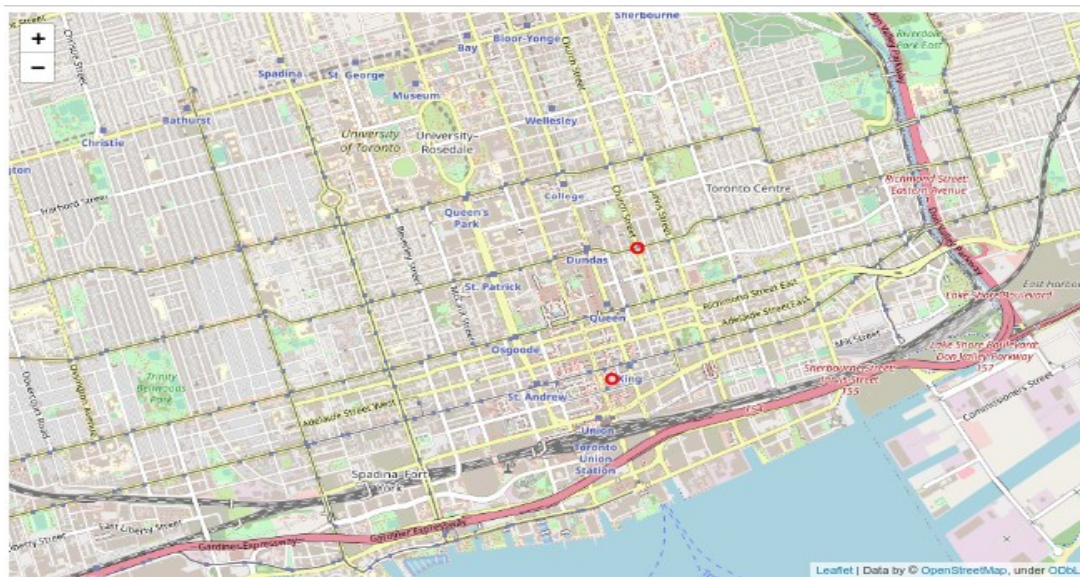
	Venue Category	Count
0	American Restaurant	3
1	Asian Restaurant	2
2	Breakfast Spot	1
3	Burrito Place	1
4	Café	7
5	Chinese Restaurant	1
6	Coffee Shop	10
7	Deli / Bodega	2
8	Fast Food Restaurant	1
9	Food Court	1
10	French Restaurant	1
11	Gastropub	2
12	Gluten-free Restaurant	1
13	Greek Restaurant	1
14	Ice Cream Shop	1
15	Italian Restaurant	3
16	Japanese Restaurant	3
17	New American Restaurant	1
18	Pizza Place	1
19	Pub	1
20	Restaurant	5
21	Salad Place	3
22	Sandwich Place	1
23	Seafood Restaurant	3
24	Steakhouse	2
25	Sushi Restaurant	2
26	Taco Place	1
27	Tea Room	2
28	Vegetarian / Vegan Restaurant	1

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Data exploration - 7

Of the five neighborhoods, the logical choice would be the neighborhood that does not currently have a Sushi restaurant. The two neighborhoods that do not have a Sushi restaurant are:

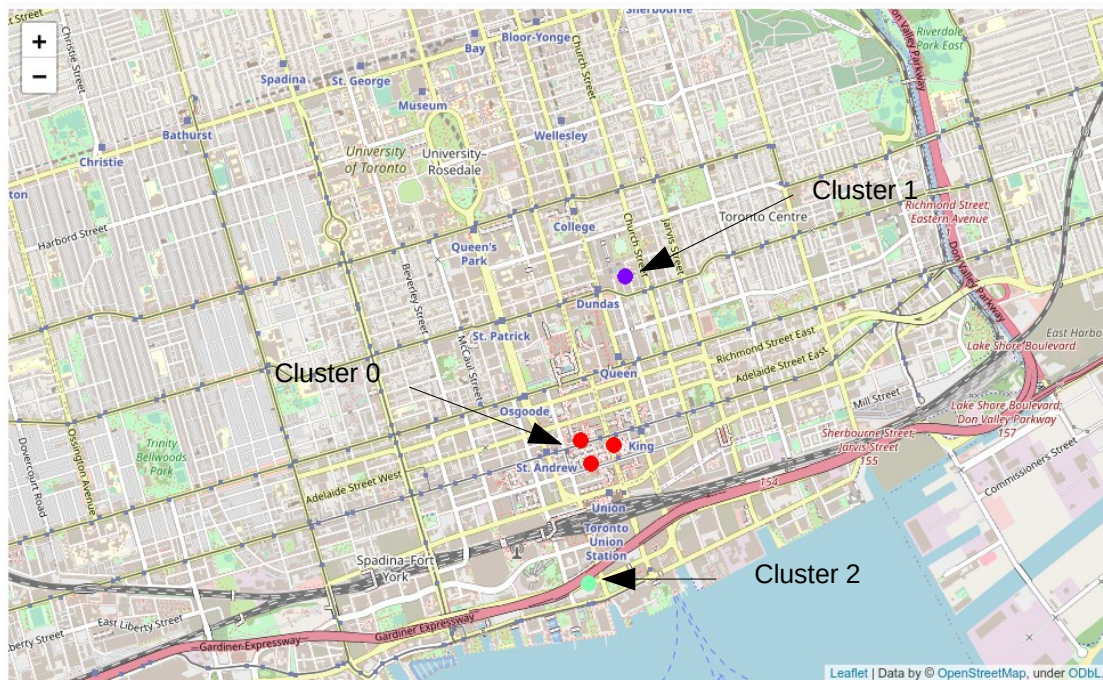
- 1 - Commerce Court, Victoria Hotel
- 2 - Garden District, Ryerson



The map shows the geographical location of the neighborhoods.

Data analysis with K-means (ML)

Applying the Machine Learning technique, K-means clustering to the dataset, we obtain 3 clusters. Exploring the clusters reveals more details.



Cluster 0:

Toronto Dominion Centre, Design Centre, Commerce Court, Victoria Hotel
Top 10 venues have at least eight (8) food related venues.
First venue is a Coffee shop.

Cluster 1:

Garden District, Ryerson
Top 10 venues have at least six (6) food related venues.
First venue is a Clothing store.

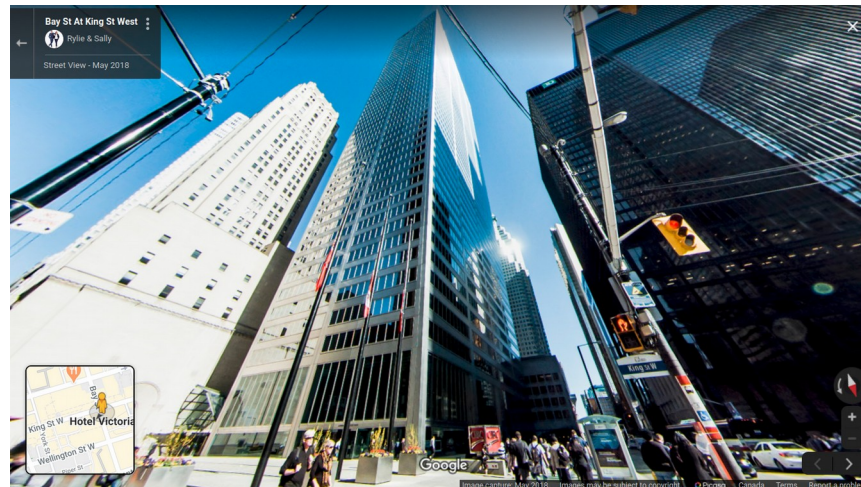
Cluster 2:

Harbourfront east, Union Station, Toronto islands
Top 10 venues have at least five (5) food related venues.
First venue is a Coffee Shop

Conclusion

The results of Data analysis clearly indicates that the neighborhood of Commerce Court and Victoria Hotel in the financial district of the City of Toronto is the best possible choice of location to start a Sushi Restaurant.

The Commerce Court/Victoria Hotel Neighborhood is the winner of the battle of the Neighborhoods!



A view of Bay st and King st. in the financial district of Toronto, *courtesy Google Maps.*



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<https://www.mercurynews.com/2019/08/30/sushi-prices-show-where-u-s-cost-of-living-is-on-the-rise/>

<https://foreignpolicy.com/2009/11/19/how-sushi-went-global/>

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