# Battle of neighbourhoods WEEK 2 REPORT

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## PROBLEM and BACKGROUND

In this exercise we compare New-Your city and Toronto as tourist destinations - to get a view of their boroughs and neighbourhoods, and marked on map their key areas (as mentioned below) with respect to those neighbourhoods and boroughs
**Toronto - Downtown Toronto**
**New York - Manhattan**

The analysis will also then compare what are the hotspots for both Downtown Toronto and Manhattan which could help tourist to locate the most popular places in each neighbourhood by virtue of rankings. This will help them plan their travels to both these places accordingly and change their travel plan basis which city and area they are in. This will also be indicative of what are the main places/attractions to visit in a particular area of a city for the tourists such as cafes, restaurants, parks etc

REASON - Tourists most often visits those countries who are rich in heritage. Every city is unique in their own way and has something different to offer. and based on available information, and the comparison (the part of the information) between the two cities tourists can choose to plan their travel or visit a particular place according to their choice.

## Data sources and cleaning

For this problem, we will get the services of Foursquare API to explore the data of two cities, in terms of their neighborhoods. The data also include the information about the places around each neighborhood like restaurants, hotels, coffee shops, parks, theaters, art galleries, museums and many more. We selected one Borough from each city to analyze their neighborhoods. Manhattan from New York and Downtown Toronto from Toronto. These objects will be given priority on the basis of foot traffic (activity) in their respective neighborhoods which will help to locate the tourist's areas and hubs and helps us analyse the similarity or difference between two cities from tourist's perspective

## Methodology
We will extract the data and analyse/visualise it for both the areas using the same method to arrive at information about each neighbourhood and its hotspot so as to compare the cities

<u>**Exploration**</u>

the Downtown Toronto data is extracted and cleaned using the data from wikipedia page +.csv file locally stored on system and imported (source - kaggle) and verified using Foursquare API to get the coordinates for neighbourhood exploration

Manhattan data for New York Coty is extracted from .csv file locally stored on system and imported (source - kaggle) which is again verified and explored for coordinates using Foursquare AP

<u>**PROCESSING DATA**</u>

**Toronto (downtown toronto) Data extraction, cleaning and sorting**

We begin be extracting data from the wikipedia source and merging it with .csv file (from kaggle) to build our dataframe (screenshot – first 5 rows)

Narrowing down data to Downtown Toronto and adding the coordinates as:

| | Borough_x | Neighbourhood | Neighborhood_x | Unnamed: 0 | Borough_y | Neighborhood_y | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|
| 0 | Downtown Toronto | Regent Park, Harbourfront | NaN | 2 | Downtown Toronto | Harbourfront,Regent Park | 43.654260 | -79.360636 |
| 1 | Downtown Toronto | Queen's Park, Ontario Provincial Government | Queen's Park | 4 | Queen's Park | Queen's Park | 43.662301 | -79.389494 |
| 2 | Downtown Toronto | Garden District, Ryerson | NaN | 9 | Downtown Toronto | Ryerson,Garden District | 43.657162 | -79.378937 |
| 3 | Downtown Toronto | St. James Town | NaN | 15 | Downtown Toronto | St. James Town | 43.651494 | -79.375418 |
| 4 | Downtown Toronto | Berczy Park | NaN | 20 | Downtown Toronto | Berczy Park | 43.644771 | -79.373306 |

Similarily we do the same for New York (Manhattan)

**New York (Manhattan) Data extraction, cleaning and sorting**

| | Unnamed: 0 | index_right | Location Type | Incident Zip | City | Borough | Latitude | Longitude | num_calls | neighborhoo |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 122 | Club/Bar/Restaurant | 10308.0 | STATEN ISLAND | STATEN ISLAND | 40.544096 | -74.141155 | 40.0 | Great Kill |
| 1 | 1 | 122 | Club/Bar/Restaurant | 10308.0 | STATEN ISLAND | STATEN ISLAND | 40.544209 | -74.141040 | 21.0 | Great Kill |
| 2 | 2 | 122 | Club/Bar/Restaurant | 10308.0 | STATEN ISLAND | STATEN ISLAND | 40.544528 | -74.140673 | 21.0 | Great Kill |
| 3 | 3 | 122 | Club/Bar/Restaurant | 10308.0 | STATEN ISLAND | STATEN ISLAND | 40.544308 | -74.140907 | 34.0 | Great Kill |
| 4 | 4 | 126 | Club/Bar/Restaurant | 10012.0 | NEW YORK | MANHATTAN | 40.729793 | -73.998842 | 18.0 | Greenwich Villag |

And narrowing down to Manhattan:

| | Unnamed: 0 | index_right | Location Type | Incident Zip | City | Borough | Latitude | Longitude | num_calls | neighborhood |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 | 126 | Club/Bar/Restaurant | 10012.0 | NEW YORK | MANHATTAN | 40.729793 | -73.998842 | 18.0 | Greenwich Village |
| 1 | 5 | 126 | Club/Bar/Restaurant | 10012.0 | NEW YORK | MANHATTAN | 40.727076 | -74.000184 | 40.0 | Greenwich Village |
| 2 | 6 | 126 | Club/Bar/Restaurant | 10012.0 | NEW YORK | MANHATTAN | 40.729519 | -73.999812 | 120.0 | Greenwich Village |
| 3 | 7 | 126 | Club/Bar/Restaurant | 10012.0 | NEW YORK | MANHATTAN | 40.729750 | -73.999614 | 41.0 | Greenwich Village |
| 4 | 8 | 126 | Club/Bar/Restaurant | 10012.0 | NEW YORK | MANHATTAN | 40.729338 | -74.001032 | 99.0 | Greenwich Village |

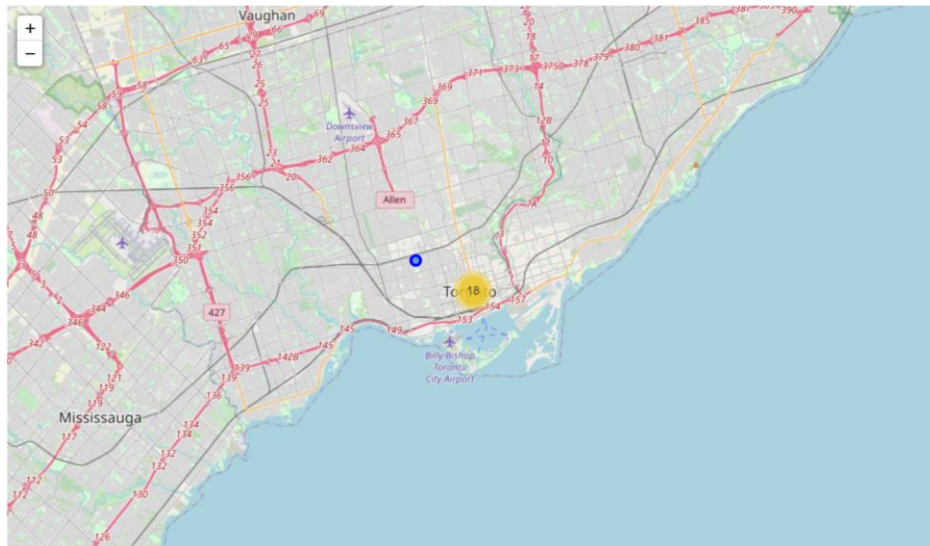**Mapping Toronto and Manahattan Neighbourhoods**

to get a good idea of the both the cities and their neighbourhoods we visually map them based on their boroughs- Downtown Toronto and Manhattan

Visualizing the selected borough neighborhoods so that we can get an idea or confirmation regarding the coordinates of that Borough.
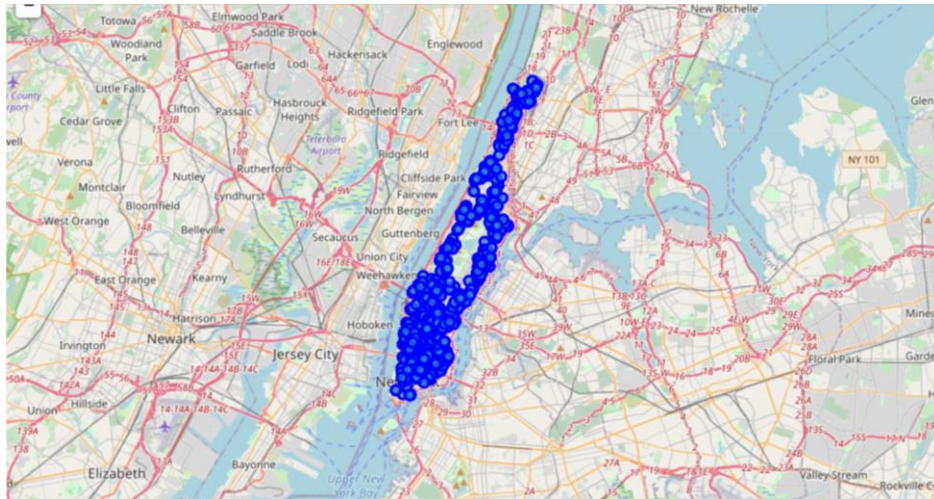
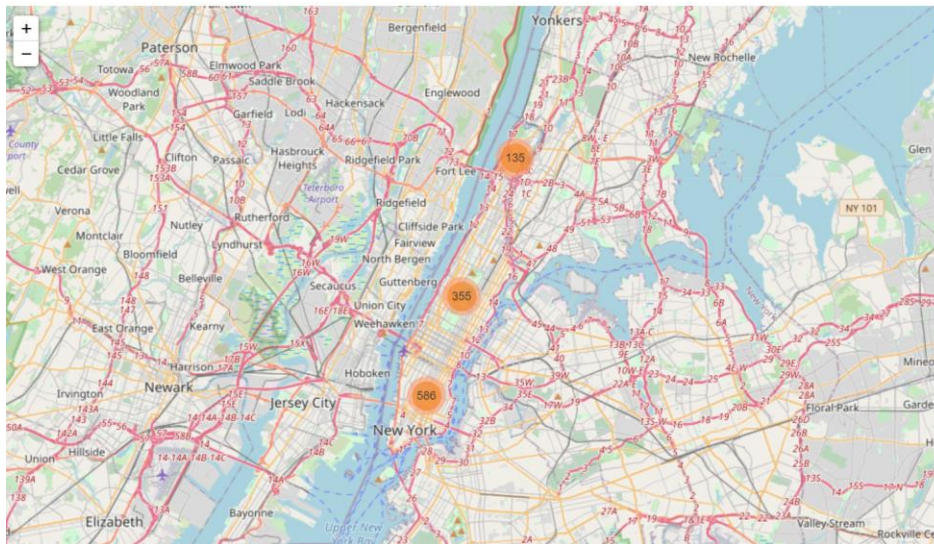Map of Toronto neighbourhoods



Neighbourhood cluster for the same



Repeating the same map visualization for Manhattan – New York

And building neighbourhood clusters for Manhattan



The maps are built using the coordinates data – latitudes and longitudes which is then verified using Foursquare API

**ANALYSIS**

We calculate mean of the frequency of occurrence of each category (using one shot encoding) and picked top ten venues on that basis for each neighbourhood. It means the top venues are showing the foot traffic or the more visited places.

**DOWNTOWN TORONTO – Analysis**

We extract the venues/tourist attraction hotspots using the footfall frequency for the below mentioned neighbourhoods

- Regent Park, Harbourfront
- Queen's Park, Ontario Provincial Government

- 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
- Stn A PO Boxes
- St. James Town, Cabbagetown
- First Canadian Place, Underground city
- Church and Wellesley

The venue analysis gives me the following information in a ranking format as below:

| | 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 | Beer Bar | Farmers Market | Park | Seafood Restaurant | Museum | Cocktail Bar | Coffee Shop | Concert Hall | Liquor Store | Bistro |
| 1 | CN Tower, King and Spadina, Railway Lands, Har... | Airport Lounge | Airport Service | Airport Terminal | Sculpture Garden | Harbor / Marina | Boat or Ferry | Coffee Shop | Bar | Rental Car Location | Boutique |
| 2 | Central Bay Street | Coffee Shop | Gastropub | Spa | Modern European Restaurant | Miscellaneous Shop | Café | Middle Eastern Restaurant | Park | Bubble Tea Shop | Ramen Restaurant |
| 3 | Christie | Grocery Store | Café | Park | Italian Restaurant | Coffee Shop | Candy Store | Restaurant | Baby Store | Athletics & Sports | Nightclub |
| 4 | Church and Wellesley | Park | Bubble Tea Shop | Ramen Restaurant | Salon / Barbershop | Juice Bar | Creperie | Dance Studio | Bookstore | Diner | Breakfast Spot |
| 5 | Commerce Court, Victoria Hotel | Café | Gastropub | Coffee Shop | Restaurant | Museum | Bakery | Gym / Fitness Center | Sandwich Place | American Restaurant | Gluten-free Restaurant |
| 6 | First Canadian Place, Underground city | Café | Restaurant | Coffee Shop | Gastropub | Steakhouse | Pizza Place | Pub | Seafood Restaurant | Speakeasy | Asian Restaurant |
| 7 | Garden District, Ryerson | Café | Art Gallery | Electronics Store | Ramen Restaurant | Sandwich Place | Music Venue | College Rec Center | Diner | Mexican Restaurant | Plaza |
| 8 | Harbourfront East, Union Station, Toronto Islands | Park | Hotel | Plaza | New American Restaurant | Lake | Salad Place | Japanese Restaurant | Deli / Bodega | Skating Rink | Ice Cream Shop |
| 9 | Kensington Market, Chinatown, Grange Park | Café | Wine Bar | Cocktail Bar | Vietnamese Restaurant | Gourmet Shop | Fish Market | Farmers Market | Dessert Shop | Coffee Shop | Cheese Shop |
| 10 | Queen's Park, Ontario Provincial Government | Sushi Restaurant | Coffee Shop | Yoga Studio | Beer Bar | Fried Chicken Joint | Fast Food Restaurant | Hobby Shop | Distribution Center | Discount Store | Italian Restaurant |
| 11 | Regent Park, Harbourfront | Coffee Shop | Park | Breakfast Spot | Performing Arts Venue | Farmers Market | Pub | Restaurant | Bakery | Spa | Distribution Center |
| 12 | Richmond, Adelaide, King | Coffee Shop | Lounge | Monument / Landmark | Seafood Restaurant | Asian Restaurant | Smoke Shop | Speakeasy | Concert Hall | Steakhouse | Sushi Restaurant |
| 13 | Rosedale | Park | Playground | Trail | Comfort Food Restaurant | Dance Studio | Creperie | Cosmetics Shop | Concert Hall | Comic Shop | Wine Bar |
| 14 | St. James Town | Gastropub | Coffee Shop | Café | Hotel | Middle Eastern Restaurant | Poke Place | Cosmetics Shop | Creperie | Restaurant | Italian Restaurant |

We repeat the same process for Manhattan data

**New York - MANHATTAN – Analysis**

The analysis gives us the information for Manhattan tourist places as below:

| | 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 | Central Park | Clothing Store | Playground | Italian Restaurant | Sandwich Place | Dog Run | Park | Outdoor Sculpture | Steakhouse | American Restaurant | Hotel |
| 1 | Chelsea | Nightclub | Hotel | Coffee Shop | Italian Restaurant | Gym / Fitness Center | Café | Cocktail Bar | Juice Bar | Theater | Yoga Studio |
| 2 | Chinatown | Chinese Restaurant | Bar | American Restaurant | Bakery | Cocktail Bar | Noodle House | Sandwich Place | Boutique | Dumpling Restaurant | Dim Sum Restaurant |
| 3 | East Harlem | Mexican Restaurant | Pizza Place | Bakery | Taco Place | Deli / Bodega | Café | Cosmetics Shop | Thai Restaurant | Donut Shop | Italian Restaurant |
| 4 | East Village | Bar | Coffee Shop | Cocktail Bar | Italian Restaurant | Pizza Place | Vietnamese Restaurant | Japanese Restaurant | Mexican Restaurant | Vegetarian / Vegan Restaurant | Ice Cream Shop |
| 5 | Financial District | Pizza Place | Coffee Shop | Pet Store | Mexican Restaurant | Sandwich Place | Café | Playground | Hotel | Burger Joint | Greek Restaurant |
| 6 | Flatiron District | Spa | Japanese Restaurant | Furniture / Home Store | Café | Gym / Fitness Center | Cycle Studio | Coffee Shop | Korean Restaurant | Italian Restaurant | American Restaurant |
| 7 | Gramercy | American Restaurant | Italian Restaurant | Bar | Café | Food Truck | Pizza Place | Pub | Wine Bar | New American Restaurant | Cheese Shop |
| 8 | Greenwich Village | Italian Restaurant | Indian Restaurant | Bar | Chinese Restaurant | Vietnamese Restaurant | Coffee Shop | Wine Bar | Sushi Restaurant | Café | Bubble Tea Shop |
| 9 | Harlem | African Restaurant | Mexican Restaurant | Deli / Bodega | Cosmetics Shop | Bar | Seafood Restaurant | Southern / Soul Food Restaurant | Coffee Shop | Grocery Store | Sandwich Place |
| 10 | Hell's Kitchen | Bar | Mexican Restaurant | Thai Restaurant | Pizza Place | Theater | Wine Bar | Italian Restaurant | Coffee Shop | Hotel | Ramen Restaurant |
| 11 | Inwood | Wine Bar | Spanish Restaurant | Restaurant | Mexican Restaurant | Bank | Latin American Restaurant | Bar | Bakery | Pizza Place | Cocktail Bar |
| 12 | Kips Bay | Bar | Thai Restaurant | Sushi Restaurant | Cocktail Bar | Bakery | Ice Cream Shop | Pub | Italian Restaurant | Taco Place | Sandwich Place |
| 13 | Little Italy | Italian Restaurant | Bakery | Tea Room | Gourmet Shop | Chinese Restaurant | Sandwich Place | Coffee Shop | Wine Bar | Vietnamese Restaurant | Café |
| 14 | Lower East Side | Coffee Shop | Cocktail Bar | Bar | Asian Restaurant | Bakery | Pizza Place | Boutique | Rock Club | Sandwich Place | Mexican Restaurant |
| 15 | Midtown | Italian Restaurant | Bakery | Hotel | Indian Restaurant | Coffee Shop | Ramen Restaurant | American Restaurant | Pizza Place | Sandwich Place | French Restaurant |
| 16 | Morningside Heights | Chinese Restaurant | Coffee Shop | American Restaurant | Mexican Restaurant | Bookstore | Bar | Seafood Restaurant | Italian Restaurant | Liquor Store | Juice Bar |

**Result**
After clustering the data of the respective neighbourhoods, both cities (Boroughs) venues
which can be explored and attract the tourists are much similar in features like food places,
clubs, museums, parks etc

**Observations and Recommendation**
The number of options to explore as tourist attractions are more in Manhattan than in
Downtown Toronto
Additionally Toronto has highest footfall in cafes as the first choice venue which shows the local
and tourist behaviour in downtown toronto in comparison to Manhattan where people mostly
visit restaurants and bars for first choice in most of neighbourhoods

**CONCLUSION**
The downtown Toronto and Manhattan neighbourhoods have a lot of similar venues but vary in
size and number of places to explore

**Future Direction**

the Analysis can be expanding to analyse different clusters in these neighbourhoods based on the venues and can be then mapped to determine the discriminating venue categories that distinguish each cluster.

Furthermore the analysis can be expanded to other boroughs and neighbourhoods.