



# The Battle of the Neighborhoods

FINDING SIMILAR NEIGHBORHOODS IN DIFFERENT CITIES

# Who needs to find similar Neighborhoods in Different Cities

- ◆ People moving to new cities
- ◆ Companies moving headquarters
- ◆ Companies opening up branch offices
- ◆ Tourists
- ◆ Real Estate Agents

# Data Sources

- ◆ Coordinate Data for the city centers of Manhattan and Toronto, available from **GeoPy Nominatim**
- ◆ Coordinate Data for the neighborhoods in Manhattan, available at this URL: [https://cocl.us/new\\_york\\_dataset](https://cocl.us/new_york_dataset)
- ◆ Neighborhoods in Toronto by postal code, available on **Wikipedia**: [https://en.wikipedia.org/wiki/List\\_of\\_postal\\_codes\\_of\\_Canada:\\_M](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M)
- ◆ Coordinate Data for postal codes in Toronto, available at this URL: [http://cocl.us/Geospatial\\_data](http://cocl.us/Geospatial_data)
- ◆ Coordinate Data and Venue/spot type from **Foursquare API**

# Manhattan Data

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Marble Hill	40.876551	-73.91066	Arturo's	40.874412	-73.910271	Pizza Place
1	Marble Hill	40.876551	-73.91066	Bikram Yoga	40.876844	-73.906204	Yoga Studio
2	Marble Hill	40.876551	-73.91066	Tibbett Diner	40.880404	-73.908937	Diner
3	Marble Hill	40.876551	-73.91066	Starbucks	40.877531	-73.905582	Coffee Shop
4	Marble Hill	40.876551	-73.91066	Dunkin'	40.877136	-73.906666	Donut Shop

# Toronto Data

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	The Beaches	43.676357	-79.293031	Glen Manor Ravine	43.676821	-79.293942	Trail
1	The Beaches	43.676357	-79.293031	The Big Carrot Natural Food Market	43.678879	-79.297734	Health Food Store
2	The Beaches	43.676357	-79.293031	Grover Pub and Grub	43.679181	-79.297215	Pub
3	The Beaches	43.676357	-79.293031	Upper Beaches	43.680563	-79.292869	Neighborhood
4	The Danforth West, Riverdale	43.679557	-79.352188	Pantheon	43.677621	-79.351434	Greek Restaurant

# Methodology

1. Generate Dataframes of neighborhoods by venue category by one-hot encoding
2. Calculate matrix of relative frequencies of venue for each neighborhood
3. Calculate most similar neighborhood using equation:

$$\min \left( \sum_i^n |x_i - y_i| \right)$$

4. Calculate Similarity

Neighborhood	Manhattan Neighborhood	% Similar
Commerce Court, Victoria Hotel	Murray Hill	0.539731
Toronto Dominion Centre, Design Exchange	Murray Hill	0.511735
King, Adelaide, Richmond	Murray Hill	0.493794
Underground city, First Canadian Place	Financial District	0.492903
Davisville	Yorkville	0.487950
Toronto Islands, Harbourfront East, Union Station	Financial District	0.466117
Kensington Market, Grange Park, Chinatown	East Village	0.464018
Ryerson, Garden District	Lenox Hill	0.460325
Cabbagetown, St. James Town	Hamilton Heights	0.453947
St. James Town	Chelsea	0.448284
Central Bay Street	Murray Hill	0.443861
Studio District	Manhattanville	0.443850
Stn A PO Boxes 25 The Esplanade	Murray Hill	0.436170
Trinity, Little Portugal	East Village	0.430293
Runnymede, Swansea	Yorkville	0.429557
The Danforth West, Riverdale	Sutton Place	0.417077
Church and Wellesley	Upper West Side	0.411111
The Annex, Yorkville, North Midtown	Morningside Heights	0.405435
The Beaches West, India Bazaar	Roosevelt Island	0.388889
North Toronto West	Flatiron	0.384698

# Results

# Analysis

Neighborhood	Latitude	Longitude	Manhattan Neighborhood	% Similar	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
Commerce Court, Victoria Hotel	43.648198	-79.379817	Murray Hill	0.539731	Coffee Shop	Café	Hotel	Restaurant	American Restaurant	Gastropub	Deli / Bodega	Seafood Restaurant	Steakhouse	Italian Restaurant

Borough	Neighborhood	Latitude	Longitude	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
Manhattan	Murray Hill	40.748303	-73.978332	Coffee Shop	Hotel	Sandwich Place	Japanese Restaurant	Italian Restaurant	Gym	Gym / Fitness Center	French Restaurant	American Restaurant	Bagel Shop



# Analysis

## ▶ Commerce Court, Victoria Hotel

- ◆ Coffee Shops 11%
- ◆ Hotels 6%
- ◆ American Restaurants 4%
- ◆ Italian Restaurants 3%

# Analysis

## ► Murray Hill

- ◆ Coffee Shops 5.3%
- ◆ Hotels 4%
- ◆ American Restaurants 3%
- ◆ Italian Restaurants 3%

# Analysis

## ▶ Similarity Toronto to Manhattan

- ◆ Overall 35%
- ◆ Downtown Toronto 42%
- ◆ Central Toronto 25%
- ◆ West Toronto 33%
- ◆ East Toronto 30%

# Conclusions

- ◆ Overall Toronto not very similar to Manhattan
- ◆ Downtown Toronto fairly more similar to Manhattan
- ◆ Improve analysis by limiting categories i.e. retail only
- ◆ Improve analysis by combining categories

# Future Considerations

- ◆ Compare other major cities to Toronto
- ◆ Compare other major cities to each other, i.e. Paris v London
- ◆ Compare neighborhoods within cities
- ◆ Obtain venue data from other API