Find the best Neighborhood in Toronto to open a New Restaurant

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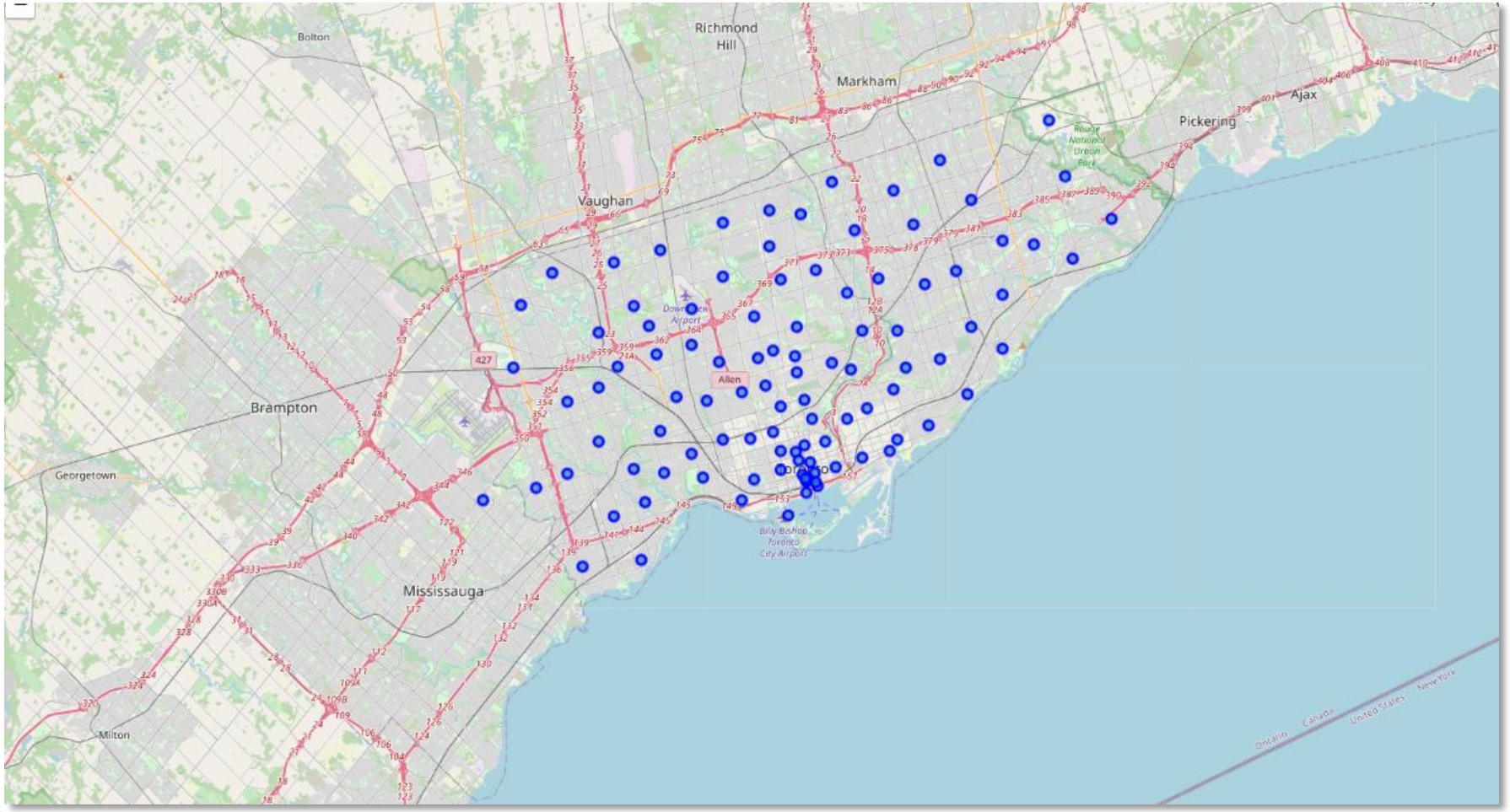
Entrepreneur trying to launch a new restaurant in Toronto, Ontario (Canada).

- Toronto consistently wins awards for being so lovably liveable, which is contributed by the night life and restaurants.
- We got to locate the similar neighborhoods with most number of restaurants and suggest that as the best place
- Borough with most number of restaurants in their top 10 most common venues.
- Also, considering similar Neighborhoods with same neighborhoods where there are less number of Restaurants, this will be the place where a Restaurant is likely to have better reception and less competition.

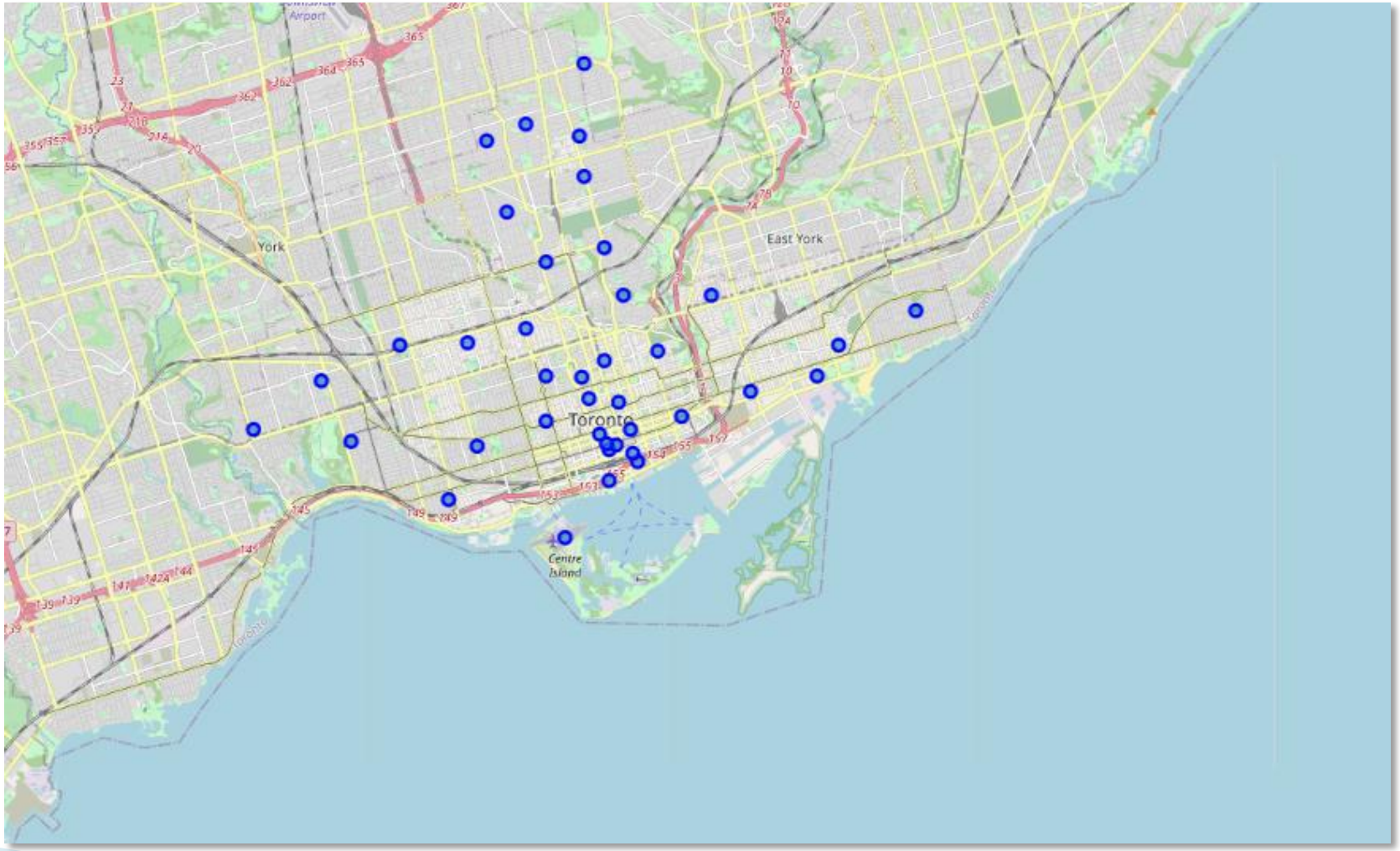
Data Acquisition and Data Cleaning

- Our initial Borough and Neighborhood details for entire Toronto City can we be scraped from this **Wiki page** here.
- use the **Four Square API** service to extract the list of venue categories around each neighborhood.
- **Geocoder package** can be used to extract the Latitude and Longitude data of each Neighborhood

Plot of Toronto City Neighborhoods



Plot the neighborhoods of Boroughs with name as Toronto



Venue Frequencies for different Neighborhoods

	Neighborhood	Yoga Studio	Afghan Restaurant	Airport	Airport Food Court	Airport Gate	Airport Lounge	Airport Service	Airport Terminal	American Restaurant	Antique Shop	Aquarium	Art Gallery	A Museu
0	Berczy Park	0.000000	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.017857	0.00000
1	Brockton, Parkdale Village, Exhibition Place	0.041667	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.00000
2	Business reply mail Processing Centre, South C...	0.055556	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.00000
3	CN Tower, King and Spadina, Railway Lands, Har...	0.000000	0.0000	0.055556	0.055556	0.055556	0.111111	0.166667	0.111111	0.000000	0.000000	0.00	0.000000	0.00000
4	Central Bay Street	0.015625	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.01562
5	Christie	0.000000	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.00000
6	Church and Wellesley	0.025000	0.0125	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012500	0.000000	0.00	0.000000	0.00000
7	Commerce Court, Victoria Hotel	0.000000	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040000	0.000000	0.00	0.010000	0.00000
8	Davisville	0.000000	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.00000
9	Davisville North	0.000000	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.00000
10	Dufferin, Dovercourt Village	0.000000	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.00000
11	First Canadian Place, Underground city	0.000000	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.030000	0.000000	0.00	0.010000	0.00000

For each Neighborhood there may be many repeated venue categories, for example: “Christie” might have 5 Café.

So to find the most common venues and to have the simplified version of data, I found the frequencies of the venues within a neighborhood

Top 10 common venues in neighborhoods

	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	Cocktail Bar	Seafood Restaurant	Cheese Shop	Beer Bar	Bakery	Café	Restaurant	Eastern European Restaurant	Department Store
1	Brockton, Parkdale Village, Exhibition Place	Café	Bakery	Breakfast Spot	Coffee Shop	Gym	Grocery Store	Pet Store	Performing Arts Venue	Nightclub	Italian Restaurant
2	Business reply mail Processing Centre, South C...	Light Rail Station	Yoga Studio	Auto Workshop	Gym / Fitness Center	Garden Center	Garden	Fast Food Restaurant	Farmers Market	Comic Shop	Pizza Place
3	CN Tower, King and Spadina, Railway Lands, Har...	Airport Service	Airport Lounge	Airport Terminal	Bar	Harbor / Marina	Coffee Shop	Boat or Ferry	Rental Car Location	Boutique	Plane
4	Central Bay Street	Coffee Shop	Café	Italian Restaurant	Sandwich Place	Burger Joint	Japanese Restaurant	Department Store	Salad Place	Bubble Tea Shop	Yoga Studio
5	Christie	Grocery Store	Café	Park	Restaurant	Diner	Baby Store	Candy Store	Nightclub	Coffee Shop	Athletics & Sports
6	Church and Wellesley	Coffee Shop	Sushi Restaurant	Japanese Restaurant	Restaurant	Gay Bar	Yoga Studio	Bubble Tea Shop	Pub	Burger Joint	Café
7	Commerce Court, Victoria Hotel	Coffee Shop	Café	Restaurant	Hotel	American Restaurant	Gym	Seafood Restaurant	Deli / Bodega	Italian Restaurant	Japanese Restaurant
8	Davisville	Sandwich Place	Dessert Shop	Gym	Café	Italian Restaurant	Sushi Restaurant	Coffee Shop	Pizza Place	Farmers Market	Seafood Restaurant
9	Davisville North	Park	Sandwich Place	Breakfast Spot	Gym / Fitness Center	Hotel	Pizza Place	Department Store	Food & Drink Shop	Dim Sum Restaurant	Diner
10	Dufferin, Dovercourt Village	Bakery	Pharmacy	Bank	Bar	Middle Eastern Restaurant	Café	Supermarket	Pizza Place	Park	Pet Store
11	First Canadian Place, Underground city	Coffee Shop	Café	Gym	Japanese Restaurant	Hotel	Restaurant	Deli / Bodega	Salad Place	Seafood Restaurant	Steakhouse
12	Forest Hill North & West, Forest Hill Road Park	Park	Jewelry Store	Trail	Sushi Restaurant	Bus Line	Department Store	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant
13	Garden District, Ryerson	Clothing Store	Coffee Shop	Bubble Tea Shop	Café	Middle Eastern Restaurant	Japanese Restaurant	Italian Restaurant	Cosmetics Shop	Tea Room	Ramen Restaurant
14	Harbourfront East, Union Station, Toronto Islands	Coffee Shop	Aquarium	Hotel	Café	Sporting Goods Shop	Restaurant	Brewery	Scenic Lookout	Italian Restaurant	Fried Chicken Joint
15	High Park, The Junction South	Thai Restaurant	Mexican Restaurant	Café	Diner	Bakery	Flea Market	Italian Restaurant	Fried Chicken Joint	Speakeasy	Cajun / Creole Restaurant
16	India Bazaar, The Beaches West	Park	Fast Food Restaurant	Gym	Ice Cream Shop	Fish & Chips Shop	Steakhouse	Restaurant	Pub	Italian Restaurant	Burrito Place
17	Kensington Market, Chinatown, Grange Park	Café	Coffee Shop	Vietnamese Restaurant	Vegetarian / Vegan Restaurant	Mexican Restaurant	Pizza Place	Dessert Shop	Bar	Gaming Cafe	Grocery Store
18	Lawrence Park	Park	Swim School	Bus Line	Dessert Shop	Ethiopian Restaurant	Electronics Store	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant
19	Little Portugal, Trinity	Bar	Asian Restaurant	Restaurant	Café	Vegetarian / Vegan Restaurant	Coffee Shop	Men's Store	Yoga Studio	Cuban Restaurant	Brewery

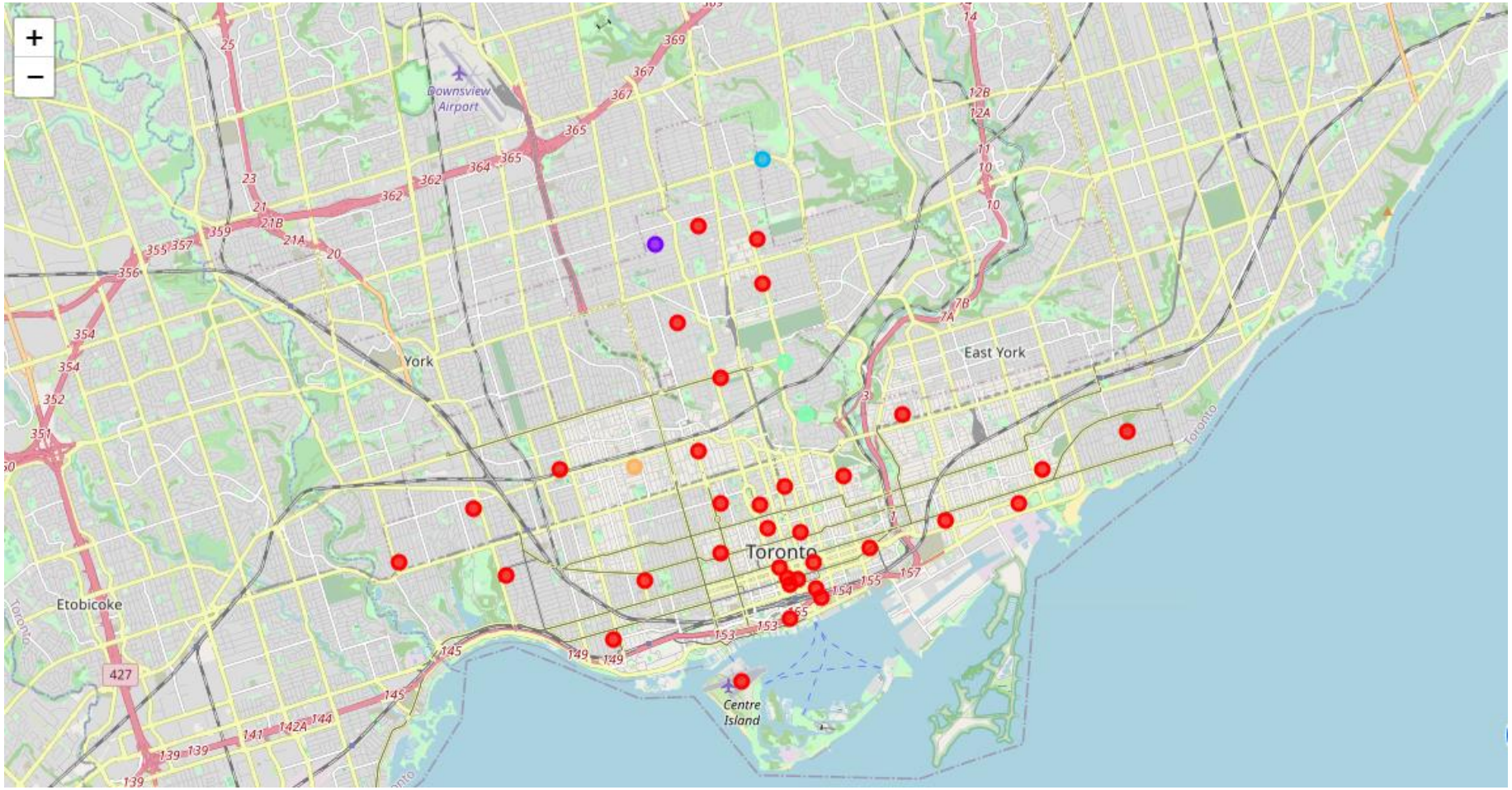
I sorted the table in descending order of the frequency mean of venues occurrence in each neighborhood.

Created a DataFrame with 10 levels of columns to display top 10 common venues in neighborhoods

k-Means Clustering

- k-Means clustering is a method of vector quantization, originally from signal processing that aims to partition n observations into k number clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster.
- I plan to specify the number of clusters to be 5 as initial setup, which seems to be optimum or the Toronto model. My random state for the k-Means would be 0. This would give me a picture of which neighborhoods share the same pattern of lifestyles.

Clusters of neighborhoods with different Lifestyle



Venue Frequencies for different Neighborhoods

	Borough	Cluster1	Cluster2	Cluster3	Cluster4	Cluster5
0	Central Toronto	3	4	2	8	4
1	East Toronto	0	0	0	7	0
2	Downtown Toronto	0	4	0	9	0
3	West Toronto	0	0	0	10	0

To find which Borough has the most number of Restaurants in these clusters, we need to find the venues with the category string as “Restaurant” and find the total count for each borough in each cluster.

These will in-turn give us a DataFrame with Boroughs and Clusters mapped with the number of Restaurants.

Most importantly we are referring to the DataFrame we created with top 10 common venues.

Bar Plot to show the Restaurant Migrations across neighborhoods

Insights

- **Insight 1** – Bar plot gives us the clear indication that Cluster 4 has more number of Restaurants, however while looking much closer Cluster 4 seems to have more restaurants and performing well across all Boroughs.
- **Insight 2** – Also, Cluster 4 in East Toronto seems to have similar lifestyle but has less number of Restaurants.
- **Insight 3** – Also in all Borough, across clusters 1,2 and 5 we can see that Central Toronto has good number of Restaurants and performing well. But in same clusters around other Boroughs does seem to have a Restaurant.

Conclusion

- **Strategy 1** – Wanting to Launch a Restaurant in a Neighborhood where majority of venues are Restaurants, considering they would catch the same growth as other venues.

For this strategy, Insight 1 would help to decide as it explains the neighborhoods with most number of restaurants across clusters. So my recommendation would be to launch a new restaurant in Cluster 4 more across all boroughs, but specifically on Downtown Toronto and West Toronto, as they have the most number of restaurants as the top 10 common venues.

Conclusion (cont.…)

- **Strategy 2** – Wanting to Launch a Restaurant in a Neighborhood where people likely to visit Restaurant but they don't have enough number of Restaurants.

For this strategy, Insight 2 and 3 would help to decide as it explains the neighborhood with opportunity to have more number of restaurants but have very less or no restaurants. So my recommendation would be to launch a new restaurant in Cluster 4 in East Toronto can be a good place to start a New Restaurant. Also, Central Toronto across cluster 1,2 and 5 would be a good choice of Neighborhood to launch a New Restaurant.

Future Directions

- In future, we can also avail other data that Four Square API provides, that is we can also include User reviews and how frequent users visit these restaurants, to derive a rating of these restaurants or identifying most suitable neighborhood which has more number of visitors to the restaurants.