Analyzing the neighborhood of Toronto, Canada for setting up a new business

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Introduction

- Toronto, capital city of Canadian province of Ontario
- One of the populous cities in Canada
- A cultural and historical hub and a tourist attraction
- Restaurants serving different varieties of food is in great demand
- The goal of the project:
    Explore the neighborhood to find a suitable place for opening new restaurant

Data collection

Finding a good location for a new business is important

Needs information of the neigborhood

Data collection for making informed choices

- Neighborhood data : Wikipedia, Toronto neighborhood
- Geolocation data:
- Venue information: Foursquare API

Data cleaning and analysis

	PostalCode	Borough	Neighbourhood
0	M1A	Not assigned	Not assigned
1	M2A	Not assigned	Not assigned
2	M3A	North York	Parkwoods
3	M4A	North York	Victoria Village
4	M5A	Downtown Toronto	Regent Park, Harbourfront

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

Left: Sample of data downloaded from wikipedia

Right: Sample data after cleaning for not assigned values

Adding coordinates to the neighborhood

	PostalCode	Borough	Neighbourhood	Latitude	Longitude
0	M3A	North York	Parkwoods	43.753259	-79.329656
1	M4A	North York	Victoria Village	43.725882	-79.315572
2	M5A	Downtown Toronto	Regent Park, Harbourfront	43.654260	-79.360636
3	M6A	North York	Lawrence Manor, Lawrence Heights	43.718518	-79.464763
4	M7A	Downtown Toronto	Queen's Park, Ontario Provincial Government	43.662301	-79.389494

Map showing all the neighborhoods in Toronto

Getting venues from Foursquare API

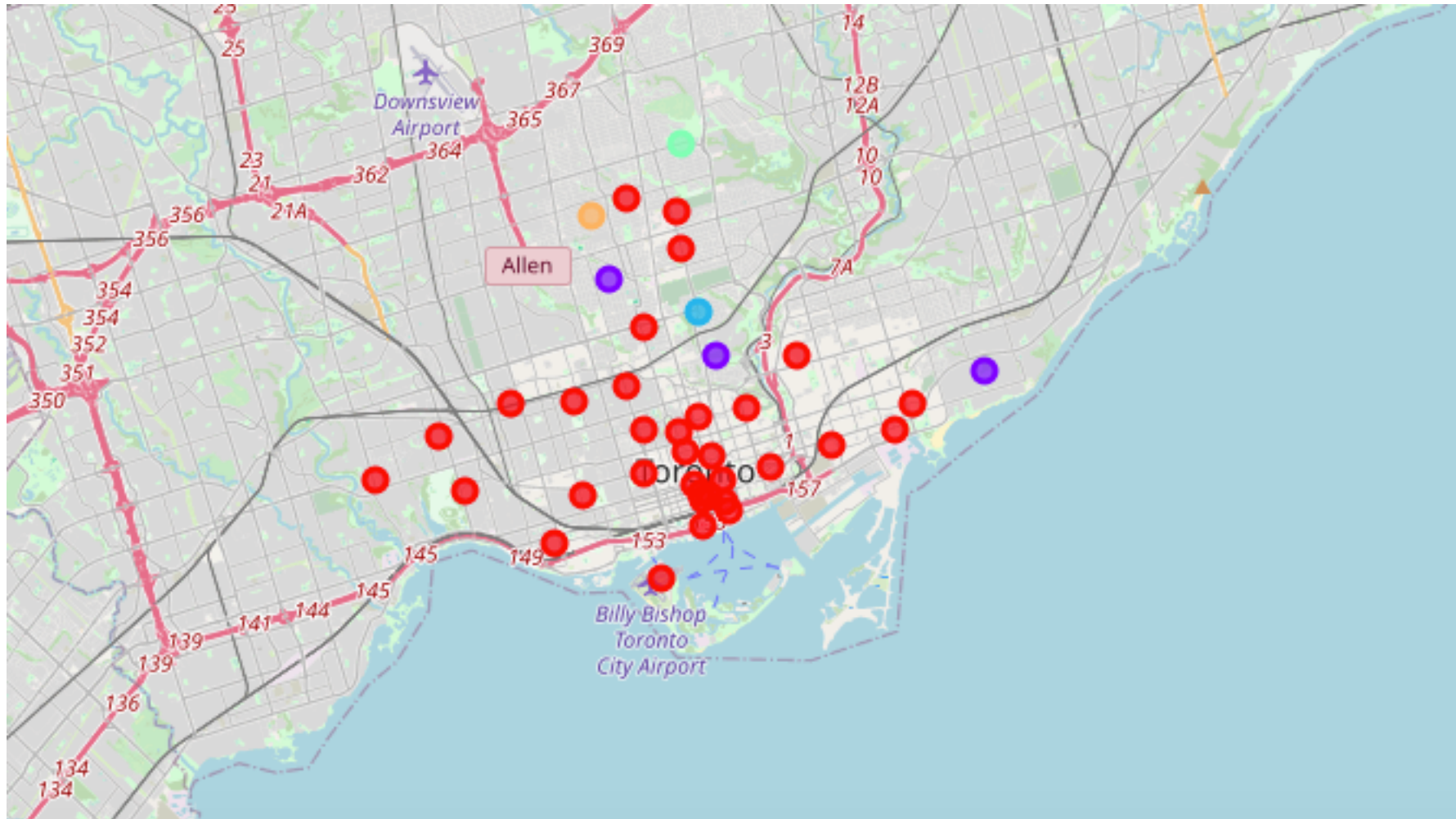|	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.65426	-79.360636	Roselle Desserts	43.653447	-79.362017	Bakery
1	Regent Park, Harbourfront	43.65426	-79.360636	Tandem Coffee	43.653559	-79.361809	Coffee Shop
2	Regent Park, Harbourfront	43.65426	-79.360636	Cooper Koo Family YMCA	43.653249	-79.358008	Distribution Center
3	Regent Park, Harbourfront	43.65426	-79.360636	Impact Kitchen	43.656369	-79.356980	Restaurant
4	Regent Park, Harbourfront	43.65426	-79.360636	Body Blitz Spa East	43.654735	-79.359874	Spa

Sample of venue information in a neighborhood obtained using Foursquare API

```
----Berczy Park----
                 venue  freq
0          Coffee Shop  0.09
1         Cocktail Bar  0.04
2       Farmers Market  0.04
3               Bakery  0.04
4   Seafood Restaurant  0.04
```

Frequencies of different categories of venues

```
----Brockton, Parkdale Village, Exhibition Place----
              venue  freq
0              Café  0.12
1          Nightclub  0.08
2        Coffee Shop  0.08
3     Breakfast Spot  0.08
4      Grocery Store  0.04
```

K-mean clustering of the neighborhoods

Map showing different clusters of neighborhood in Toronto

Examining clusters: Cluster 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
0	Downtown Toronto	0	Coffee Shop	Park	Bakery	Pub	Café	Theater	Breakfast Spot	Shoe Store	Distribution Center	Electronics Store
1	Downtown Toronto	0	Coffee Shop	Yoga Studio	Café	Beer Bar	Smoothie Shop	Italian Restaurant	Sandwich Place	Distribution Center	Restaurant	Diner
2	Downtown Toronto	0	Coffee Shop	Clothing Store	Café	Bubble Tea Shop	Cosmetics Shop	Japanese Restaurant	Furniture / Home Store	Hotel	Pizza Place	Bookstore
3	Downtown Toronto	0	Coffee Shop	Café	Cocktail Bar	Restaurant	Gastropub	Beer Bar	American Restaurant	Japanese Restaurant	Seafood Restaurant	Clothing Store
5	Downtown Toronto	0	Coffee Shop	Farmers Market	Bakery	Beer Bar	Cocktail Bar	Cheese Shop	Seafood Restaurant	Restaurant	Grocery Store	Pub
6	Downtown Toronto	0	Coffee Shop	Café	Sandwich Place	Italian Restaurant	Department Store	Japanese Restaurant	Thai Restaurant	Burger Joint	Bubble Tea Shop	Salad Place
7	Downtown Toronto	0	Grocery Store	Café	Park	Candy Store	Italian Restaurant	Restaurant	Baby Store	Athletics & Sports	Nightclub	Coffee Shop
8	Downtown Toronto	0	Coffee Shop	Café	Restaurant	Gym	Hotel	Bar	Clothing Store	Thai Restaurant	Cosmetics Shop	Concert H

Only 8 neighborhoods of cluster 1 is shown here

Examining clusters: Cluster 2-5

Cluster 2

	Borough	Neighborhood	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
4	East Toronto	The Beaches	1	Health Food Store	Pub	Trail	Dive Bar	Dessert Shop	Dim Sum Restaurant	Diner	Discount Store	Distribution Center	Women's Store
21	Central Toronto	Forest Hill North & West, Forest Hill Road Park	1	Park	Sushi Restaurant	Jewelry Store	Trail	Mexican Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Dive Bar
33	Downtown Toronto	Rosedale	1	Park	Trail	Tennis Court	Playground	Doner Restaurant	Dog Run	Donut Shop	Dive Bar	Dance Studio	Distribution Center

Cluster 3

|	Borough	Neighborhood	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
29	Central Toronto	Moore Park, Summerhill East	2	Trail	Playground	Women's Store	Deli / Bodega	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Dive Bar

Cluster 4

	Borough	Neighborhood	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
18	Central Toronto	Lawrence Park	3	Park	Swim School	Bus Line	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run	Dive Bar	Distribution Center

Cluster 5

	Borough	Neighborhood	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
19	Central Toronto	Roselawn	4	Dive Bar	Music Venue	Garden	Women's Store	Deli / Bodega	Eastern European Restaurant	Dumpling Restaurant	Donut Shop	Doner Restaurant	Dog Run

Observation and result
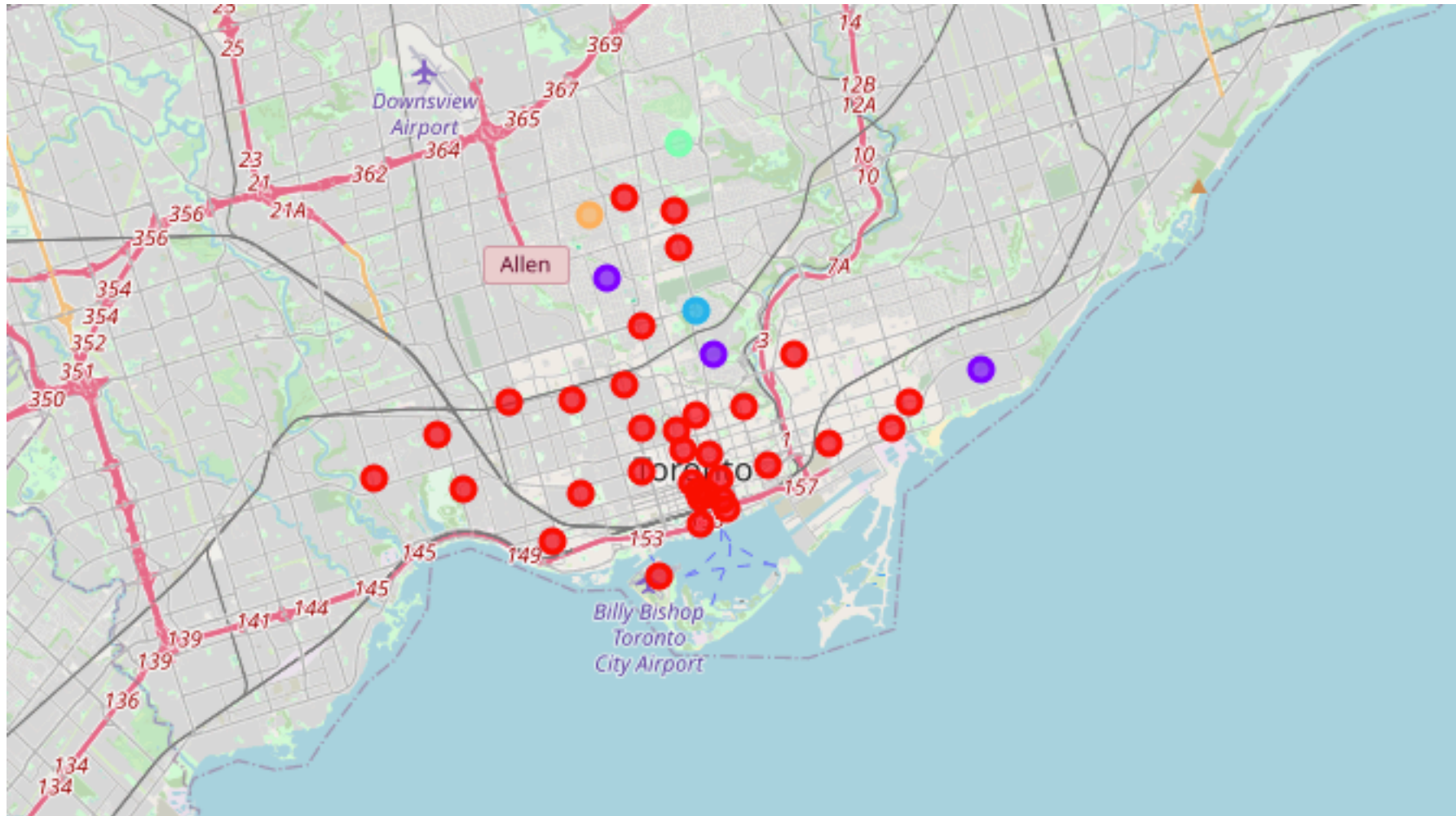
Cluster in red is more suitable for opening restaurant

Conclusion and future direction

1. The neighborhood of Toronto is explored using unsupervised learning

2. We found a suitable neighborhood for opening a restaurant, which is situaded Cluster 1 shown in the map

Future direction
   1. More detailed analysis to be done using city crime data
   2. Getting information of standard of living information to further suggest the type of business to set up.