Analyzing Neighborhoods of Two Cities

Capstone Project – The Battle of the Neighborhoods

Applied Data Science Capstone – IBM/Coursera

By

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Comparing the neighborhoods of City of Toronto and New York City

- Both cities are culturally and economically diverse, they are the financial capitals of their respective countries.
- The standard of living in each city is expensive compared to the rest of the country.
- In terms of population, Toronto is the largest city in Canada while New York City is the largest city in the United States.
- New York City is a Coastal City while Toronto is a Great Lakes City. NYC is built on series of islands while Toronto is completely built on the mainland.
- The way of life in NYC is more fast-paced, intense and feels like it has more “energy”
- NYC is a lot more crowded, especially in the city center, while Toronto is actually a governmental capital.
- This analysis provide useful insights to stakeholders in making informed decisions on their personal or business interest as well as investment ventures.

Data Sources and Description

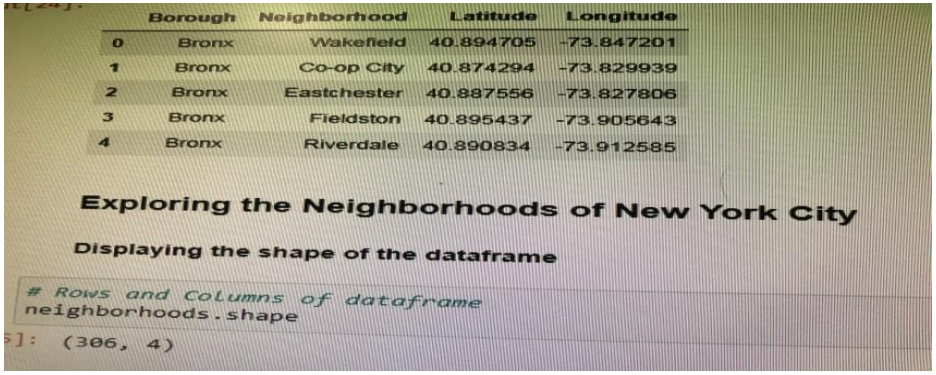
- I acquired Toronto data by scraping this Wikipedia page; https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M
- New York City dataset was provided on the server for this course from https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-DS0701EN-SkillsNetwork/labs/newyork_data.json
- I imported the csv file containing the latitude and longitudes of various postal codes in Canada from https://cocl.us/Geospatial_data
- I used the Geopy library - Geocoder Python package to get the latitude and longitude values of the City of Toronto and New York City.
- Also, I used Foursquare API to explore neighborhoods in Toronto and New York City.
- Data wrangling and explorations were performed
- Cleaned dataframe of Toronto consist of 15 boroughs and 103 neighborhoods, while New York City consist of 5 boroughs and 306 neighborhoods.

Displaying the shape of the dataframes

- Dataframe of City of Toronto

	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
5	M9A	Etobicoke	Islington Avenue	43.667856	-79.532242
6	M1B	Scarborough	Malvern, Rouge	43.806686	-79.194353
7	M3B	North York	Don Mills North	43.745906	-79.352188
8	M4B	East York	Parkview Hill, Woodbine Gardens	43.706397	-79.309937
9	M5B	Downtown Toronto	Garden District, Ryerson	43.657162	-79.378937
10	M6B	North York	Glencairn	43.709577	-79.445073
11	M9B	Etobicoke	West Deane Park, Princess Gardens, Martin Grov...	43.650943	-79.554724
12	M1C	Scarborough	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497
13	M3C	North York	Don Mills South	43.725900	-79.340923
14	M4C	East York	Woodbine Heights	43.695344	-79.318389
15	M5C	Downtown Toronto	St. James Town	43.651494	-79.375418
16	M6C	York	Humewood-Cedarvale	43.693781	-79.428191
17	M9C	Etobicoke	Eringate, Bloordale Gardens, Old Burnhamthorpe...	43.643515	-79.577201
18	M1E	Scarborough	Guildwood, Morningside, West Hill	43.763573	-79.188711
19	M4E	East Toronto	The Beaches	43.676357	-79.293031

- Dataframe of New York City



	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

Exploring the Neighborhoods of New York City

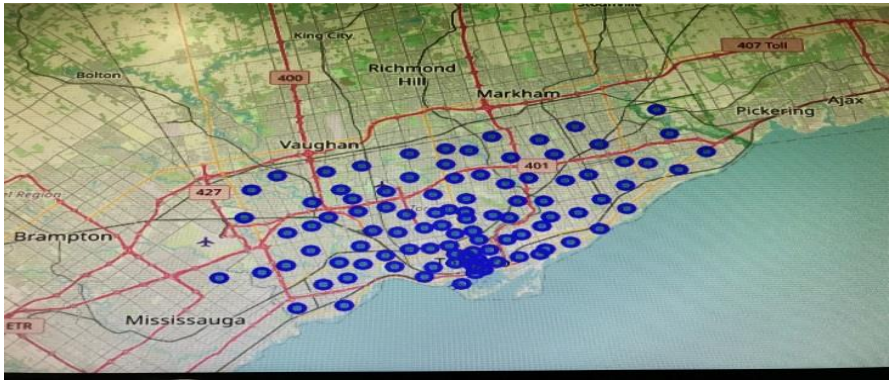
Displaying the shape of the dataframe

```
# Rows and Columns of dataframe
neighborhoods.shape
```

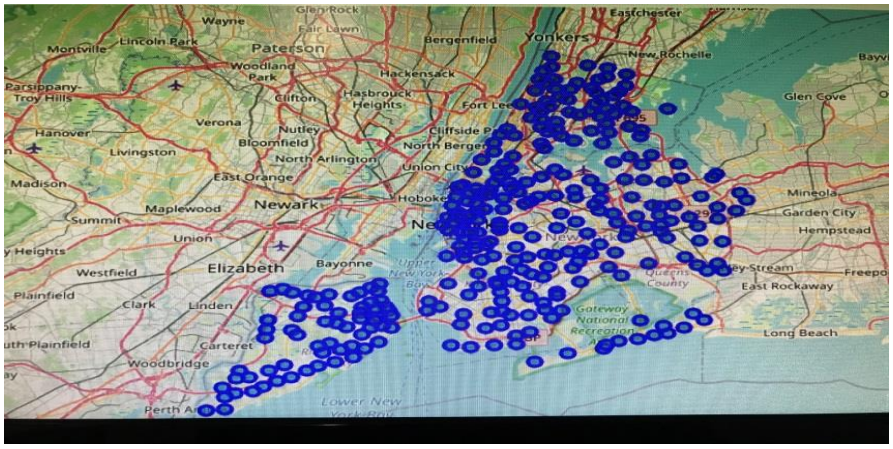
```
]: (306, 4)
```

The Map of Toronto and New York City

- The map of Toronto with neighborhoods superimposed on top.



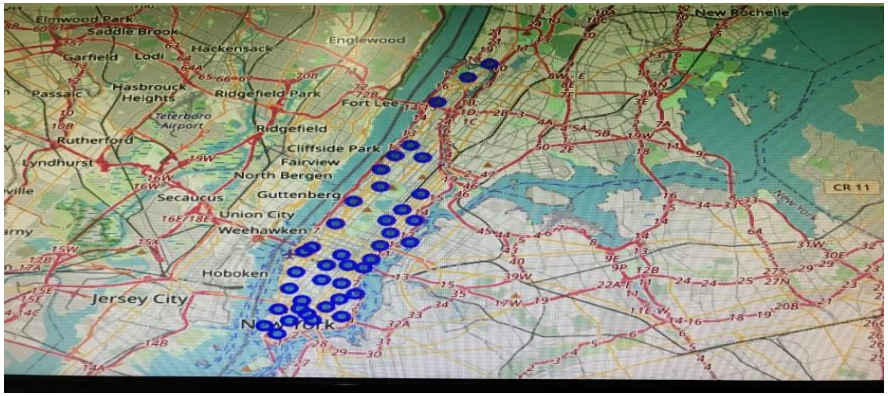
- The map of New York City with neighborhoods superimposed on top.



Exploring the Neighborhoods in Downtown Toronto and Manhattan

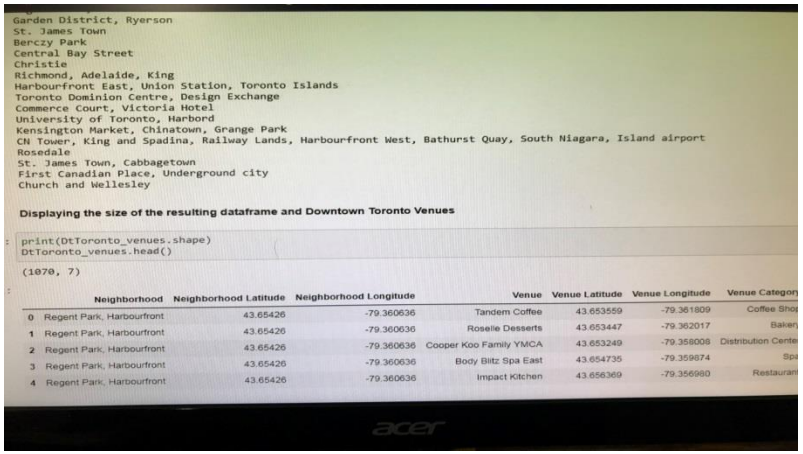
- Exploring only the boroughs of Downtown Toronto to simplify the Toronto map

- Exploring only the boroughs of Manhattan to simplify the New York City map



Foursquare API resulting nearby venues of all the neighborhoods.

- Downtown Toronto venues resulting dataframe of 1070rows x 7columns.



```
Garden District, Ryerson
St. James Town
Berczy Park
Central Bay Street
Christie
Richmond, Adelaide, King
Harbourfront East, Union Station, Toronto Islands
Toronto Dominion Centre, Design Exchange
Commerce Court, Victoria Hotel
University of Toronto, Harbord
Kensington Market, Chinatown, Grange Park
CN Tower, King and Spadina, Railway Lands, Harbourfront West, Bathurst Quay, South Niagara, Island airport
Rosedale
St. James Town, Cabbagetown
First Canadian Place, Underground city
Church and Wellesley
```

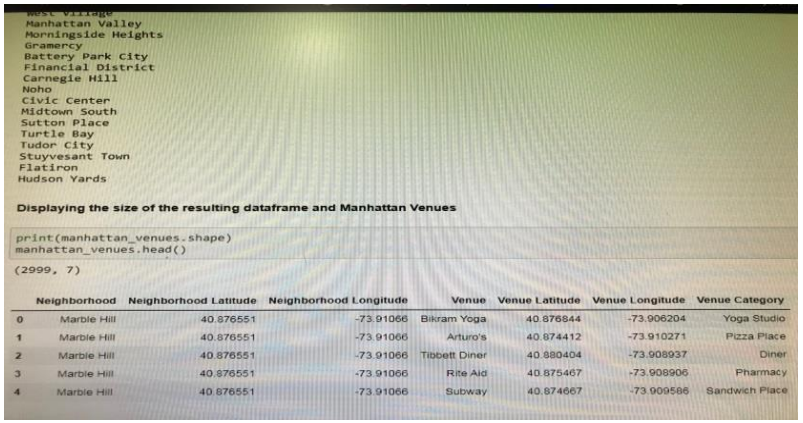
Displaying the size of the resulting dataframe and Downtown Toronto Venues

```
print(DtToronto_venues.shape)
DtToronto_venues.head()
```

```
(1070, 7)
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
1	Regent Park, Harbourfront	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
2	Regent Park, Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	Regent Park, Harbourfront	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa
4	Regent Park, Harbourfront	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant

- Manhattan venues resulting dataframe of 2999rows x 7columns.



```
West Village
Manhattan Valley
Morningside Heights
Gramercy
Battery Park City
Financial District
Carnegie Hill
Noho
Civic Center
Midtown South
Sutton Place
Turtle Bay
Tudor City
Stuyvesant Town
Flatiron
Hudson Yards
```

Displaying the size of the resulting dataframe and Manhattan Venues

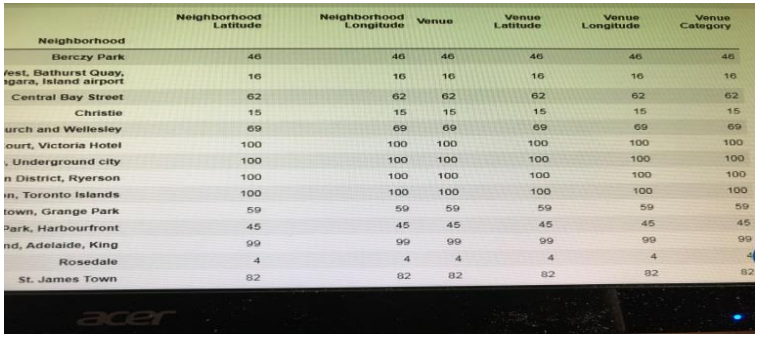
```
print(manhattan_venues.shape)
manhattan_venues.head()
```

```
(2999, 7)
```

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.91066	Bikram Yoga	40.876844	-73.906204	Yoga Studio
1	Marble Hill	40.876551	-73.91066	Arturo's	40.874412	-73.910271	Pizza Place
2	Marble Hill	40.876551	-73.91066	Tibbett Diner	40.880404	-73.908937	Diner
3	Marble Hill	40.876551	-73.91066	Rite Aid	40.875467	-73.908906	Pharmacy
4	Marble Hill	40.876551	-73.91066	Subway	40.874667	-73.909586	Sandwich Place

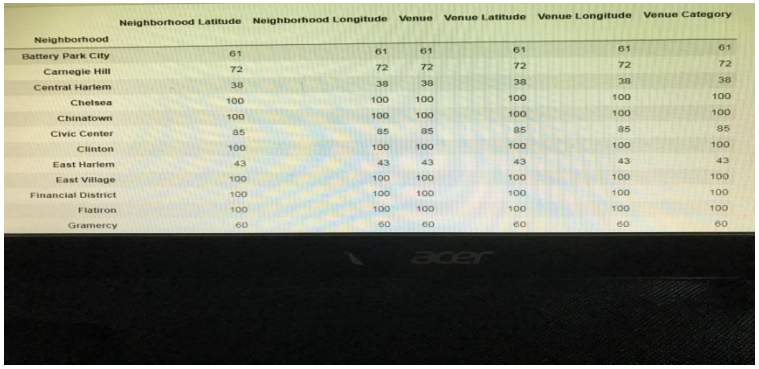
Analysis of Each Neighborhood with resulting unique categories

- Analysis of each neighborhood of Downtown Toronto with the resulting 187 unique categories.



Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Berczy Park	46	46	46	46	46	46
est, Bathurst Quay, gara, Island airport	16	16	16	16	16	16
Central Bay Street	62	62	62	62	62	62
Christie	15	15	15	15	15	15
urch and Wellesley	69	69	69	69	69	69
ourt, Victoria Hotel	100	100	100	100	100	100
, Underground city	100	100	100	100	100	100
n District, Ryerson	100	100	100	100	100	100
n, Toronto Islands	100	100	100	100	100	100
town, Grange Park	59	59	59	59	59	59
Park, Harbourfront	45	45	45	45	45	45
nd, Adelaide, King	99	99	99	99	99	99
Rosedale	4	4	4	4	4	4
St. James Town	82	82	82	82	82	82

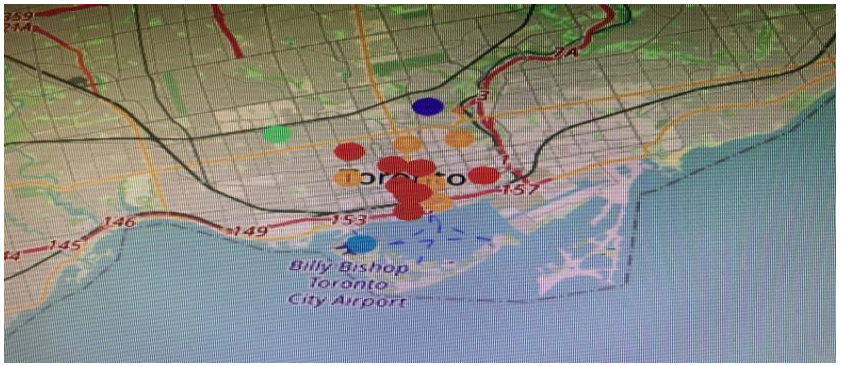
- Analysis of each neighborhood of Manhattan with the resulting 326 unique categories.



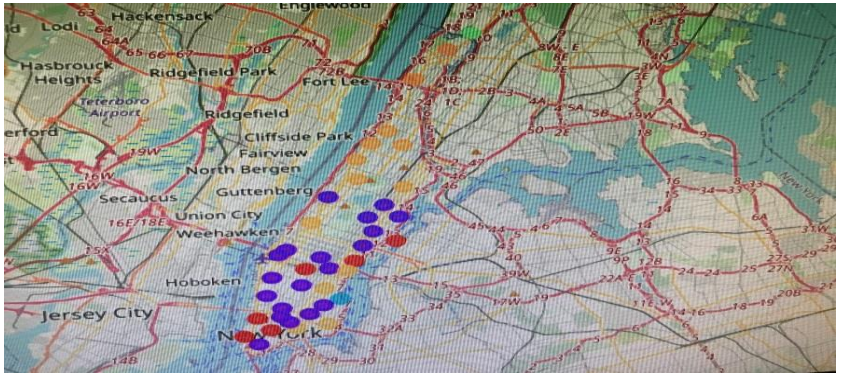
Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Battery Park City	61	61	61	61	61	61
Carnegie Hill	72	72	72	72	72	72
Central Harlem	38	38	38	38	38	38
Chelsea	100	100	100	100	100	100
Chinatown	100	100	100	100	100	100
Civic Center	85	85	85	85	85	85
Clinton	100	100	100	100	100	100
East Harlem	43	43	43	43	43	43
East Village	100	100	100	100	100	100
Financial District	100	100	100	100	100	100
Flatiron	100	100	100	100	100	100
Gramercy	60	60	60	60	60	60

Creating K-Means Clusters of the Neighborhoods.

- Created map of Downtown Toronto to visualize K-Means clusters of the neighborhoods.



- Created map of Manhattan to visualize K-Means clusters of the neighborhoods.



Results and Discussion

Downtown Toronto Clusters:

- DtToronto_Cluster 1 – COFFE SHOP, RESTAURANT, DIVERSE STORES, BANK
  These neighborhoods are represented on the map in Red with Cluster Label 0. They are close to the city center.
- DtToronto_Cluster 2 – NORTHERN RESIDENTIAL
  There is only 1 neighborhood (Rosedale) in this cluster, represented on the map in Purple with Cluster Label 1. It's close to the northern part of the city center. Common venues in this neighborhood has residential feel to it like Park, Playground and so on.
- DtToronto_Cluster 3 – AIRPORT CITY, SEA PORT
  These neighborhoods are represented on the map in Blue with Cluster Label 2. It's close to the southern part of the city center.
- DtToronto_Cluster 4 – WESTERN RESIDENTIAL
  There is only 1 neighborhood (Christie) in this cluster, represented on the map in Green with Cluster Label 3. It's close to the western part of the city center. Common venues in this neighborhood has residential feel to it like Grocery Store, Café, Park, and so on.
- DtToronto_Cluster 5 – COFFE SHOP, RESTAURANT, EATRY
  These neighborhoods are represented on the map in Orange with Cluster Label 4. They are close to the city center.

Manhattan Clusters:

- Manhattan_Cluster 1 – PARK, RESTAURANT, COFFE SHOP, DIVERSE STORES,
  These neighborhoods are represented on the map in Red with Cluster Label 0. They spread out on the center-south to the city center.
- Manhattan_Cluster 2 – COFFE SHOP, RESTAURANT, EATRY
  These neighborhoods are represented on the map in Purple with Cluster Label 1. They spread out from the south to the city center.
- Manhattan_Cluster 3 – PARK, PORT, STORES
  There is only 1 neighborhood (Stuyvesant Town) in this cluster, represented on the map in Blue with Cluster Label 2. It's close to the southern part of the city center.
- Manhattan_Cluster 4 – SANDWICH PLACE, STORES, EATRY
  There is only 1 neighborhood (Marble Hill) in this cluster, represented on the map in Green with Cluster Label 3. It's situated on the northern part of the city center.
- Manhattan_Cluster 5 – RESTAURANT, EATRY, DIVERSE STORES
  These neighborhoods are represented on the map in Orange with Cluster Label 4. They spread out from north to south of the city center.

Conclusion

- There are similarities and dissimilarities between the neighborhoods of City of Toronto and New York City.
- There are many diverse common venues in all the neighborhoods.
- New York City cover larger geographical locations, with location data widely spread out more than in the City of Toronto.
- Residential areas are easily identified in Toronto more than in New York City where different venue categories are diversely spread out among residential areas.
- Stakeholders who want to make decisions about work-lifestyle-balance would definitely benefit from this location data as well as those who are making decisions about business venture and investment.
- Many factors that could be considered are based on different views, ideas and opinions of individual and to what interest are being considered, these can be for further studies.