MANDT

THE BATTLE OF NEIGHBORHOODS

IBM Applied Data Science Capstone

Neighborhood Hunting in Toronto, Canada

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1. INTRODUCTION

1.1. Background

Evaluating houses is a deeply personal and complex process, impacted by diverse factors ranging from the physical characteristics and local amenities to politic-economic factors. It's important to analyze the situation, research the options, and gather all the necessary information before making an important decision about moving.

Besides the intrinsic features of a property such as the number of beds, baths, square footage, price, age, etc, a factor that can affect the decision of evaluating houses is the proximity to the things that matter most to them. This may include a workplace, views, parks, schools, community service, residences of relatives and so on.

The same rings true for all who seeks a new place around the world in pursuit of their dreams or in search of a better life.

1.2. Problem

Both cities have a large and diverse population of both Toronto and New York, including . Every year hundreds of thousands of immigrants, businessmen and professionals visit, migrate to or settle in these cities for work, livelihood and tourism.

One of my clients lives in Yorkville, Manhattan, New York and she loves her neighborhood. She recieved a great job offer from Toronto, and she decided to move to Toronto in 3 weeks to take up the new opportunity. She wants to find out a neighborhood in Toronto that has similar amenities available near her that she gets in Yorkville.

Therefore the problem is to find neighborhoods that provides similar amenities of its current neighborhood. In this project, Python's data analysis and geospatial analysis packages was used to analyze the whole spectrum of available listings in a market, evaluate and rank properties based on venue category frequency and arrive at a shortlist of neighborhoods in Toronto, similars to Yorkville.

1.3. Target Audience

Target audience for this project is anyone who is searching for a new properties in neighborhoods that provides similar amenities of their current neighborhood.

2. DATA

Housing data for the city of New York was collected from the New York University Libraries [1]. The New York dataset has a total of 5 boroughs and 306 neighborhoods, as well as the latitude and logitude coordinates of each neighborhood.

Housing data for the city of Toronto was scraped from Wikipedia [2] that contains a list of postal codes, boroughs and neighborhoods, with a total of 10 boroughs and 217 neighborhoods.

3. METHODOLOGY

Firstly, the boroughs and neighborhoods of New York was collected from the New York University Libraries [1]; and postal codes, boroughs and neighborhoods of Toronto was scraped from Wikipedia [2] using Pandas package.

In order to use Foursquare API, the geographical coordinates in the form os latitude and longitude of neighborhoods of Toronto was needed. To do so, the Geocoder package was used to convert address into latitude and longitude.

Next, Foursquare API was used passing the geographical coordinates to get the top 100 venues that are with a radius of 750 meters. Foursquare returns the venue data in JSON format and the venue name, category, latitude and longitude was acquired. Then, each neighborhood was analyzed by grouping the rows by neighborhood and calculating the mean of the frequency of each venue category.

Lastly, a shortlist of Toronto neighborhoods was defined by filtering the data with the top 10 most frequent venue category of Yorkville.

4. RESULTS

The results from ranking show that Harbourfront, Lawrence Manor, Parkwoods, Regent Park and Victoria Village are the most similar neighborhoods to Yorkville, based on the most frequent venue category.

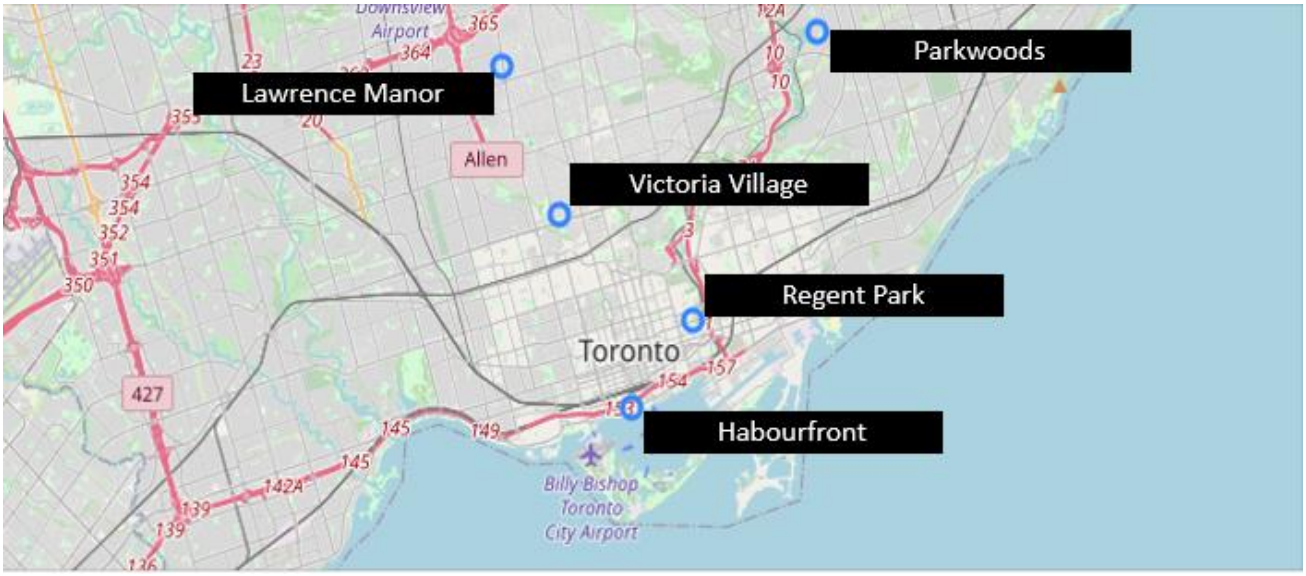
The image bellow shows the top 10 venue categories of Yorkville.

	Neighborhood	Coffee Shop	Ice Cream Shop	Pizza Place	Gym	Italian Restaurant	Deli / Bodega	Bagel Shop	Wine Shop	Bar	Mexican Restaurant
0	Yorkville	0.07	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03

The image bellow shows the shortlist of similar neighborhoods to Yorkville.

	Neighborhood	Coffee Shop	Ice Cream Shop	Pizza Place	Gym	Italian Restaurant	Deli / Bodega	Bagel Shop	Wine Shop	Bar	Mexican Restaurant
0	Harbourfront	0.063075	0.005779	0.030619	0.009808	0.013503	0.009807	0.001723	0.000688	0.007991	0.010083
1	Lawrence Manor	0.065583	0.015518	0.031787	0.004697	0.019946	0.002273	0.000000	0.000000	0.007108	0.009367
2	Parkwoods	0.070725	0.018485	0.030372	0.015229	0.008921	0.006578	0.000000	0.000000	0.007644	0.005332
3	Regent Park	0.072782	0.007766	0.064346	0.008766	0.016415	0.003538	0.002019	0.000000	0.007092	0.004394
4	Victoria Village	0.054502	0.008497	0.069860	0.000000	0.008497	0.011364	0.000000	0.000000	0.012529	0.000000

The shortlist of similar venues are visualized in the map bellow.



5. CONCLUSION

In this case study, the input data set was scraped from different sources and was spatially enriched with information about access to different venues. It demonstrates how data science can be employed to one aspect of the real estate industry. Buying a home is a personal process, however a lot of decisions are heavily influenced by location. As shown in this study, Python libraries such as Pandas can be used for visualization and statistical analysis, and libraries such as the Foursquare API for Python for spatial analysis. The methods adopted in this study can be applied to any other real estate market to build other recommendation engines.

REFERENCES

[1] https://geo.nyu.edu/catalog/nyu_2451_34572

[2] https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M