

# **IBM Coursera Capstone Toronto Business Classification**

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# Outline

- Introduction
- Business Problem
- Data Sources
- Data Integration
- Analysis
- Finding/Result
- Conclusion
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# Introduction

- **This is a project of IBM Data Science Capstone**
- **Focus on concluding practices of Data science**
- **Data cases is Toronto Area**

# Business Problem

- Learn and practice how to use Foursquare on Toronto City
- Classify businesses of Toronto city and surrounding
- How data science and foursquare API are used for clustering Neighborhood data
- Learn more about Data Science

# Data Sources

## Three data source

- **Strat data**

- Start data = 'https://en.wikipedia.org/wiki/List\_of\_postal\_codes\_of\_Canada:\_M'

Out[4]:

	PostalCode	Borough	Neighbourhood
0	M3A\n	North York\n	Parkwoods\n
1	M4A\n	North York\n	Victoria Village\n
2	M5A\n	Downtown Toronto\n	Regent Park, Harbourfront\n
3	M6A\n	North York\n	Lawrence Manor, Lawrence Heights\n
4	M7A\n	Downtown Toronto\n	Queen's Park, Ontario Provincial Government\n

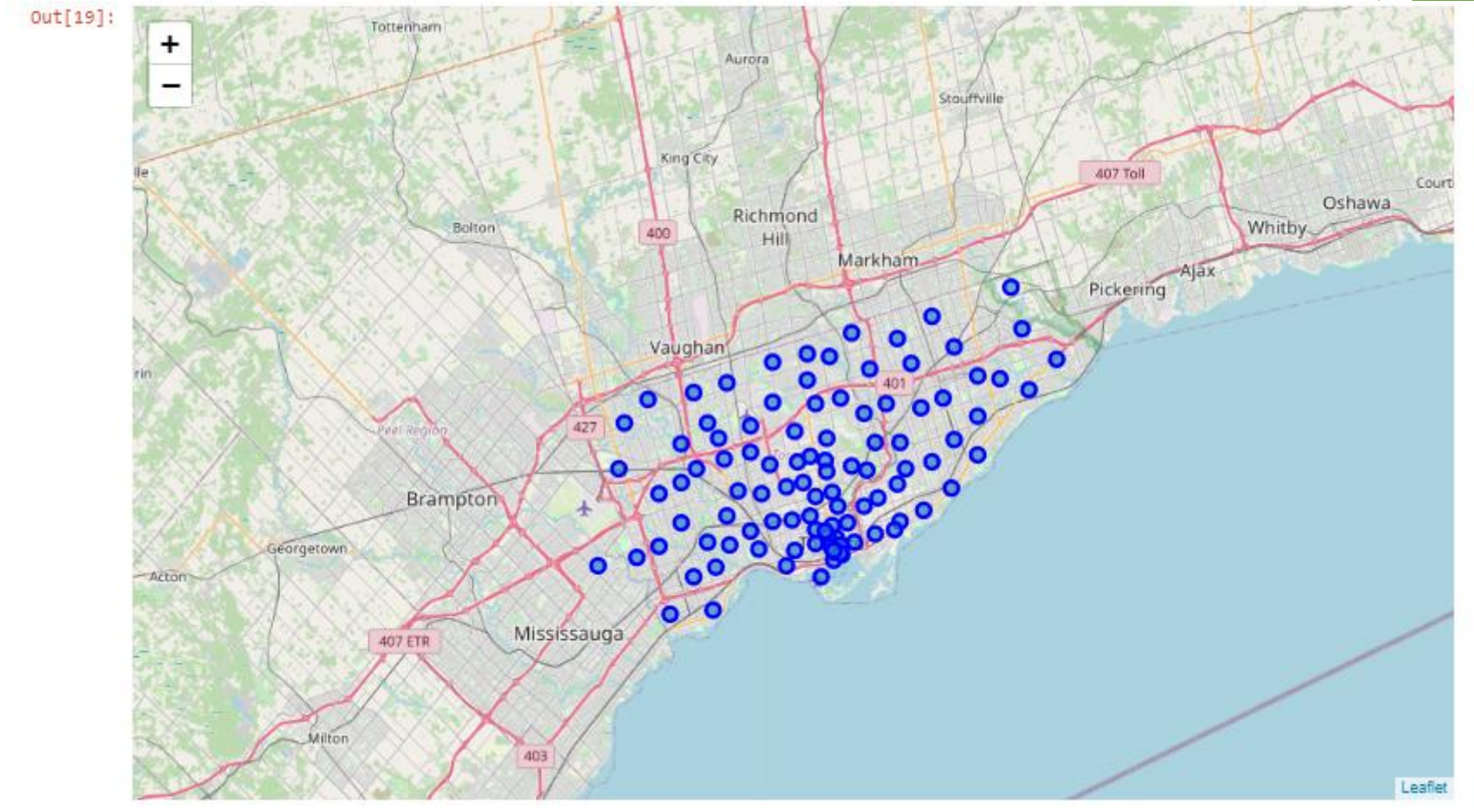
- **Geo Data**

- geo\_data = 'https://cocl.us/Geospatial\_data'

Out[5]:

	Postal Code	Latitude	Longitude
0	M1B	43.806686	-79.194353
1	M1C	43.784535	-79.160497
2	M1E	43.763573	-79.188711
3	M1G	43.770992	-79.216917
4	M1H	43.773136	-79.239476

# Toronto Map with Records



- Foursquare Data

Out[16]:

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Malvern, Rouge	43.806886	-79.194353	Wendy's	43.807448	-79.199056	Fast Food Restaurant
1	Rouge Hill, Port Union, Highland Creek	43.784535	-79.160497	Royal Canadian Legion	43.782533	-79.163085	Bar
2	Guildwood, Morningside, West Hill	43.763573	-79.188711	RBC Royal Bank	43.766790	-79.191151	Bank
3	Guildwood, Morningside, West Hill	43.763573	-79.188711	G & G Electronics	43.765309	-79.191537	Electronics Store
4	Guildwood, Morningside, West Hill	43.763573	-79.188711	Sail Sushi	43.765951	-79.191275	Restaurant
...	...	...	...	...	...	...	...
2124	South Steeles, Silverstone, Humbergate, Jamestown	43.739416	-79.588437	Pizza Nova	43.736761	-79.589817	Pizza Place
2125	South Steeles, Silverstone, Humbergate, Jamestown	43.739416	-79.588437	Rogers Plus	43.741312	-79.585263	Video Store
2126	Northwest, West Humber - Clairville	43.706748	-79.594054	Economy Rent A Car	43.708471	-79.589943	Rental Car Location
2127	Northwest, West Humber - Clairville	43.706748	-79.594054	Saand Rexdale	43.705072	-79.598725	Drugstore
2128	Northwest, West Humber - Clairville	43.706748	-79.594054	Vectra Heavy Haulers	43.704891	-79.599410	Truck Stop

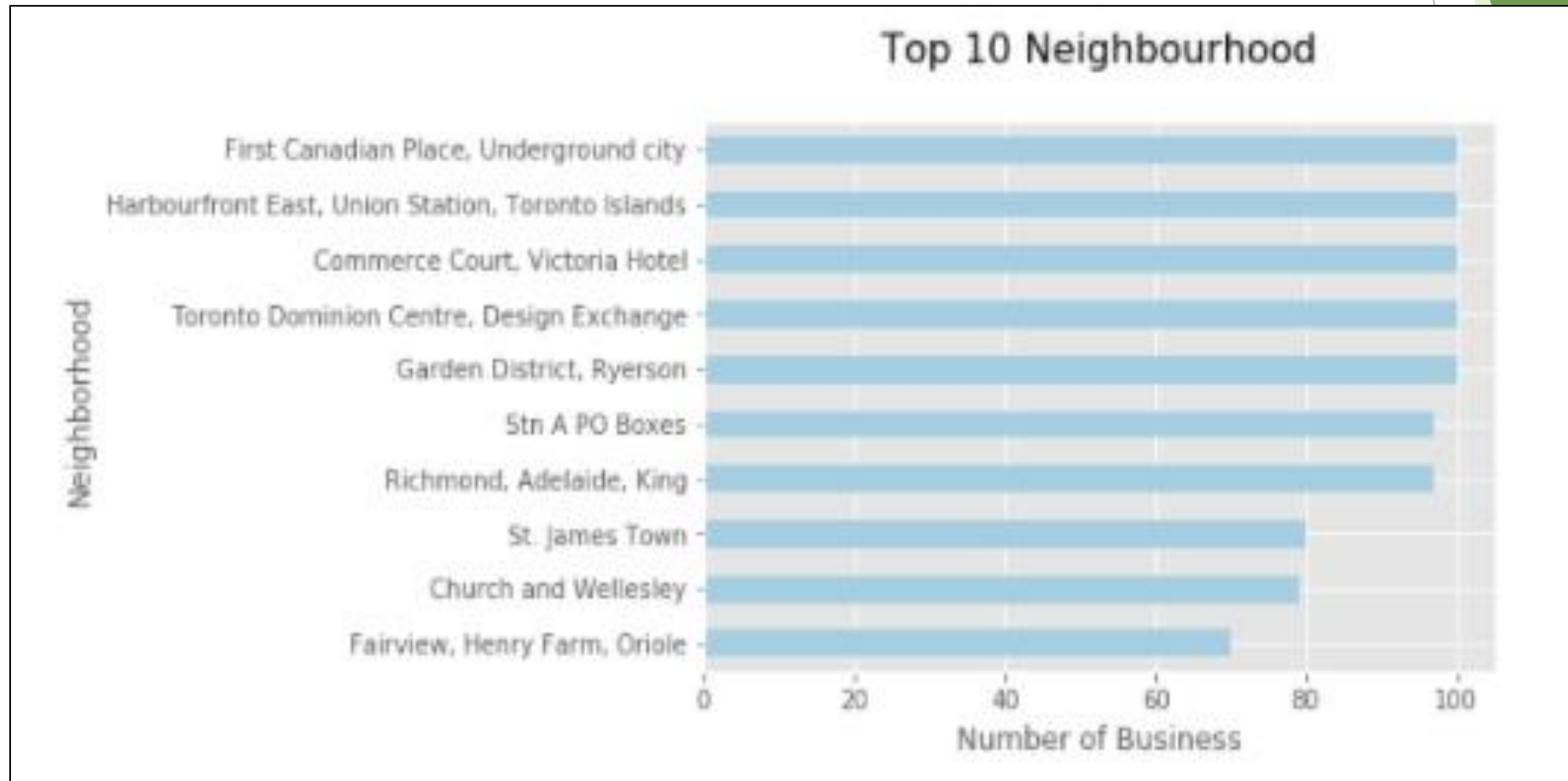
# Data Integration

- Merging data
  - Grouping and transferring features
- Slicing data
  - Extracting data



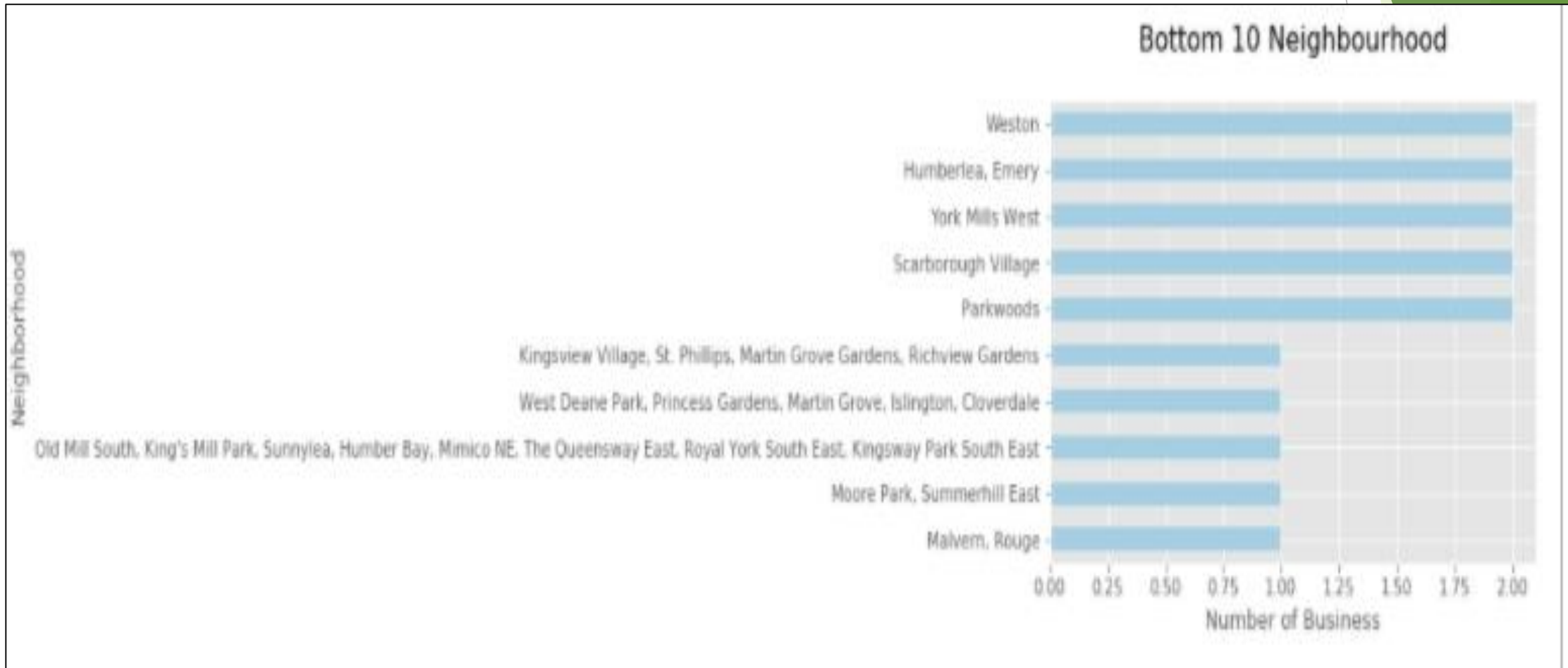
# Data Analysis

- Top 10 Neighborhood with number of venues/business



# Data Analysis

- Bottom 10 Neighborhood with number of venues/business



# Data Analysis/Clustering

- Onehot

318]: Partial view of data frame

	Neighbourhood	Adult Boutique	Airport	Airport Food Court	Airport Gate	Airport Lounge	Airport Service	Airport Terminal	American Restaurant	Antique Shop	...	Theme Restaurant	R
0	The Beaches	0	0	0	0	0	0	0	0	0	...	0	
1	The Beaches	0	0	0	0	0	0	0	0	0	...	0	
2	The Beaches	0	0	0	0	0	0	0	0	0	...	0	
3	The Beaches	0	0	0	0	0	0	0	0	0	...	0	
4	The Beaches	0	0	0	0	0	0	0	0	0	...	0	

5 rows x 233 columns

- The 10 Most common venues in each Neighborhood

[151]:

	Cluster Labels	Neighbourhood	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	1	Agincourt	Skating Rink	Lounge	Breakfast Spot	Latin American Restaurant	Eastern European Restaurant	Distribution Center	Dog Run	Doner Restaurant	Donut Shop	Drugstore
1	1	Alderwood, Long Branch	Pizza Place	Sandwich Place	Gym	Coffee Shop	Skating Rink	Pool	Pub	Yoga Studio	Distribution Center	Dessert Shop
2	1	Bathurst Manor, Wilson Heights, Downsview North	Coffee Shop	Bank	Frozen Yogurt Shop	Shopping Mall	Sandwich Place	Diner	Middle Eastern Restaurant	Restaurant	Deli / Bodega	Supermarket
3	1	Bayview Village	Café	Japanese Restaurant	Bank	Chinese Restaurant	Yoga Studio	Discount Store	Distribution Center	Dog Run	Doner Restaurant	Donut Shop
4	1	Bedford Park, Lawrence Manor East	Sandwich Place	Italian Restaurant	Coffee Shop	Comfort Food Restaurant	Thai Restaurant	Juice Bar	Butcher	Café	Japanese Restaurant	Restaurant

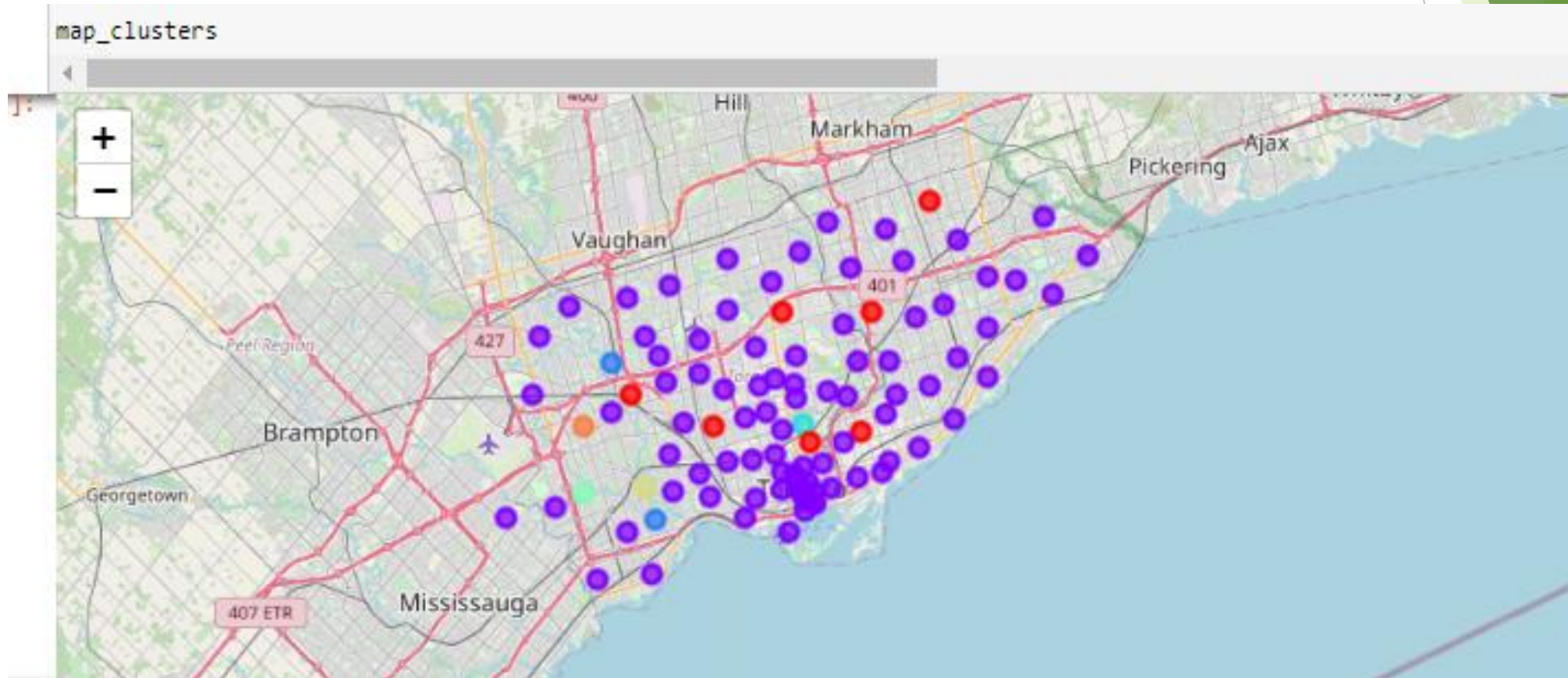
# Clustering data

- Cluster label 1

	PostalCode	Neighbourhood	Latitude	Longitude	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 Common Venue
0	M3A	Parkwoods	43.753259	-79.329656	0.0	Food & Drink Shop	Park	Yoga Studio	Diner	Discount Store	Distribution Center	Dog Run	Rest
21	M6E	Caledonia-Fairbanks	43.689026	-79.453512	0.0	Park	Women's Store	Drugstore	Diner	Discount Store	Distribution Center	Dog Run	Rest
35	M4J	East Toronto, Broadview North (Old East York)	43.685347	-79.338106	0.0	Park	Convenience Store	Drugstore	Diner	Discount Store	Distribution Center	Dog Run	Rest
64	M9N	Weston	43.706876	-79.518188	0.0	Park	Jewelry Store	Yoga Studio	Drugstore	Discount Store	Distribution Center	Dog Run	Rest
66	M2P	York Mills West	43.752758	-79.400049	0.0	Convenience Store	Park	Drugstore	Diner	Discount Store	Distribution Center	Dog Run	Rest
85	M1V	Milliken, Agincourt North, Steeles East, L'Amo...	43.815252	-79.284577	0.0	Playground	Park	Intersection	Yoga Studio	Dog Run	Dessert Shop	Dim Sum Restaurant	
91	M4W	Rosedale	43.679563	-79.377529	0.0	Park	Playground	Trail	Yoga Studio	Doner Restaurant	Dim Sum Restaurant	Diner	Dis

# Finding/Result

- Toronto Neighborhood data Clustered in to 7 classes

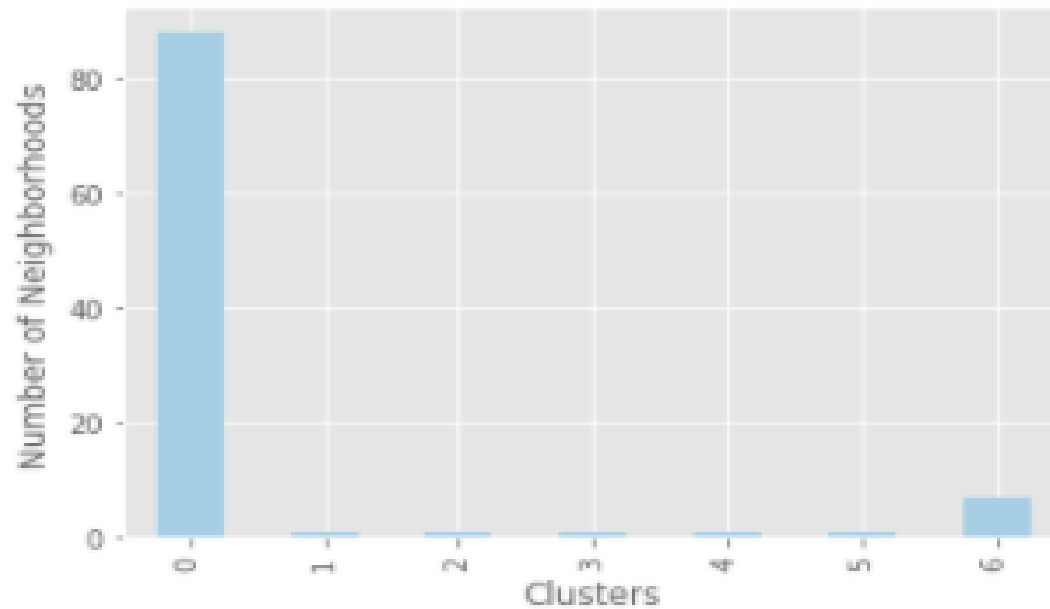


# Conclusion

- Number of Neighborhood in each cluster

Cluster	Number of Neighborhoods	Some of the Common Venues in cluster
0	88	Bars, Coffee Shops, Pizza Places
1	1	Fast Food Restaurant, Yoga Studio
2	1	Martial Arts School, Electronic Store
3	1	Baseball Field, Dog Run
4	1	Filipino Restaurant, Eastern European Restaurant
5	1	Pizza Places
6	7	Playground, Parks,

Neighbourhoods in Clusters



# Reference

1. List of postal codes of Canada: M  
en.wikipedia.org ---- (visited on December 2020)  
[https://en.wikipedia.org/wiki/List\\_of\\_postal\\_codes\\_of\\_Canada: M](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada: M)
1. List of postal code from online ---- (visited on December 2020)  
[https://cocl.us/Geospatial\\_data](https://cocl.us/Geospatial_data)
1. Several IBM data science notes and lectures from the IBM Coursera class