

Opening a new Hotel in Toronto, Canada

Introduction: Business Problem

- In this project we try to find the best location for building a new hotel in Toronto, Canada
- We want to build a hotel in the neighborhood which the competition is low, and there are not already crowded with hotels
- However, we want to make sure that this place is close enough to the large amount of entertainment activities.

Toronto

- Toronto is the capital city of the Canadian province of Ontario
- It is the most populous city in Canada and the fourth most populous city in North America
- Toronto is an international centre of business, finance, arts, and culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world

DATA

- 1. https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M . I scraped the Wikipedia page and wrangle the data, clean it, and then read it into a pandas dataframe so that it is in a structured format. This webpage includes Toronto boroughs and neighborhoods.
- 2. http://cocl.us/Geospatial_data Here is a link to a csv file that has the geographical coordinates of each postal code
- 3. Hotels and Entertainment activities data in every neighborhood will be obtained using Foursquare API

Methodology

- First, we collected location of all neighborhood of Toronto. Then we retrieved location of all hotels in each neighborhood of Toronto
- Second, we use our model to cluster different neighborhood in Toronto depends on location of hotels. Then we choose best cluster depends of number of hotels as well as number of entertainment activities in that cluster.

Analysis

- We collected data about all Borough and Neighborhood in Toronto, Canada. We clear this data, remove all non-assigned neighborhood and borough. We converted it to structured format so we can do analysis based on that.
- Then we collected data from https://cocl.us/Geospatial_data. From this data set, we got latitude and longitude of each neighborhood in Toronto. Then we merge these two tables into one table.

Sample of Merged Data

	Postal Code	Borough	Neighborhood	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

Sample of Hotels in Toronto

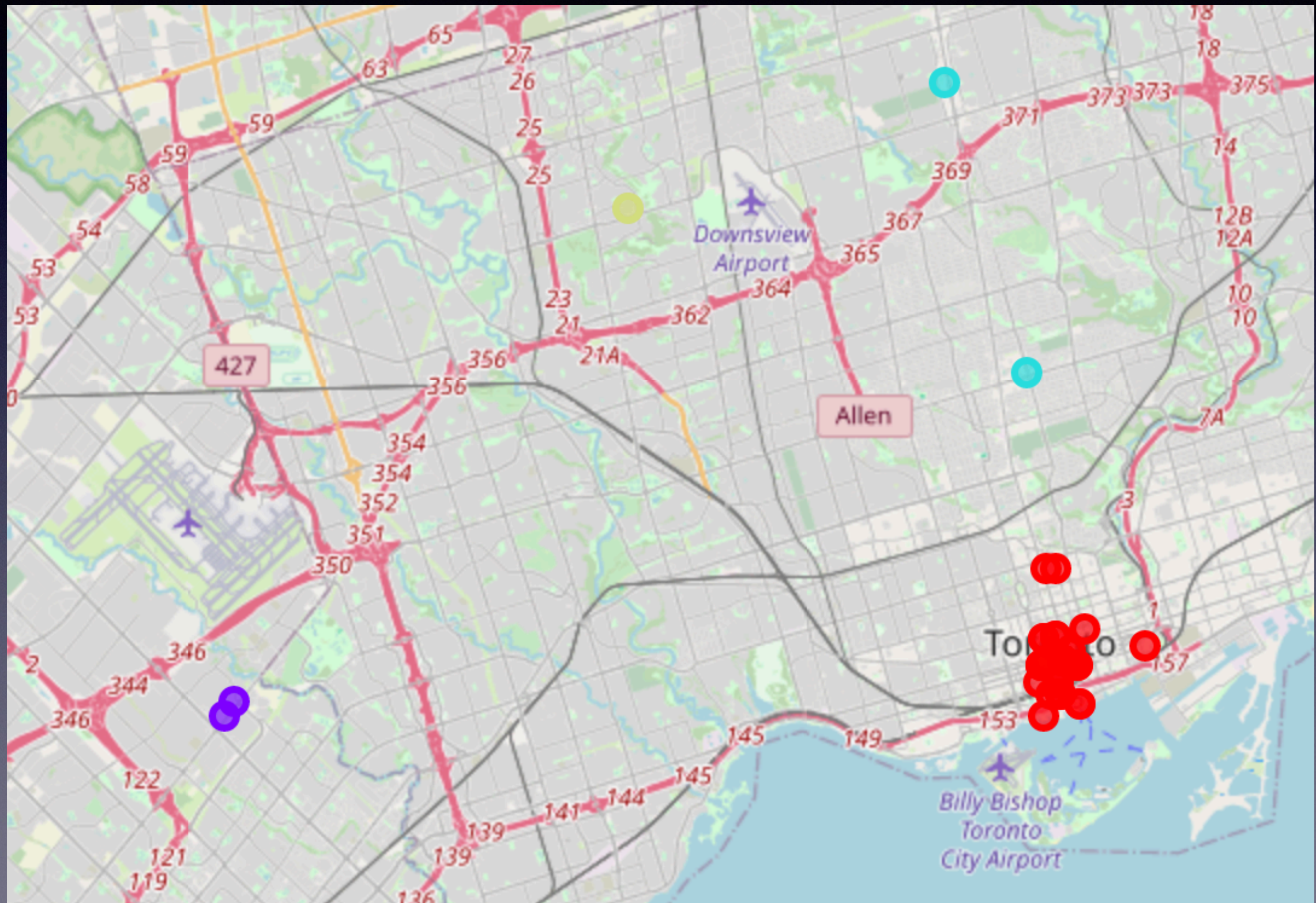
- Then we use API to fetch data from Foursquare. We want to list all hotels in Toronto. The below code shows us there are 43 hotels in Toronto. You can find the code as well as the sample of result

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Regent Park, Harbourfront	43.654260	-79.360636	Residence & Conference Centre	43.653040	-79.357040	Hotel
1	Garden District, Ryerson	43.657162	-79.378937	The Grand Hotel & Suites Toronto	43.656449	-79.374110	Hotel
2	Garden District, Ryerson	43.657162	-79.378937	Marriott Downtown at CF Toronto Eaton Centre	43.654728	-79.382422	Hotel
3	St. James Town	43.651494	-79.375418	Cambridge Suites Toronto	43.651836	-79.378107	Hotel
4	St. James Town	43.651494	-79.375418	One King West Hotel & Residence	43.649139	-79.377876	Hotel

K-Means Clustering

- Run k-means to cluster the neighborhood into 4 clusters. Then by using folium, we can plot a map where all hotels in the same cluster have the same color. You can find the map in the next page. As you can see, there is just one Yellow color hotel in one of the clusters.

Four Cluster of Hotels



"Downsview" Neighborhood

- So we choose "Downsview" Neighborhood in the yellow clusters. Because our hotel just have one competitor. Also, many attractions are near to this location. We can see some of them in next page.

Other Activities in this Neighborhood

- One airport is located in this neighborhood. Our hotel will be the best location for the travelers who stop at this airport. Also, there are two beautiful parks close to our proposed location. Our guest can shop at three grocery stores which are located near us. This location is near to Baseball Field too.

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Downsview	43.737473	-79.464763	Toronto Downsview Airport (YZD)	43.738883	-79.470111	Airport
Downsview	43.761631	-79.520999	Driftwood community centre	43.765680	-79.519706	Athletics & Sports
Downsview	43.739015	-79.506944	TD Canada Trust	43.740236	-79.512550	Bank
Downsview	43.728496	-79.495697	Roding Park	43.728655	-79.492918	Baseball Field
Downsview	43.728496	-79.495697	Blue Sail Energy Solutions	43.731445	-79.493787	Business Service
Downsview	43.728496	-79.495697	Yummy Dogs	43.726512	-79.501280	Food Truck
Downsview	43.739015	-79.506944	Win Farm Supermarket	43.739193	-79.512053	Grocery Store
Downsview	43.739015	-79.506944	Price Chopper	43.739908	-79.512261	Grocery Store
Downsview	43.761631	-79.520999	Durante's No Frills	43.758178	-79.519680	Grocery Store
Downsview	43.761631	-79.520999	Planet Fitness	43.757538	-79.519610	Gym / Fitness Center
Downsview	43.728496	-79.495697	Toronto Painters by MPS	43.729367	-79.499002	Home Service
Downsview	43.739015	-79.506944	Gecko Hospitality	43.742670	-79.503958	Hotel
Downsview	43.761631	-79.520999	LCBO	43.759257	-79.519454	Liquor Store
Downsview	43.737473	-79.464763	Ancaster Park	43.734706	-79.464777	Park
Downsview	43.739015	-79.506944	Giltspur Park	43.735724	-79.507821	Park
Downsview	43.739015	-79.506944	jane sheppard mall	43.740104	-79.512552	Shopping Mall

Results and Discussions

- Our analysis shows that although there is a great number of hotels in Toronto, most of them concentrate on downtown.
- After clustering different neighborhood, we understand that in one cluster, there is only one hotel. So we choose this cluster to build our hotel.
- Then we investigate all neighborhoods in this cluster to find out what is the best location to build this hotel. We find "Downsview" Neighborhood. This neighborhood has lots of activities for tourists to do.
- It has two parks (Ancaster Park, Giltspur Park), one shopping mall (jane sheppard mall), three grocery stores (Win Farm Supermarket, Price Chopper, Durante's No Frills), one baseball field (Roding Park), and so on.
- Also, this neighborhood has one Airport which is Toronto Downsview Airport (YZD) which can attracts travelers who has stop at this airport.
- So all in all, there are not much competition in this region as well as lot of attraction for tourist. So building the hotel in this area can make a huge revenue for a new hotel.

Conclusion

- The purpose of this project was to find an area with low number of hotels on Toronto to open a new Hotel. After retrieving data from several data sources and convert them to a structured data frame, applying the K-Means clustering algorithm, we picked the cluster with fewer hotels and more entertainment activities.
- Final decision on optimal hotel location will be made by stakeholders based on specific characteristics of neighborhoods like competition and other activities on that neighborhood like restaurants, airport, grocery store, sport field and so on