

## Capstone Project

### Comparing New York and Toronto

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June 5, 2019

#### 1. Introduction

There are some multicultural cities in the world. One of them is New York City in the U.S. and it is also the financial capital of the country. Toronto in Canada also correspond to its condition. These days many cities are becoming diverse. To find the similar points and dissimilar points by analyzing both two countries, it will be helpful information for some cities which hold multicultural people.

#### 2. Data

Data source is two websites and Foursquare. The URLs are [https://geo.nyu.edu/catalog/nyu\\_2451\\_34572](https://geo.nyu.edu/catalog/nyu_2451_34572) and [https://en.wikipedia.org/wiki/List\\_of\\_postal\\_codes\\_of\\_Canada:\\_M](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M). Based on the data, I made the map and tables of both cities related to venues. The following are the data from clustering.

##### 2.1. Data of New York City (Manhattan)

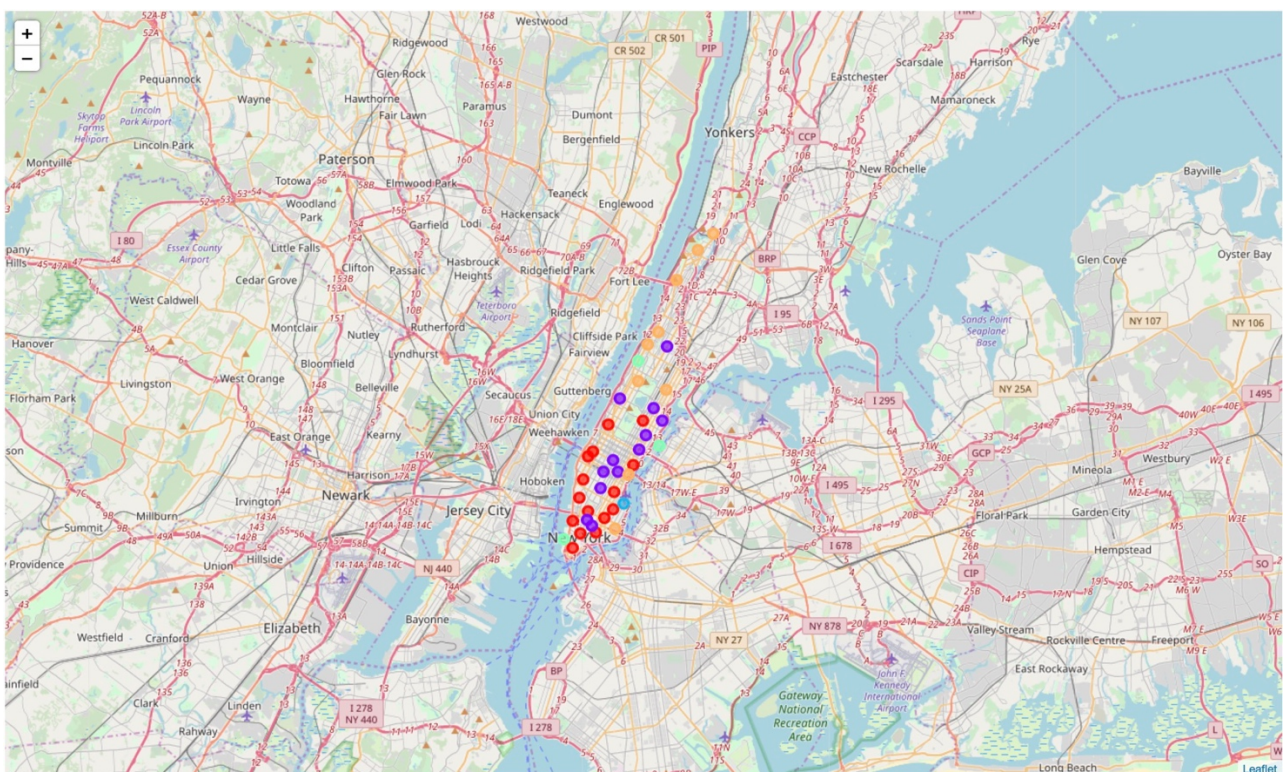


Fig.1 Map of resulting clusters

Table1.1 Cluster Label = 0

	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
1	Chinatown	Chinese Restaurant	American Restaurant	Cocktail Bar	Dumpling Restaurant	Spa	Bubble Tea Shop	Vietnamese Restaurant	Asian Restaurant	Jewelry Store	Korean Restaurant
8	Upper East Side	Exhibit	Italian Restaurant	Coffee Shop	Juice Bar	Bakery	Gym / Fitness Center	Art Gallery	French Restaurant	Spa	Cocktail Bar
13	Lincoln Square	Gym / Fitness Center	Theater	Café	Plaza	Italian Restaurant	Concert Hall	Opera House	Performing Arts Venue	French Restaurant	Park
14	Clinton	Theater	Gym / Fitness Center	Hotel	American Restaurant	Italian Restaurant	Wine Shop	Coffee Shop	Spa	Food Court	New American Restaurant
17	Chelsea	Coffee Shop	Italian Restaurant	Ice Cream Shop	American Restaurant	Bakery	Nightclub	Hotel	Seafood Restaurant	Theater	French Restaurant
18	Greenwich Village	Italian Restaurant	Clothing Store	Sushi Restaurant	French Restaurant	Café	Seafood Restaurant	Indian Restaurant	Ice Cream Shop	Burger Joint	Coffee Shop
19	East Village	Bar	Wine Bar	Chinese Restaurant	Cocktail Bar	Ice Cream Shop	Mexican Restaurant	Pizza Place	Ramen Restaurant	Vegetarian / Vegan Restaurant	Coffee Shop
21	Tribeca	Spa	Café	Italian Restaurant	American Restaurant	Boutique	Park	Gym	Greek Restaurant	Coffee Shop	Wine Bar
24	West Village	Italian Restaurant	New American Restaurant	Cosmetics Shop	Park	Jazz Club	Wine Bar	American Restaurant	Gastropub	Coffee Shop	Bakery
27	Gramercy	Cocktail Bar	American Restaurant	Italian Restaurant	Bagel Shop	Bar	Pizza Place	Thrift / Vintage Store	Thai Restaurant	Hotel	Mexican Restaurant
29	Financial District	Coffee Shop	Steakhouse	Wine Shop	Hotel	Gym	Gym / Fitness Center	American Restaurant	Café	Bar	Pizza Place
31	Noho	Italian Restaurant	Cocktail Bar	French Restaurant	Mexican Restaurant	Pizza Place	Coffee Shop	Boutique	Rock Club	Gift Shop	Art Gallery
32	Civic Center	Italian Restaurant	Gym / Fitness Center	Coffee Shop	Sandwich Place	French Restaurant	Bakery	Yoga Studio	Hotel	Cocktail Bar	Spa
35	Turtle Bay	Italian Restaurant	Hotel	Steakhouse	Sushi Restaurant	Coffee Shop	Wine Bar	Japanese Restaurant	Ramen Restaurant	Indian Restaurant	French Restaurant
39	Hudson Yards	American Restaurant	Italian Restaurant	Café	Coffee Shop	Gym / Fitness Center	Hotel	Restaurant	Salad Place	Dog Run	Gym

Table1.2 Cluster Label = 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
6	Central Harlem	African Restaurant	Public Art	French Restaurant	Chinese Restaurant	Seafood Restaurant	Gym / Fitness Center	Art Gallery	Cosmetics Shop	American Restaurant	Boutique
9	Yorkville	Italian Restaurant	Gym	Bar	Coffee Shop	Pizza Place	Sushi Restaurant	Diner	Japanese Restaurant	Deli / Bodega	Ice Cream Shop
10	Lenox Hill	Coffee Shop	Sushi Restaurant	Italian Restaurant	Pizza Place	Sporting Goods Shop	Gym	Burger Joint	Gym / Fitness Center	Cycle Studio	Deli / Bodega
12	Upper West Side	Italian Restaurant	Wine Bar	Bar	Coffee Shop	Mediterranean Restaurant	Bakery	Indian Restaurant	Vegetarian / Vegan Restaurant	Yoga Studio	Pub
15	Midtown	Hotel	Coffee Shop	Cocktail Bar	Clothing Store	Theater	Steakhouse	Japanese Restaurant	Spa	Food Truck	Bookstore
16	Murray Hill	Hotel	Sandwich Place	Japanese Restaurant	Coffee Shop	Gym	Salon / Barbershop	Italian Restaurant	French Restaurant	Cocktail Bar	Taco Place
22	Little Italy	Bakery	Salon / Barbershop	Sandwich Place	Hotel	Clothing Store	Italian Restaurant	Mediterranean Restaurant	Seafood Restaurant	Café	Thai Restaurant
23	Soho	Clothing Store	Boutique	Shoe Store	Women's Store	Italian Restaurant	Sporting Goods Shop	Art Gallery	Bakery	Men's Store	Mediterranean Restaurant
30	Carnegie Hill	Pizza Place	Coffee Shop	Café	Yoga Studio	Grocery Store	Bookstore	Wine Shop	French Restaurant	Cosmetics Shop	Bar
33	Midtown South	Korean Restaurant	Hotel	Hotel Bar	Coffee Shop	Japanese Restaurant	Italian Restaurant	Dessert Shop	Cosmetics Shop	Cocktail Bar	American Restaurant
34	Sutton Place	Italian Restaurant	Gym / Fitness Center	Indian Restaurant	Furniture / Home Store	American Restaurant	Pizza Place	Juice Bar	Gym	Dessert Shop	Yoga Studio
38	Flatiron	Gym	Yoga Studio	Japanese Restaurant	American Restaurant	Gym / Fitness Center	Dessert Shop	Spa	New American Restaurant	Clothing Store	Café

Table1.3 Cluster Label = 2

	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
37	Stuyvesant Town	Park	Bar	Playground	Farmers Market	Baseball Field	Fountain	Harbor / Marina	Cocktail Bar	Coffee Shop	Heliport

Table1.4 Cluster Label = 3

	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
11	Roosevelt Island	Park	Sandwich Place	Deli / Bodega	Coffee Shop	School	Liquor Store	Metro Station	Supermarket	Bridge	Bus Line
26	Morningside Heights	Coffee Shop	Park	Bookstore	American Restaurant	Tennis Court	Food Truck	New American Restaurant	Deli / Bodega	Burger Joint	Frozen Yogurt Shop
28	Battery Park City	Park	Coffee Shop	Hotel	Memorial Site	Wine Shop	Italian Restaurant	Clothing Store	Gym	Plaza	Burger Joint

Table1.5 Cluster Label = 4

	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	Marble Hill	Discount Store	Sandwich Place	Coffee Shop	Yoga Studio	Pizza Place	Tennis Stadium	Supplement Shop	Steakhouse	Seafood Restaurant	Clothing Store
2	Washington Heights	Café	Mobile Phone Shop	Bakery	Spanish Restaurant	Deli / Bodega	Mexican Restaurant	Sandwich Place	New American Restaurant	Park	Supplement Shop
3	Inwood	Café	Mexican Restaurant	Lounge	Pizza Place	Bakery	Chinese Restaurant	Frozen Yogurt Shop	Park	American Restaurant	Deli / Bodega
4	Hamilton Heights	Deli / Bodega	Pizza Place	Mexican Restaurant	Café	Chinese Restaurant	Coffee Shop	Sandwich Place	Sushi Restaurant	Bakery	Caribbean Restaurant
5	Manhattanville	Deli / Bodega	Mexican Restaurant	Park	Coffee Shop	Seafood Restaurant	Italian Restaurant	Fried Chicken Joint	Spanish Restaurant	Grocery Store	Beer Garden
7	East Harlem	Mexican Restaurant	Bakery	Deli / Bodega	Thai Restaurant	Latin American Restaurant	Donut Shop	Bank	Cocktail Bar	Clothing Store	Beer Bar
20	Lower East Side	Café	Coffee Shop	Ramen Restaurant	Pizza Place	Cocktail Bar	Sandwich Place	Chinese Restaurant	Art Gallery	Bakery	Park
25	Manhattan Valley	Coffee Shop	Indian Restaurant	Pizza Place	Yoga Studio	Mexican Restaurant	Café	Bar	Thai Restaurant	Deli / Bodega	Szechuan Restaurant
36	Tudor City	Park	Mexican Restaurant	Greek Restaurant	Café	Asian Restaurant	Deli / Bodega	Pizza Place	Hotel	Dog Run	Sushi Restaurant

## 2.2. Data of Toronto

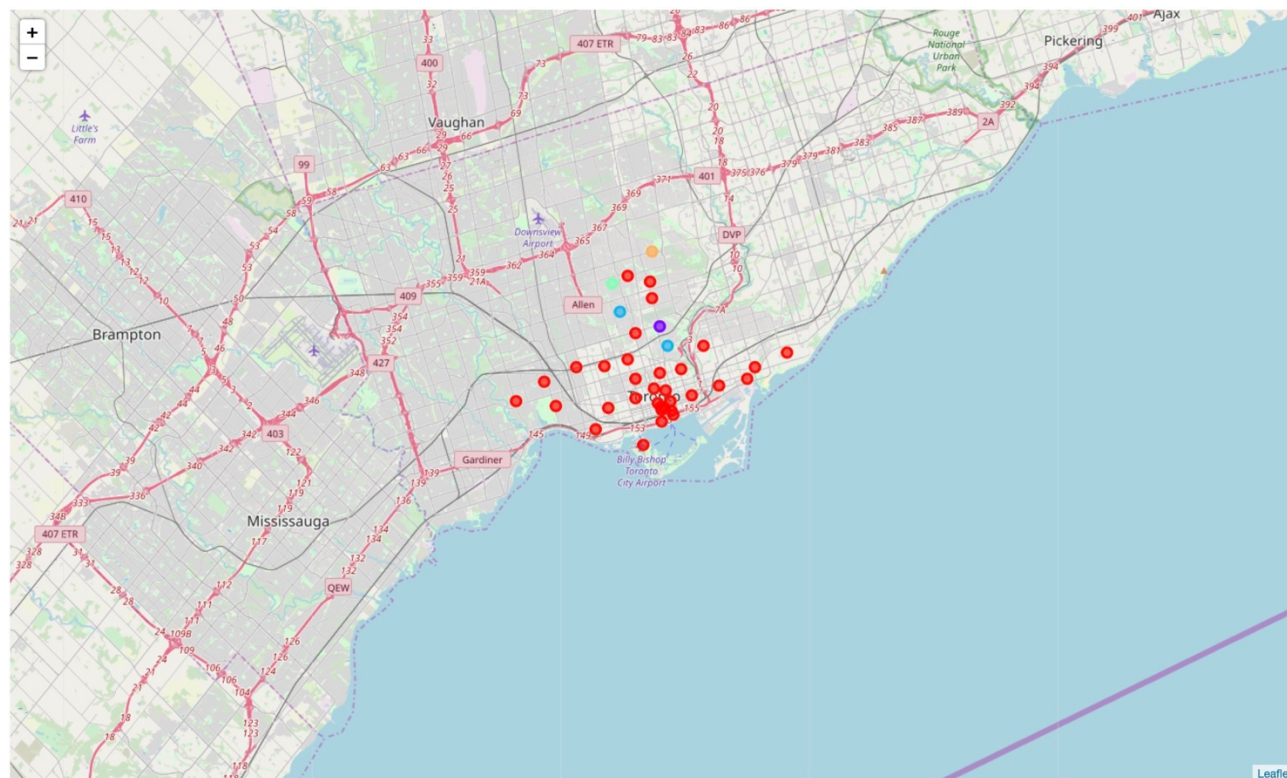


Table2.1 Cluster Label = 0

	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
37	East Toronto	0	Health Food Store	Pub	Trail	Yoga Studio	Electronics Store	Dog Run	Doner Restaurant	Donut Shop	Dumpling Restaurant	Eastern European Restaurant
41	East Toronto	0	Greek Restaurant	Coffee Shop	Ice Cream Shop	Italian Restaurant	Furniture / Home Store	Yoga Studio	Pizza Place	Brewery	Bubble Tea Shop	Café
42	East Toronto	0	Park	Gym	Ice Cream Shop	Pizza Place	Pub	Movie Theater	Sandwich Place	Burrito Place	Burger Joint	Brewery
43	East Toronto	0	Café	Coffee Shop	Gastropub	Italian Restaurant	Bakery	American Restaurant	Yoga Studio	Gym	Brewery	Seafood Restaurant
45	Central Toronto	0	Gym	Grocery Store	Breakfast Spot	Hotel	Sandwich Place	Park	Clothing Store	Food & Drink Shop	Yoga Studio	Dumpling Restaurant
46	Central Toronto	0	Coffee Shop	Yoga Studio	Bagel Shop	Fast Food Restaurant	Mexican Restaurant	Diner	Dessert Shop	Park	Clothing Store	Chinese Restaurant
47	Central Toronto	0	Pizza Place	Sandwich Place	Dessert Shop	Coffee Shop	Café	Italian Restaurant	Sushi Restaurant	Thai Restaurant	Restaurant	Diner
49	Central Toronto	0	Pub	Coffee Shop	Light Rail Station	Bagel Shop	Fried Chicken Joint	Sushi Restaurant	Supermarket	American Restaurant	Sports Bar	Vietnamese Restaurant
51	Downtown Toronto	0	Coffee Shop	Restaurant	Pizza Place	Italian Restaurant	Café	Bakery	Pub	Park	Japanese Restaurant	Jewelry Store
52	Downtown Toronto	0	Japanese Restaurant	Coffee Shop	Sushi Restaurant	Gay Bar	Restaurant	Bubble Tea Shop	Pub	Burger Joint	Hotel	Fast Food Restaurant
53	Downtown Toronto	0	Coffee Shop	Pub	Bakery	Park	Mexican Restaurant	Restaurant	Breakfast Spot	Café	Theater	Hotel
54	Downtown Toronto	0	Coffee Shop	Clothing Store	Cosmetics Shop	Café	Middle Eastern Restaurant	Restaurant	Theater	Fast Food Restaurant	Sporting Goods Shop	Italian Restaurant
55	Downtown Toronto	0	Coffee Shop	Café	Hotel	Restaurant	Cosmetics Shop	Gastropub	Clothing Store	Bakery	Breakfast Spot	Italian Restaurant
56	Downtown Toronto	0	Coffee Shop	Cocktail Bar	Seafood Restaurant	Café	Cheese Shop	Farmers Market	Beer Bar	Bakery	Steakhouse	Italian Restaurant
57	Downtown Toronto	0	Coffee Shop	Italian Restaurant	Café	Middle Eastern Restaurant	Sandwich Place	Burger Joint	Indian Restaurant	Spa	Bar	Japanese Restaurant
58	Downtown Toronto	0	Coffee Shop	Café	Steakhouse	Bar	American Restaurant	Thai Restaurant	Burger Joint	Cosmetics Shop	Hotel	Bakery
59	Downtown Toronto	0	Coffee Shop	Hotel	Aquarium	Café	Italian Restaurant	Brewery	Bakery	Scenic Lookout	Restaurant	Pizza Place
60	Downtown Toronto	0	Coffee Shop	Café	Hotel	Restaurant	Gastropub	Seafood Restaurant	Bakery	Steakhouse	Italian Restaurant	American Restaurant
61	Downtown Toronto	0	Coffee Shop	Café	Hotel	Restaurant	American Restaurant	Bakery	Gastropub	Steakhouse	Deli / Bodega	Seafood Restaurant
65	Central Toronto	0	Coffee Shop	Sandwich Place	Café	Pizza Place	Park	Jewish Restaurant	BBQ Joint	Indian Restaurant	Pub	American Restaurant
66	Downtown Toronto	0	Café	Bakery	Bar	Italian Restaurant	Japanese Restaurant	Bookstore	Restaurant	Pub	Beer Bar	Beer Store
67	Downtown Toronto	0	Café	Vegetarian / Vegan Restaurant	Dumpling Restaurant	Mexican Restaurant	Coffee Shop	Bar	Bakery	Chinese Restaurant	Vietnamese Restaurant	Dessert Shop
68	Downtown Toronto	0	Airport Lounge	Airport Service	Airport Terminal	Boat or Ferry	Sculpture Garden	Harbor / Marina	Plane	Airport	Airport Food Court	Airport Gate
69	Downtown Toronto	0	Coffee Shop	Restaurant	Café	Seafood Restaurant	Beer Bar	Italian Restaurant	Hotel	Cocktail Bar	Art Gallery	Breakfast Spot
70	Downtown Toronto	0	Café	Coffee Shop	Restaurant	Hotel	Gastropub	Seafood Restaurant	Burger Joint	Bar	Bakery	Steakhouse
75	Downtown Toronto	0	Café	Grocery Store	Park	Convenience Store	Restaurant	Baby Store	Diner	Italian Restaurant	Nightclub	Coffee Shop
76	West Toronto	0	Pharmacy	Bakery	Supermarket	Coffee Shop	Bar	Brazilian Restaurant	Discount Store	Café	Middle Eastern Restaurant	Music Venue
77	West Toronto	0	Bar	Coffee Shop	Men's Store	Asian Restaurant	New American Restaurant	Cocktail Bar	Pizza Place	Bakery	Café	Vietnamese Restaurant
78	West Toronto	0	Coffee Shop	Café	Breakfast Spot	Yoga Studio	Italian Restaurant	Convenience Store	Performing Arts Venue	Climbing Gym	Restaurant	Caribbean Restaurant
82	West Toronto	0	Mexican Restaurant	Café	Bar	Italian Restaurant	Music Venue	Bookstore	Flea Market	Speakeasy	Cajun / Creole Restaurant	Fried Chicken Joint
83	West Toronto	0	Breakfast Spot	Gift Shop	Movie Theater	Eastern European Restaurant	Bank	Bar	Cuban Restaurant	Dog Run	Coffee Shop	Bookstore
84	West Toronto	0	Coffee Shop	Café	Pizza Place	Sushi Restaurant	Italian Restaurant	Diner	Pharmacy	Bookstore	Boutique	Burrito Place
87	East Toronto	0	Yoga Studio	Auto Workshop	Park	Pizza Place	Gym / Fitness Center	Recording Studio	Restaurant	Butcher	Burrito Place	Brewery

Table2.2 Cluster Label = 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
48	Central Toronto	1	Playground	Tennis Court	Comic Shop	Concert Hall	Fast Food Restaurant	Farmers Market	Falafel Restaurant	Event Space	Ethiopian Restaurant	Electronics Store

Table2.3 Cluster Label = 2

	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
50	Downtown Toronto	2	Park	Playground	Trail	Dessert Shop	Farmers Market	Falafel Restaurant	Event Space	Ethiopian Restaurant	Electronics Store	Eastern European Restaurant
64	Central Toronto	2	Trail	Jewelry Store	Sushi Restaurant	Park	Yoga Studio	Doner Restaurant	Donut Shop	Dumpling Restaurant	Eastern European Restaurant	Electronics Store

Table2.4 Cluster Label = 3

	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
63	Central Toronto	3	Ice Cream Shop	Garden	Yoga Studio	Discount Store	Fast Food Restaurant	Farmers Market	Falafel Restaurant	Event Space	Ethiopian Restaurant	Electronics Store

Table2.5 Cluster Label = 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
44	Central Toronto	4	Park	Swim School	Bus Line	Yoga Studio	Dog Run	Fast Food Restaurant	Farmers Market	Falafel Restaurant	Event Space	Ethiopian Restaurant



### 3. Analysis

#### 3.1. Similar Points

Both cities hold restaurant of various countries such as Italian and Mexican. I can say that it is one of the characteristics of multicultural city.

Both cities have a variety of facilities, not only restaurant but also theater, hotel and park. Facilities for living, entertaining and traveling center on these two cities because both cities are the financial capital of each country.

#### 3.2. Dissimilar Points

New York is more diverse than Toronto because most of borough in Toronto is classified as cluster label = 0 category. On the other hand, New York have three main clusters (cluster label = 0, 1, 4). You can see it from the following circle graphs.

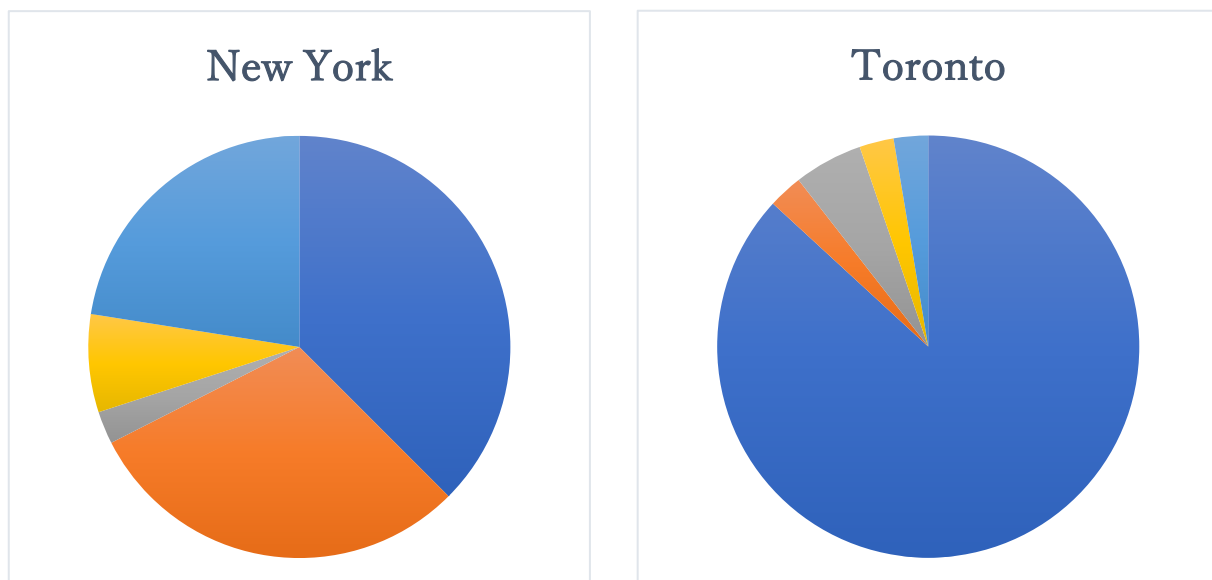


Fig.3 Circle graphs of rate of clusters in both cities

Toronto hold many coffee shops and cafes especially in cluster label = 0. Coffee shop is used for not only for relaxing but also for working or business table. It's because Toronto is the financial capital of Canada and many people are working there.

### 4. Conclusion

Both cities hold a variety of facilities like restaurants, café, theater, park and so on. This is the characteristic of multicultural and financial capital of the country. New York is more diverse than Toronto from the aspect of venues.