

The Battle of Neighborhoods – Toronto vs NYC

Hareen Subramaniam

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Background/Problem Statement

- New York City and Toronto are two large cities which are well-known and can be quite attractive to immigrants from many countries around the globe.
- Both cities in the past couple of decades have been home to many immigrants around the world. Each of these two cities are unique to their own heritages.
- If one were thinking about migrating to either cities, which would be the better city to live in?
- With a wide range of data and tools to process and analyze them from our data science toolbox, we will be exploring how similar/dissimilar they are to one another with regards to common venues for food, tourist attractions, and more

Data acquisition and cleaning

- Pulling data from previous course labs such as the New York/Manhattan dataset and the Toronto dataset provided by the .csv file
 - Webscrape data from Wikipedia for Toronto and utilize data from Coursera lab for New York
- Remove erroneous data, combine neighborhoods which have same neighborhood coordinates for each borough and remove "Not Assigned" neighborhoods
- Transform data into usable format i.e dataframe using Pandas

Data acquisition and cleaning cont.

- Tables after preprocessing should look like this:

	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	Queen's Park	Ontario Provincial Government	43.662301	-79.389494

Table indicating first five rows of the Toronto dataset.

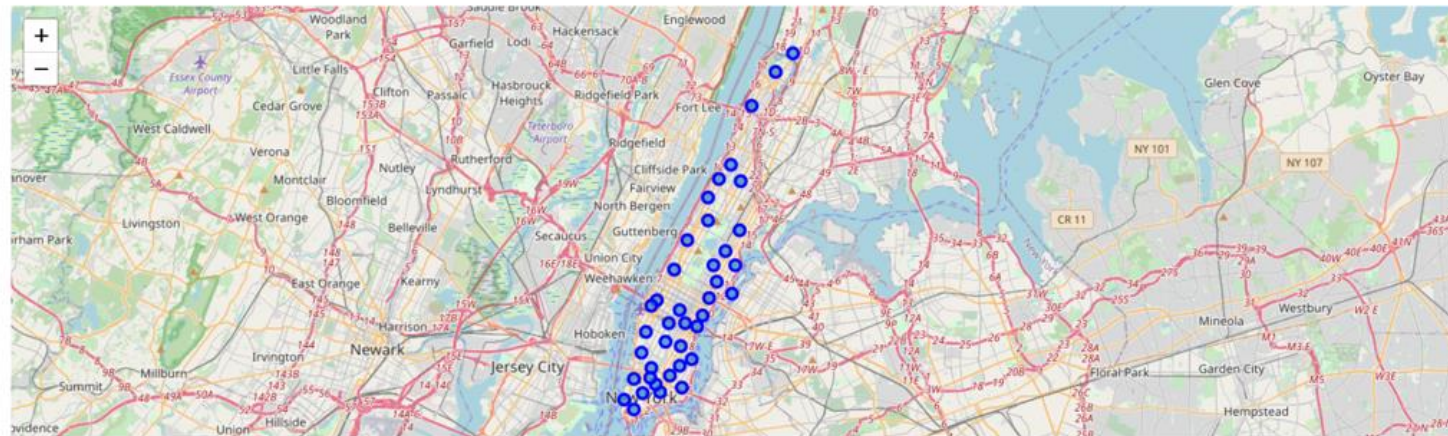
	Borough	Neighborhood	Latitude	Longitude
0	Bronx	Wakefield	40.894705	-73.847201
1	Bronx	Co-op City	40.874294	-73.829939
2	Bronx	Eastchester	40.887556	-73.827806
3	Bronx	Fieldston	40.895437	-73.905643
4	Bronx	Riverdale	40.890834	-73.912585

Table indicating first five rows of the New York dataset.

Visualize coordinates on Map



Map of Downtown Toronto indicating the location of each neighborhood.



Map of Manhattan indicating the location of each neighborhood.

Analysis

- Foursquare API was utilized to pull common venues for each neighborhood
- Using one hot encoding, each neighborhood was assigned a dummy variable within vicinity of each neighborhood and after, top 10 most common venues were tabulated

Clustering

- Algorithm applied: K-means clustering
- In both cities, k-means = 5 (was assigned by trial and error)
- New dataframe was created by grouping common venues, initial dataset (with coordinates, boroughs and neighborhood names) and cluster labels

Clustering - Continued

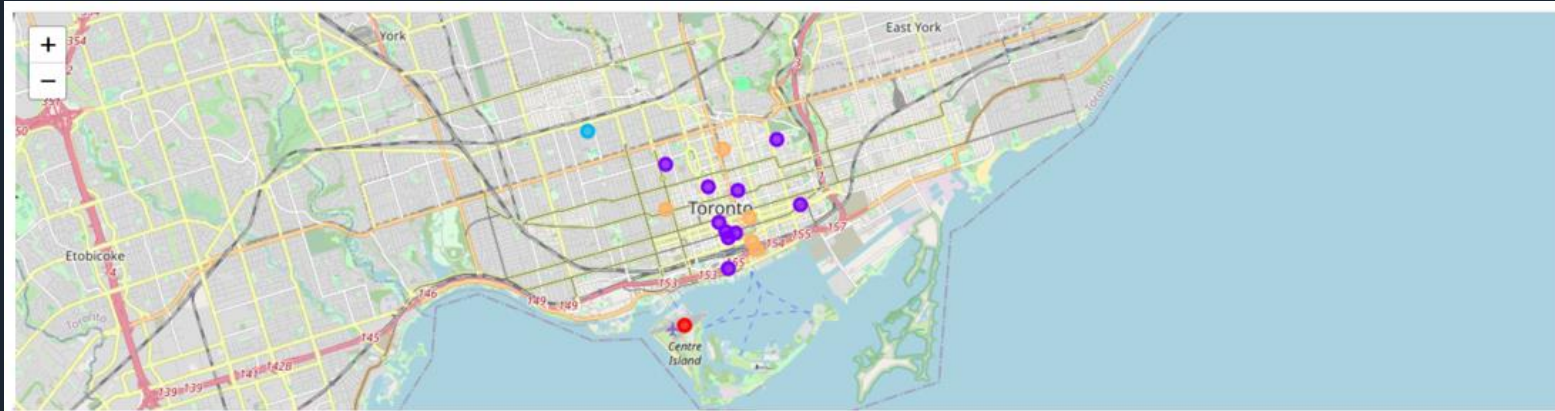
	PostalCode	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636	1	Coffee Shop	Park	Pub	Bakery	Restaurant	Café	Historic Site	Chocolate Shop	Sandwich Place	Beer Store
1	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937	1	Coffee Shop	Clothing Store	Sandwich Place	Café	Japanese Restaurant	Pizza Place	Hotel	Cosmetics Shop	Bank	Middle Eastern Restaurant
2	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418	4	Coffee Shop	Café	Italian Restaurant	Cocktail Bar	Restaurant	Clothing Store	Gastropub	Farmers Market	Diner	Department Store
3	M5E	Downtown Toronto	Berczy Park	43.644771	-79.373306	4	Cocktail Bar	Coffee Shop	Sandwich Place	Bakery	Farmers Market	Beer Bar	Seafood Restaurant	Vegetarian / Vegan Restaurant	Lounge	Bistro
4	M5G	Downtown Toronto	Central Bay Street	43.657952	-79.387383	1	Coffee Shop	Sandwich Place	Sushi Restaurant	Café	Italian Restaurant	Japanese Restaurant	Pizza Place	Burger Joint	Bank	Salad Place

Screenshot of the table indicating the first 5 rows of toronto merged.

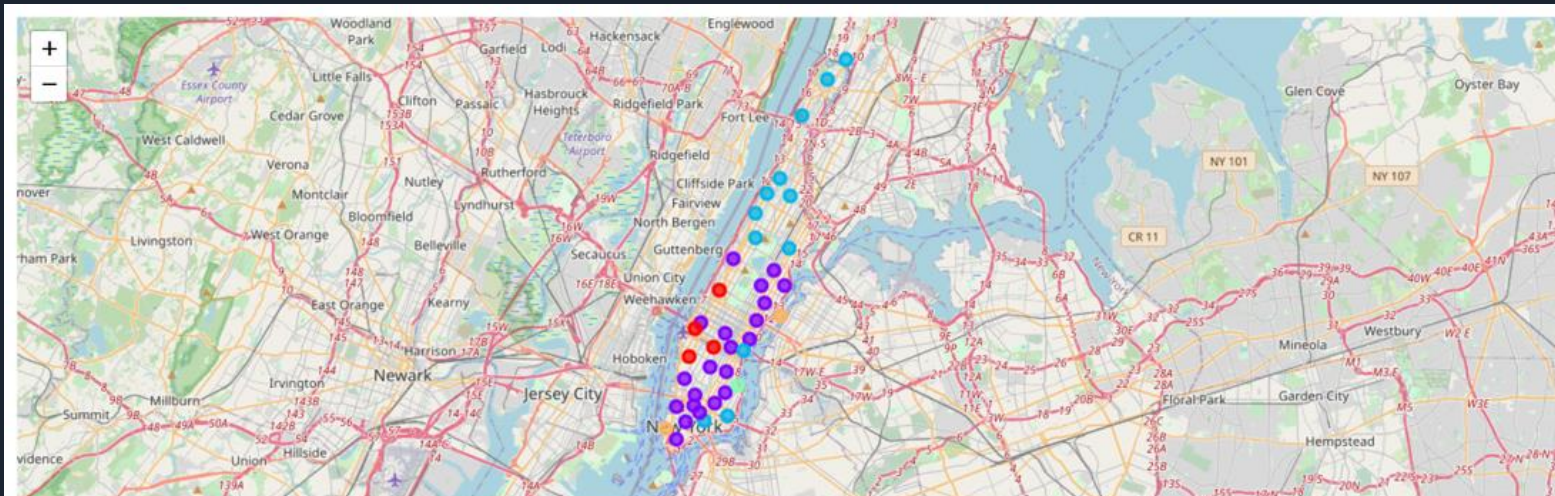
	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Manhattan	Marble Hill	40.876551	-73.910660	2	Sandwich Place	Yoga Studio	Diner	Supplement Shop	Storage Facility	Steakhouse	Clothing Store	Coffee Shop	Seafood Restaurant	Department Store
1	Manhattan	Chinatown	40.715618	-73.994279	2	Bakery	Chinese Restaurant	Cocktail Bar	Dessert Shop	Salon / Barbershop	Noodle House	Ice Cream Shop	American Restaurant	Spa	Optical Shop
2	Manhattan	Washington Heights	40.851903	-73.936900	2	Café	Pizza Place	Grocery Store	Mobile Phone Shop	Bank	Bakery	Chinese Restaurant	Supplement Shop	Tapas Restaurant	Coffee Shop
3	Manhattan	Inwood	40.867684	-73.921210	2	Mexican Restaurant	Lounge	Café	Deli / Bodega	Bakery	Bank	Park	Pizza Place	Chinese Restaurant	Caribbean Restaurant
4	Manhattan	Hamilton Heights	40.823604	-73.949688	2	Pizza Place	Café	Mexican Restaurant	Sandwich Place	Yoga Studio	Juice Bar	Cocktail Bar	Bakery	Latin American Restaurant	Park

Screenshot of the table indicating the first 5 rows of manhattan merged.

Visualization from k-means clustering



Map of Downtown Toronto indicating the locations of each neighborhood cluster.



Map of Manhattan indicating the locations of each neighborhood cluster.

Results from analysis

Downtown Toronto dataset:

Manhattan dataset:

Cluster 1

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
12	Decorators	0	Ascent Services	Ascent Services	Ascent Lounge	Place	Revelo Car	Harford / Wajima	Book or Ferry	Ascent Gate	Ascent Food Court

Cluster 2

	Borough	Cluster Label	1st Store Common Value	2nd Store Common Value	3rd Store Common Value	4th Store Common Value	5th Store Common Value	6th Store Common Value	7th Store Common Value	8th Store Common Value	9th Store Common Value	10th Store Common Value
1	Downsview Township	1	Coffee Shop	Park	Pub	Bakery	Restaurant	Cafe	Home Sls	Chocolate Shop	Sandwich Place	Beer Shop
2	Downsview Township	1	Coffee Shop	Clothing Store	Sandwich Place	Cafe	Japanese Restaurant	Pizza Place	Hotel	Cosmetics Shop	Bank	Mobile Electronics
3	Downsview Township	1	Coffee Shop	Sandwich Place	Snack Restaurant	Cafe	Italian Restaurant	Japanese Restaurant	Pizza Place	Burger Joint	Bank	Snack Place
4	Downsview Township	1	Coffee Shop	Cafe	Sandwich Place	Clothing Store	Gym	Snack Restaurant	Restaurant	Deli - Bodega	Pizza Place	Smully Place
5	Downsview Township	1	Coffee Shop	Cafe	Hotel	Aquarium	Scout Landlord	Pizza Place	Bookhouse	Park	Bank	Brewery
6	Downsview Township	1	Coffee Shop	Cafe	Sandwich Place	Hotel	Asian Restaurant	Pharmacy	Restaurant	Snack Place	Deli - Bodega	Bakery
7	Downsview Township	1	Coffee Shop	Sandwich Place	Cafe	Hotel	Restaurant	Gym	Japanese Restaurant	Asian Restaurant	Bank	Deli - Bodega
8	Downsview Township	1	Cafe	Coffee Shop	Sandwich Place	Pub	Japanese Restaurant	Bar	Bakery	Gym	Confection Food Restaurant	Beer Shop
9	Downsview Township	1	Coffee Shop	Pub	Pizza Place	Restaurant	Italian Restaurant	Cafe	Bakery	Diner	Deli - Bodega	Beer Shop
10	Downsview Township	1	Coffee Shop	Sandwich Place	Cafe	Hotel	Gym	Bank	Japanese Restaurant	Asian Restaurant	Deli - Bodega	Restaurant

Cluster 3

Borough	Cluster Label	1st West Common Venue	2nd West Common Venue	3rd West Common Venue	4th West Common Venue	5th West Common Venue	6th West Common Venue	7th West Common Venue	8th West Common Venue	9th West Common Venue	10th West Common Venue
5	Downsides	J	Grocery Store	Cafe	Park	Restaurant	Nightclub	Coffee Shop	Bath Store	Italian Restaurant	College Arts

Cluster 4

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	1	Park	Playground	Trail	Convention Hall	Discount Store	Event	Downtown Store	Department Store	Dev'l - Buildings	Dance Studio

Cluster 5

	Borough	Cluster Labels	1st West Common Venue	2nd West Common Venue	3rd West Common Venue	4th West Common Venue	5th West Common Venue	6th West Common Venue	7th West Common Venue	8th West Common Venue	9th West Common Venue	10th West Common Venue
2	Downsview Township	4	Coffee Shop	Cafe	Indian Restaurant	Cocktail Bar	Restaurant	Chefing Store	Geddy's	Farmers Market	Beer	Department Store
3	Downsview Township	4	Cocktail Bar	Coffee Shop	Seafood Place	Bakery	Farmers Market	Beer Bar	Seafood Restaurant	Vegetarian / Vegan Restaurant	Lounge	Bar
11	Downsview Township	4	Cafe	Vegetarian / Vegan Restaurant	Coffee Shop	Gaming Cafe	Bar	Bakery	Art & Crafts Store	Burger Joint	Mexican Restaurant	Vietnamese Restaurant
14	Downsview Township S.A.	4	Seafood Place	Coffee Shop	Cocktail Bar	Indian Restaurant	Bar	Bakery	Cafe	Japanese Restaurant	Beer Bar	Hotel
19	Downsview Township	4	Japanese Restaurant	Spa Restaurant	Gas Bar	Restaurant	Coffee Shop	Indian Restaurant	Pub	Fast Food	Mediterranean Restaurant	Spa

Cluster 1

	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
12	Lincoln Square	Concert Hall	Cafe	Place	Theater	Performing Arts Center	Indie Movie Theater	Bakery	Sym. / Fitness Center	Coffee Shop	Hotel
17	Chelsea	Art Gallery	Bakery	Coffee Shop	Italian Restaurant	Theater	Ice Cream Shop	French Restaurant	Bookstore	Spa Restaurant	Cycle Shop
23	Millbrook South	Korean Restaurant	Hotel	Hotel Bar	Bakery	Sym. / Fitness Center	Cafe	Coffee Shop	Spa/Pool	Cosmetics Shop	Dessert Shop
29	Hudson Heights	American Restaurant	Sym. / Fitness Center	Park	Restaurant	Sym. Center	Movie	Italian Restaurant	Coffee Shop	Clothing Store	Music Store

Cluster 2

[illegible]

Cluster 3

[illegible]

Cluster 4

Neighborhood	1st Ward Common Venue	2nd Ward Common Venue	3rd Ward Common Venue	4th Ward Common Venue	5th Ward Common Venue	6th Ward Common Venue	7th Ward Common Venue	8th Ward Common Venue	9th Ward Common Venue	10th Ward Common Venue	11th Ward Common Venue
12. Recommended Team	David in Paris	Eden	Olivia Wolfe	Farhana Waniat	Faustine	Salma	Archer, Marissa	Christal Ray	Colleen Olson	Arnell	

Cluster 5

[illegible]

Toronto Results

- Cluster 1 - common venues were those of airport relation
- Cluster 2 - Common venues are coffee shops, parks, sandwich places over 10 boroughs
- Cluster 3 & 4 - Singular borough (cluster 3 is similar to cluster 2, however, cluster 4, top 3 common venues were park, playground and trail)
- Cluster 5 - 5 boroughs which have diverse set of venues ranging from coffee shops, to cocktail bars and diverse restaurants

Manhattan Results & Discussion

- Cluster 1, 2 & 3 – Both have many neighborhoods within their vicinities such as concert halls, art galleries, diverse restaurants
- Cluster 4 & 5 – Only 1 or 2 neighborhoods
 - Cluster 4 - the common venues are boat/marina related which suggests neighborhood is near to the pier
 - Cluster 5 – common venue is close to the park for both neighborhoods

Observations & Recommendations

- Toronto seems to be a quieter and calmer city compared to New York city. They both have pretty similar venues but it does seem that there are far more tourist attractions in the city of New York than in Toronto.
- For someone who loves the hustle and bustle lifestyle or would love to open a restaurant for the purposes of immigrating, the city of New York would seem more appropriate to be the recommendation to migrate to. Specifically, clusters 2 or 3 as they seem to be the best amongst the five clusters that were analyzed due to the proximities of many common venues to those neighborhoods.
- However, for someone who loves city lifestyle but rather not so "on-the-go", Toronto would be more suitable. Cluster 1 would not be highly recommended as it is close by the airport which results in a lot of traffic noises which could be quite distracting and annoying. The best clusters would be cluster 2 as there are coffee shops, parks, sandwich places or cafes for over 10 boroughs.

Conclusion

- Both cities have their similarities as well as their dissimilarities.
- From one aspect, in terms of common venues, both cities have cafes, parks, coffee shops, gyms, shops, restaurants, etc.
- However, the difference lies were in historical landmarks and tourist attractions.
- From the maps, we can see that the island of Manhattan has a lot of venues for a smaller land area compared to Downtown Toronto.
- *In terms of migration, if migrating to settle down in a quieter neighborhood, Toronto would be a more suitable city to do so. However, for the purposes of migrating in opening a restaurant, museum, etc. both cities are appropriate.*