Introduction

A businessman wants to start a new restaurant business in North America and after researching, he has narrowed down to two cities: New York and Toronto. Both cities are very diverse and are the financial capitals of their respective countries. So, he decided to compare the neighborhoods of the two cities and determine how similar or dissimilar they are. Then he can have more useful information on making decisions.

Data

We will be using neighborhoods data of these two cities from Foursquare API for fetching and exploring all sorts of restaurant-like venues. For New York, we are using the New York data from previous lab and for Toronto, we will be web scraping the data from Wikipedia plus the coordinates data from previous lab. We will choose one borough from each city: Manhattan for New York and Downtown for Toronto and apply Neighborhood Segmentation and Clustering to analyze the neighborhood data and prioritize the best restaurant location in both cities.

Methodology

We will be exploring two cities one by one with the same methodology. After we extract the data for both cities, we will explore them by using Foursquare API and visualize the results separately.

Manhattan Data:

	Borough	Neighborhood	Latitude	Longitude
0	Manhattan	Marble Hill	40.876551	-73.910660
1	Manhattan	Chinatown	40.715618	-73.994279
2	Manhattan	Washington Heights	40.851903	-73.936900
3	Manhattan	Inwood	40.867684	-73.921210
4	Manhattan	Hamilton Heights	40.823604	-73.949688

Downtown Toronto Data:

	Borough	Neighborhood	Latitude	Longitude
0	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
1	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
2	Downtown Toronto	St. James Town	43.651494	-79.375418
3	Downtown Toronto	Berczy Park	43.644771	-79.373306
4	Downtown Toronto	Central Bay Street	43.657952	-79.387383

Visualize Manhattan neighborhoods:
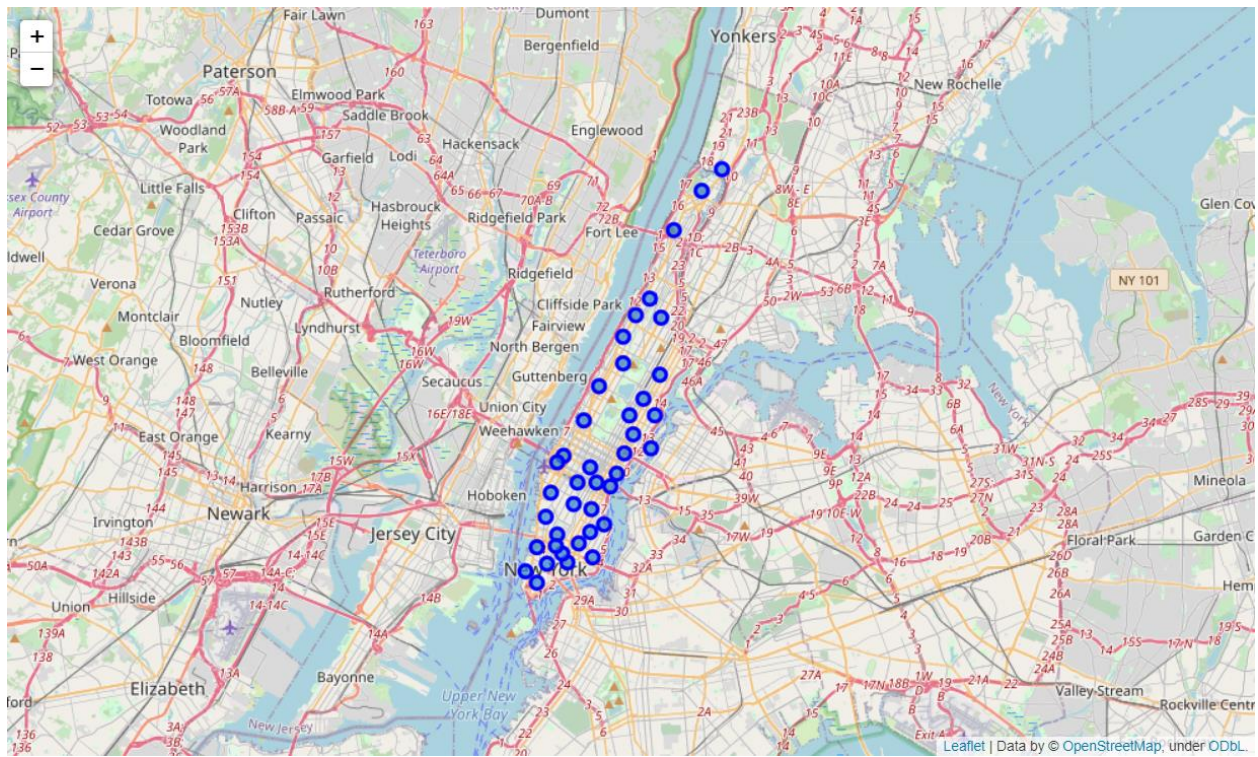
Visualize Downtown Toronto neighborhoods:
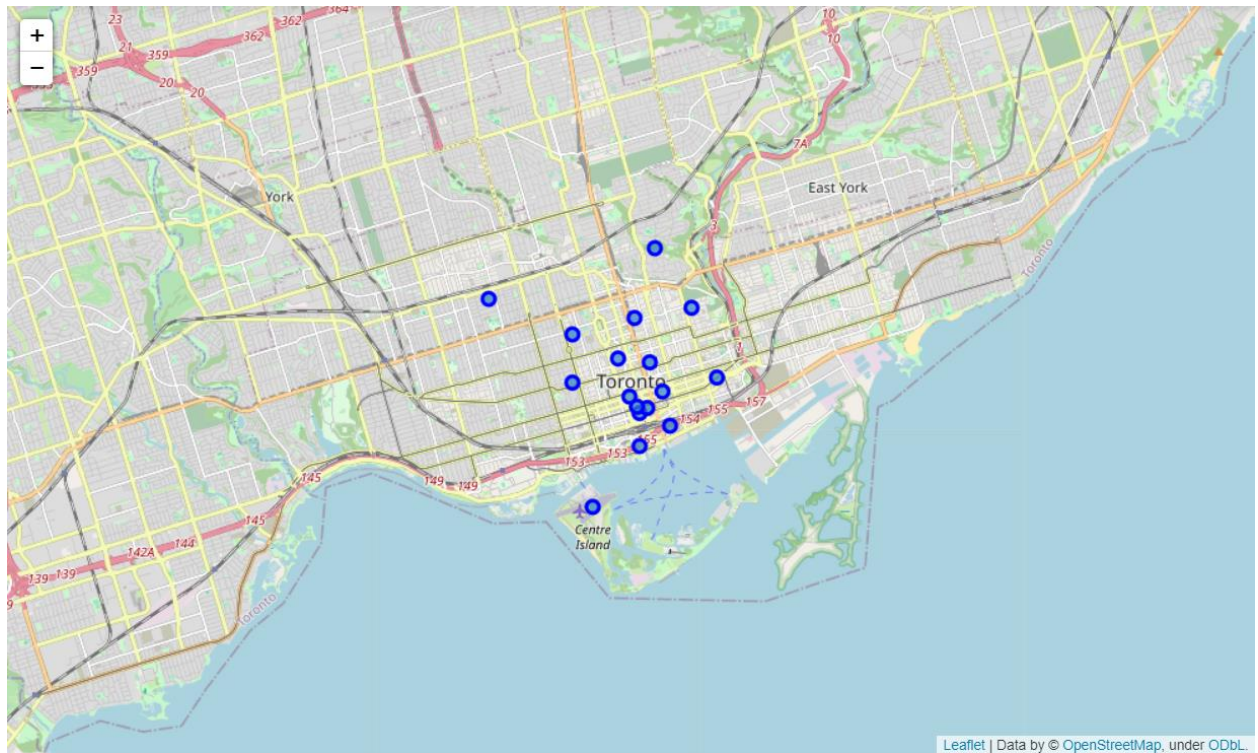
We will be using the Foursquare API to explore the venues in neighborhoods with setting the limit as 50 venues and the radius 500 meter based on latitude and longitude of each Borough. Then, we will sort the top 10 venues for each neighborhood.
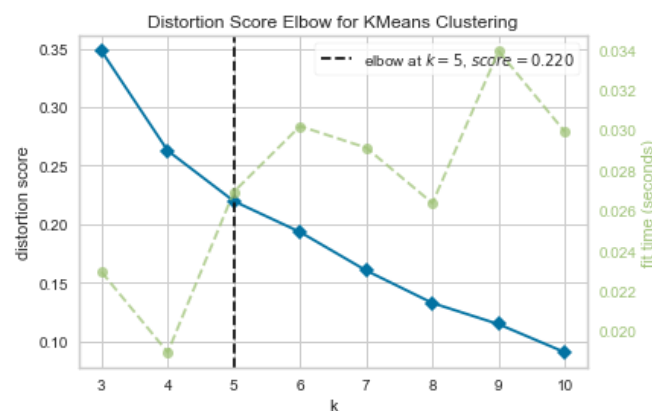
Manhattan top venues:

	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	Battery Park City	Park	Coffee Shop	Memorial Site	BBQ Joint	Food Court	Hotel	Gourmet Shop	Plaza	Italian Restaurant	Sandwich Place
1	Carnegie Hill	Café	Bookstore	Yoga Studio	Gym / Fitness Center	French Restaurant	Cocktail Bar	Coffee Shop	Gym	Pizza Place	Wine Shop
2	Central Harlem	African Restaurant	Chinese Restaurant	American Restaurant	Bar	French Restaurant	Gym / Fitness Center	Seafood Restaurant	Pizza Place	Library	Spa
3	Chelsea	Coffee Shop	Ice Cream Shop	Hotel	Italian Restaurant	French Restaurant	Cupcake Shop	Market	Nightclub	American Restaurant	Seafood Restaurant
4	Chinatown	Chinese Restaurant	Hotpot Restaurant	Ice Cream Shop	Boutique	American Restaurant	Spa	Bakery	Sandwich Place	Salon / Barbershop	Asian Restaurant

Downtown Toronto top venues:

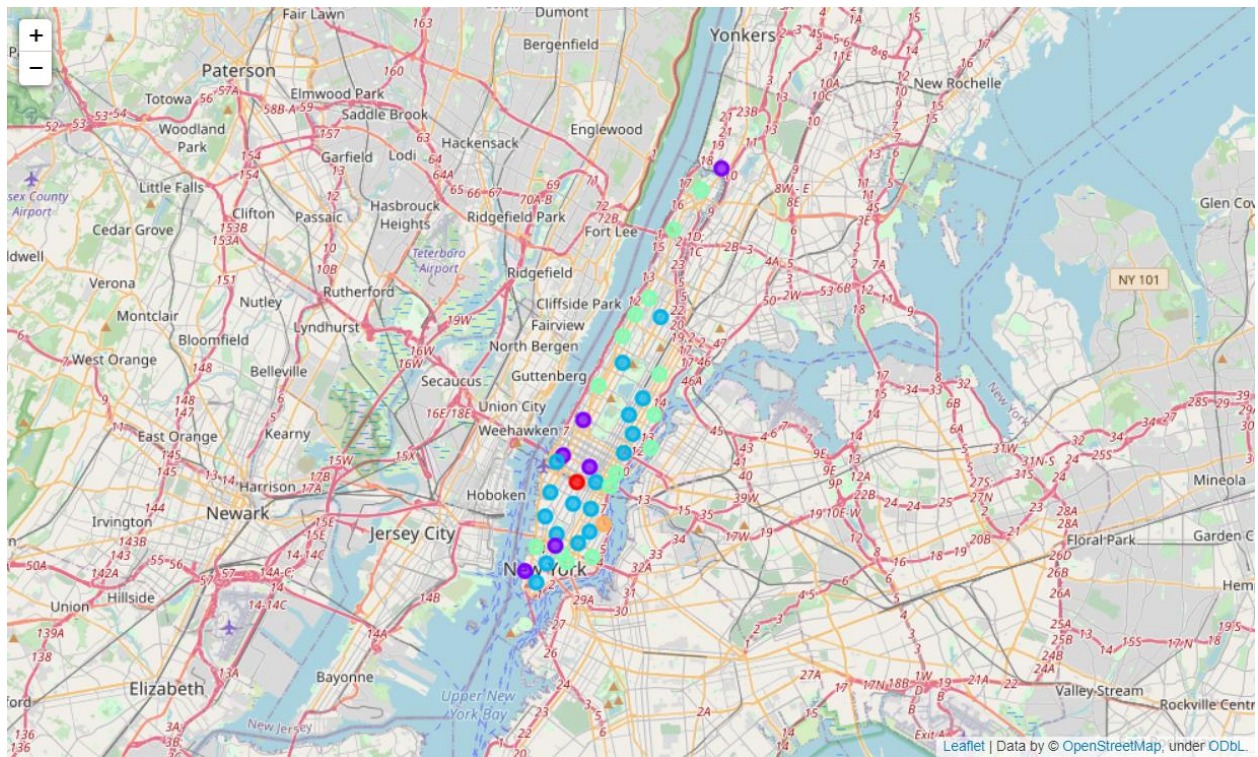|	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Berczy Park	Coffee Shop	Bakery	Pharmacy	Cheese Shop	Seafood Restaurant	Farmers Market	Cocktail Bar	Restaurant	Beer Bar	Comfort Food Restaurant
1	CN Tower, King and Spadina, Railway Lands, Har...	Airport Lounge	Airport Service	Airport Terminal	Airport	Harbor / Marina	Plane	Rental Car Location	Boutique	Boat or Ferry	Sculpture Garden
2	Central Bay Street	Coffee Shop	Sandwich Place	Café	Italian Restaurant	Burger Joint	Yoga Studio	Comic Shop	Ice Cream Shop	Modern European Restaurant	Salad Place
3	Christie	Grocery Store	Café	Park	Restaurant	Baby Store	Coffee Shop	Candy Store	Nightclub	Athletics & Sports	Italian Restaurant
4	Church and Wellesley	Coffee Shop	Japanese Restaurant	Sushi Restaurant	Yoga Studio	Men's Store	Restaurant	Creperie	Dance Studio	Sake Bar	Indian Restaurant

We will be using K-means clustering to analyze the neighborhood and use the elbow method to determine the best "K".
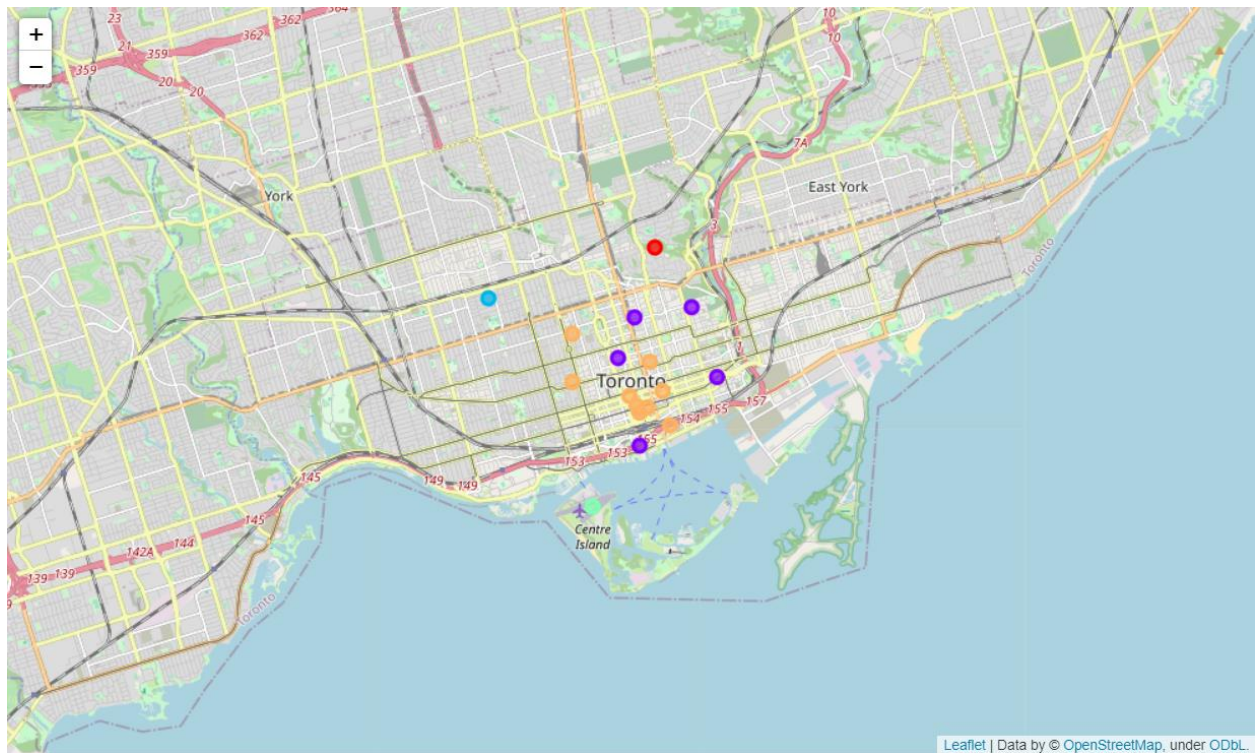

Thus, we will run K-means to cluster the neighborhood into 5 clusters.

Results

Manhattan resulting clusters:

Downtown Toronto resulting clusters:

Manhattan clustered venues:

Neighborhood	Latitude	Longitude	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
Marble Hill	40.876551	-73.910660	1	Gym	Sandwich Place	Yoga Studio	Deli / Bodega	Steakhouse	Seafood Restaurant	Clothing Store	Coffee Shop	Pharmacy	Department Store
Chinatown	40.715618	-73.994279	3	Chinese Restaurant	Hotpot Restaurant	Ice Cream Shop	Boutique	American Restaurant	Spa	Bakery	Sandwich Place	Salon / Barbershop	Asian Restaurant
Washington Heights	40.851903	-73.936900	3	Café	Pizza Place	Bakery	Mobile Phone Shop	Coffee Shop	Spanish Restaurant	New American Restaurant	Park	Deli / Bodega	Wine Shop
Inwood	40.867684	-73.921210	3	Mexican Restaurant	Restaurant	Café	Bakery	Chinese Restaurant	Lounge	Deli / Bodega	Wine Bar	Park	Pizza Place
Hamilton Heights	40.823604	-73.949688	3	Café	Coffee Shop	Mexican Restaurant	Pizza Place	Yoga Studio	Sushi Restaurant	Bakery	Caribbean Restaurant	Chinese Restaurant	Cocktail Bar

Downtown Toronto clustered venues:

Neighborhood	Latitude	Longitude	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
Regent Park, Harbourfront	43.654260	-79.360636	1	Coffee Shop	Pub	Park	Bakery	Theater	Breakfast Spot	Café	Mexican Restaurant	Cosmetics Shop	Performing Arts Venue
Garden District, Ryerson	43.657162	-79.378937	4	Café	Coffee Shop	Clothing Store	Ramen Restaurant	Bookstore	Cosmetics Shop	Theater	Middle Eastern Restaurant	Plaza	Pizza Place
St. James Town	43.651494	-79.375418	4	Café	Coffee Shop	Cosmetics Shop	Park	Beer Bar	Farmers Market	Creperie	Seafood Restaurant	Gastropub	Food Truck
Berczy Park	43.644771	-79.373306	4	Coffee Shop	Bakery	Pharmacy	Cheese Shop	Seafood Restaurant	Farmers Market	Cocktail Bar	Restaurant	Beer Bar	Comfort Food Restaurant
Central Bay Street	43.657952	-79.387383	1	Coffee Shop	Sandwich Place	Café	Italian Restaurant	Burger Joint	Yoga Studio	Comic Shop	Ice Cream Shop	Modern European Restaurant	Salad Place

Manhattan top 10 most common venues:

Venue Category	Count
Coffee Shop	64
Italian Restaurant	56
Pizza Place	44
Park	43
American Restaurant	43
Café	42
Bakery	37
Gym / Fitness Center	36
Gym	35
Mexican Restaurant	33

Downtown Toronto top 10 most common venues:

	Count
Venue Category	
Café	33
Coffee Shop	32
Park	16
Restaurant	15
Bakery	13
Hotel	13
Japanese Restaurant	12
Italian Restaurant	11
Pub	9
Sushi Restaurant	8

Discussion & Conclusion

As we can see from the clustering results and venue counts: Manhattan has more diverse restaurants as well as more various entertainment venues than Downtown Toronto. That means Manhattan might attract more opportunities and food traffic. Moreover, since there are more diverse restaurants, people can be more open to different food cultures. This will also potentially lower the risk of starting new restaurant businesses in Manhattan.