Defining best location for new apartments

Laura Perez

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1. Introduction

1.1. Background

Canada is a popular location for exchange students, between 2014 and 2017 there was an increase of 34% in international students. Most of these international students were in Toronto, Vancouver and Montreal. The continuous increasing rate of foreign students requires a higher housing amount.

Finding a place to live is usually a hard task for foreign students as they have to take into account many aspects such as living expenses, amenities, transportation, among others.

1.2. Problem

When a company is trying to build apartments for students in Toronto, is important to look for the right location, that will make students choose them. In order to do that is important to consider:
  - public transport
  - shopping and eating
  - distance to universities

1.3. Interest

Stakeholders of a construction project are interested on making a good investment that can allow them to choose the right neighborhood in Toronto in order to rent all the apartments in a short period of time.

2. Data acquisition

The data be used for the problem is a list of postal codes in Toronto. This data got from https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M and turned into a dataframe for further analysis.

After getting the information from the webpage previously mentioned the Foursquare location data was be used to look for the neighborhood with good benefits.

The data has the following features:

- Postal Code
- Borough
- Neighborhood
- Latitude
- Longitude

In order to reduce the amount of data only boroughs of Toronto are considered. Figure 1 shows the first 5 rows of the used dataframe.

	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

Figure 1. Dataframe to analyze.

3. Methodology

The objective is to find the right neighborhood to build student apartments in Toronto. Therefore, we need to use Foursquare data and look for the most common venues on each neighborhood to see if are of interest for students, the second aspect important to consider is the distance to universities, in this case we focused in University of Toronto as it is the one with a higher amount of students.

First we used the folium and geolocator libraries in order to get the geographical coordinates of Toronto and to visualize the neighborhoods on a map as shown in Figure 2.

Figure 2. Neighborhoods in Toronto.

Then using Foursquare we explore all neighborhoods in Toronto and get the 10 most common venues on each one as shown in Figure 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 Co
0	Berczy Park	Coffee Shop	Cocktail Bar	Beer Bar	Bakery	Seafood Restaurant	Cheese Shop	Café	Rest
1	Brockton, Parkdale Village, Exhibition Place	Café	Coffee Shop	Breakfast Spot	Nightclub	Gym / Fitness Center	Furniture / Home Store	Intersection	Rest
2	Business reply mail Processing Centre	Smoke Shop	Pizza Place	Skate Park	Brewery	Burrito Place	Farmers Market	Fast Food Restaurant	Rest
3	CN Tower, King and Spadina, Railway Lands, Har...	Airport Service	Airport Terminal	Airport Lounge	Sculpture Garden	Rental Car Location	Plane	Harbor / Marina	E

Figure 3. Top venues per neighborhood.

After that we clustered the neighborhoods in 5 groups according to the type of venue they have, the resulting cluster is shown in Figure 4, each neighborhood is represented with a specific color.
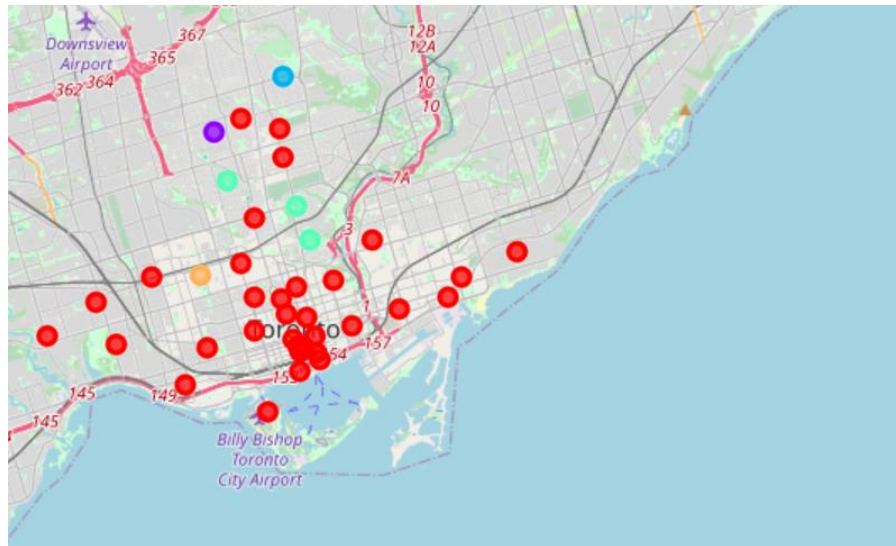

Figure 4. Clusters of neighborhoods.

Finally, we analyze each cluster in order to select the best one depending on their venues. The cluster 0, shown in read in Figure 4, is the best one as it has more interesting venues and to choose the best neighborhood on cluster 0 we compute the distance to University of Toronto.

4. Results

We can summarize the results in 4 points.
- The cluster with more venues of interest for students is cluster 0.
- Only cluster 2 has "Bus line" as most common venues.
- The nearest neighborhood to University of Toronto in cluster 0 is Business reply mail Processing Centre.
- The furthest neighborhood to University of Toronto in cluster 0 is North Toronto West.

5. Discussion and conclusion

As previously shown the best place to build departments for students is in cluster 0, then if you had to choose a specific neighborhood the top three according to distance and venues would be:
- University of Toronto, Harbord
- Regent Park, Harbourfront
- St. James Town, Cabbagetown