

# Comparative Analysis of two Financial districts Neighborhood (Downtown Toronto/Canada and Manhattan/USA)

Richard BITIE

April 15, 2019

## 1. Introduction: The Idea

In This project i will make a comparative analysis between two Financial Districts area in the world. The key question will be how are their Neighborhood are structured and diversified:

- **What Level of diversity?** Through inertia of clusters and number of possible clusters we will analyse the 2 places Neighborhood.
- **What structure?** Through the characteristics of the cluster we could say how the Neighborhood is structured?

On a final i will discuss the result and open perspectives for other further analysis.

I choose Downtown Toronto(Canada) and Manhattan (USA) for the study.

## 2. Data

### a. Sources

For This study we will use New York and Toronto data, combine to Foursquare API data:

- **New York Data** : We will essentially need a dataset that contains boroughs and the neighborhoods that exist in each borough as well as the latitude and longitude coordinates of each neighborhood. These information are in a dataset provided as json file. From this file will make a pandas dataframe and use it for the study.
- **Toronto Data** : We will need the same kind of informations as for New York city. For that purpose we will scrap the information from the web, more precisely from Wikipedia. We will transform this data into a Pandas dataframe and use it for the study.

- **Geospatial Coordinate** : The data from wikipedia have not geo information. We will use a file provide for the course. In this file we have some geo information that we are going to take to complete wikipedia informations through a join operation.
- **Foursquare** : For square API will provide the venues around the neighborhoods we will provide. The will merge those informations the NewYork and Toronto data for the study.

## b. Data Cleaning and feature selection

For this study i clean the data as follow :

- Remove data with null Borough : Toronto dataset had null Borough and i choose to elinate the row rows as titi s no sens to use them. I could locate anything.
- Replace Null Neighborhood with the Borough : I assume that if a Bourough have no neighbourhood mentionned it is his own neighbord.
- Group data by PostalCode and Borough : in order to avoid any duplication i fi rst grouped Toronto data by postal code and Borough . I after make a join ge odata t find the coordinates and finally remove postal codes to have the sam e structure of dataframe for the two Finacial District.
- I choose to rename some venues categories to group them in more big comm on category. The objective was to give a more global sens to the place in the analysis as here i was analysising all venues.

For feature selection, i choose to focus on the 5th most common venue catego ries by Borough to focus on the main caracteristics of Boroughs.

## 3. Methodology

For this study K-Mean clustering will be our main tool and we will focus on the inertia of clusters and optimal clusters number to analyse the diversity.

I choose to focus on the 5th most common venue categories by Borough to focus on the main caracteristics of Boroughs. I will do them same process separately for each dataset financial district data.

To analyse the result i will use the intra-cluster inertia. I will calculate and plot them to determine a "elbow" point. I will then choose optimal cluster number for every financial district data. I will finally for each cluster identify the main caracterics that best describe

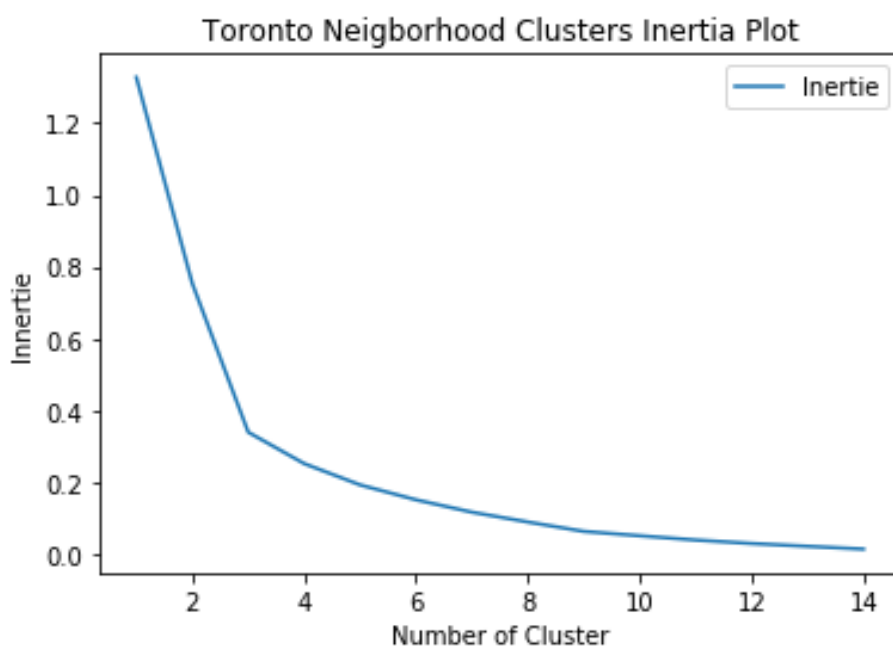
it. All this will help me to see what are the dynamics around the 2 places. I will try find venues that exist in Manhattan but not in Toronto Downtown and vice versa.

My analysis will also use the story of some place to justify why they are so.

## 4. Analyse

For this study I first choose to try to define a proper cluster size for each area and I got that results :

### a. Clusters size



In Downtown Toronto Clustering the Elbow is more evident at glance than in Manhattan Clustering. I choose 3 for Toronto and 8 for Manhattan. Why not 5 for Manhattan? Because at 8 the inertia is close to Toronto Downtown. This is a choice to be approximatively on the same level of comparison.

Here we can clearly tell Manhattan Neighborhood is more diverse than Downtown Toronto. This maybe mean you have to go to some Specific Boroughs if you want to easily find some venues.

Thge clusters :

## **b. Result and discussion**

In this cluster analysis of Downtown Toronto and Manhattan Neighborhood we have seen that Manhattan is more diverse than Downtown Toronto in the structure of their Neighborhood. Approximativement the same inertia Manhattan has more cluster than Downtown Toronto. In addition the elbow point for Downtown Toronto is easier to identify than for Manhathan. We choose 3 for Manhattan and 8 for Downtown Toronto.

Globally these two Financial Districts Neighborhood are structured as follow:

In Downtown Toronton the 3 clusters are airport area located in an island with airport comodities, quay and Museums; Rosedale an upscale Borough with park playground and Restaurant;and the others (Mainly Restaurant and shops).

In Manhattan the 8 clusters are have most thing in common than Downtown Toronton clusters. We have a first subcluster where venues are mosly Shops (1,2,4,8), a second subcluster where venues are mosly fifty fifty Restaurant and Shops (3,6,7) and a third subcluster where the main venue category are Bars:

**Subcuster 1:** In the cluster 1 we have Soho and Marble Hill. In reality Soho refers to art and fashion and can see that in venues around. marbel Hill is the only Neighborhood of Manhattan that is not and Island. finally theseare two atypic places where u find venue that are not common + shops and restaurants.

In cluster 2 we only have shops Restaurant and Bar mostly. The Restaurant are mostly Asian.

In cluster 4 we only have plus shops and Restaurant Hotel, Parks, Schools, Coffee Shops. It is most diverse than the 2nd in term of venues category.

In cluster 8 is also diverse than the 2nd but with sport places, Park, Theater. It is where we found mostly sport place.

**Subcuster 2:** In cluster 3 we only mostly Asian/European Restaurant and Other food places/no one specialy very présent. There are also shops and Bars.

In cluster 6 we only mostly latin Restaurant.

In cluster 7 we only mostly Asian Restaurant and Shop mostly. Plus we have some European restaurant.

### **Subcluster 3:**

This subcluster has only one Borough (Stuyvesant town in the east side) the main venue category are Bars boats.

Finally Manhattan clustering was the most ambiguous as there is not real differences between clusters out of the order of the venue category counts. Sometime non common venues make the difference. My study is an overview and it remains global. It is possible to study some specificities like focusing on food places with some additional information on their size, their menus... There was also not real information about local food restaurant. Above all it was a good exercise to have an idea of the two places.

Clearly Manhattan has most venues than Downtown Toronto and that maybe explains its diversity. The number of venue categories you can find in Manhattan neighborhood is also higher than that you can find in Downtown Toronto but not in Manhattan neighborhood. This fact explains also the number of clusters in Manhattan compared to Downtown Toronto.

## **5. Conclusion**

The objective of this study was to compare two financial districts in the world and we chose Toronto and Manhattan. They appear very different in terms of structure as Manhattan is more diverse. The most venues of these places were shops, restaurants, hotels... and it is very typical of business areas. We also found some place near the water with boats... Something interesting was also that we found an airport in Downtown Toronto neighborhood but not in Manhattan Neighborhood.

## 6. Annexe :

### a. List of venues that are in Manhattan but not in Downtown Toronto

Arepa Restaurant	Basketball Court	Music School
Argentinian Restaurant	Big Box Store	Music Store
Austrian Restaurant	Bike Rental / Bike Share	Nail Salon
Auto Workshop	Bike Shop	Newsstand
Baseball Field	Bike Trail	Non-Profit
Beer Garden	Boutique	Outdoor Sculpture
Board Shop	Bridal Shop	Outdoors & Recreation
Boxing Gym	Bridge	Paella Restaurant
Bus Stop	Bus Line	Pakistani Restaurant
Business Service	Bus Station	Pet Café
Caucasian Restaurant	Cafeteria	Pet Service
Club House	Cambodian Restaurant	Piano Bar
College Cafeteria	Candy Store	Pilates Studio
Cultural Center	Circus	Pool
Cupcake Shop	Climbing Gym	Public Art
Czech Restaurant	College Academic Building	Rental Car Location
Design Studio	College Bookstore	Resort
Eastern European Restaurant	College Theater	Rest Area
English Restaurant	Comedy Club	River
Exhibit	Community Center	Rock Climbing Spot
Frozen Yogurt Shop	Cuban Restaurant	Roof Deck
General College & University	Cycle Studio	Russian Restaurant
Golf Course	Daycare	School
High School	Dive Bar	Shanghai Restaurant
Himalayan Restaurant	Drugstore	Shipping Store
Hotpot Restaurant	Dry Cleaner	Soba Restaurant
Indie Movie Theater	Duty-free Shop	Social Club
Intersection	Flea Market	South American Restaurant
Library	Flower Shop	South Indian Restaurant
Memorial Site	Garden	Spanish Restaurant
Moroccan Restaurant	Garden Center	Street Art
North Indian Restaurant	Gas Station	Supplement Shop
Other Nightlife	Gymnastics Gym	Swiss Restaurant
Paper / Office Supplies Store	Hardware Store	Tapas Restaurant
Peruvian Restaurant	Hawaiian Restaurant	Tattoo Parlor
Photography Studio	Heliport	Tech Startup
Pie Shop	Herbs & Spices Store	Tennis Court
Residential Building (Apartment / Condo)	Hot Dog Joint	Theme Park Ride / Attraction
Rock Club	Indie Theater	Tiki Bar
Skate Park	Israeli Restaurant	Track
Southern / Soul Food Restaurant	Japanese Curry Restaurant	Tree
Spiritual Center	Jewish Restaurant	Turkish Restaurant
Sports Club	Karaoke Bar	Udon Restaurant
Szechuan Restaurant	Kids Store	Veterinarian
Tourist Information Center	Kosher Restaurant	Video Store
Used Bookstore	Laundry Service	Volleyball Court
Venezuelan Restaurant	Leather Goods Store	Watch Shop
Womens Store	Lebanese Restaurant	Waterfront
African Restaurant	Malay Restaurant	Whisky Bar
Arcade	Medical Center	Wine Shop
Auditorium	Mini Golf	Tennis Stadium
Australian Restaurant	Mobile Phone Shop	

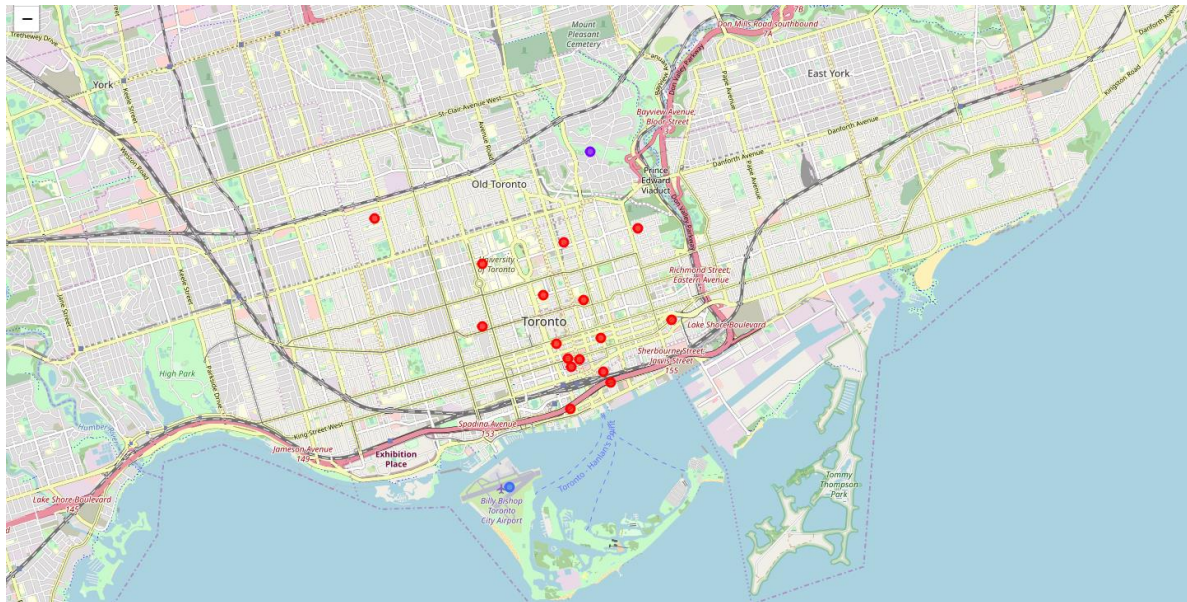


## b. List of venues that are in Downtown Toronto but not in Manhattan

Airport Gate	Airport Service	Hospital
Airport Lounge	Airport Terminal	Lake
Aquarium	Baseball Stadium	Neighborhood
Basketball Stadium	Beach	Other Great Outdoors
College Arts Building	Belgian Restaurant	Plane
College Rec Center	Brewery	Skating Rink
Colombian Restaurant	Church	Smoothie Shop
Comfort Food Restaurant	Comic Shop	Tanning Salon
Poutine Place	Doner Restaurant	Train Station
Airport	General Travel	Theme Restaurant
Airport Food Court	Gluten-free Restaurant	

## c. Clusters in the map

### Downtown Toronto



### Manhattan

