Exploring for potential location for Indian Restaurant in Vancouver.

Introduction

Vancouver located in the province of the British Columbia is one of the most populous cities in Canada. Vancouver with a population of 675,000 has the highest population density in Canada, with over 5,400 people per square kilometer. The city is made of up number of small neighbourhoods with their own distinct cultures. The city of Vancouver officially divides the city in 22 neighbourhoods. Vancouver is one of the most ethnically diverse cities in Canada:50.6 % of residents belong to visible minority groups.

With such a diverse and large population there is always a demand for restaurants and fast-food chains in densely populated areas. For an investor interested in opening a restaurant, trending venues in a neighbourhood is a key factor for deciding on the location. Also, the number of restaurants near by can play a major role in deciding for a location. Further, the presence of ethnic population is analyzed when the restaurants is of a particular cuisine.

When solving for this problem, we can analyze the location data to create a map and determine the most popular venues to decide on the location of a restaurant.

Data

- I have used an excel file with data about the neighbourhoods in Vancouver and their longitude and latitude. For example, the data for the neighbourhood of Downtown has the following coordinates:

	Neighbourhood	Latitude	Longitude
0	Downtown	49.2820	123.1171

- I have used foursquare API to find the most common venues in the neighbourhoods of Vancouver for our analysis. Some other information extracted include 'Venue', 'Venue Category, 'Venue Latitude' and 'Venue Longitude'.

Methodology

- First, I have used geocoder library to get the coordinates of Vancouver (49.2608724, -123 .1139529） . Then using folium library, I have plotted the neighbourhood candidates on th e map of Vancouver.
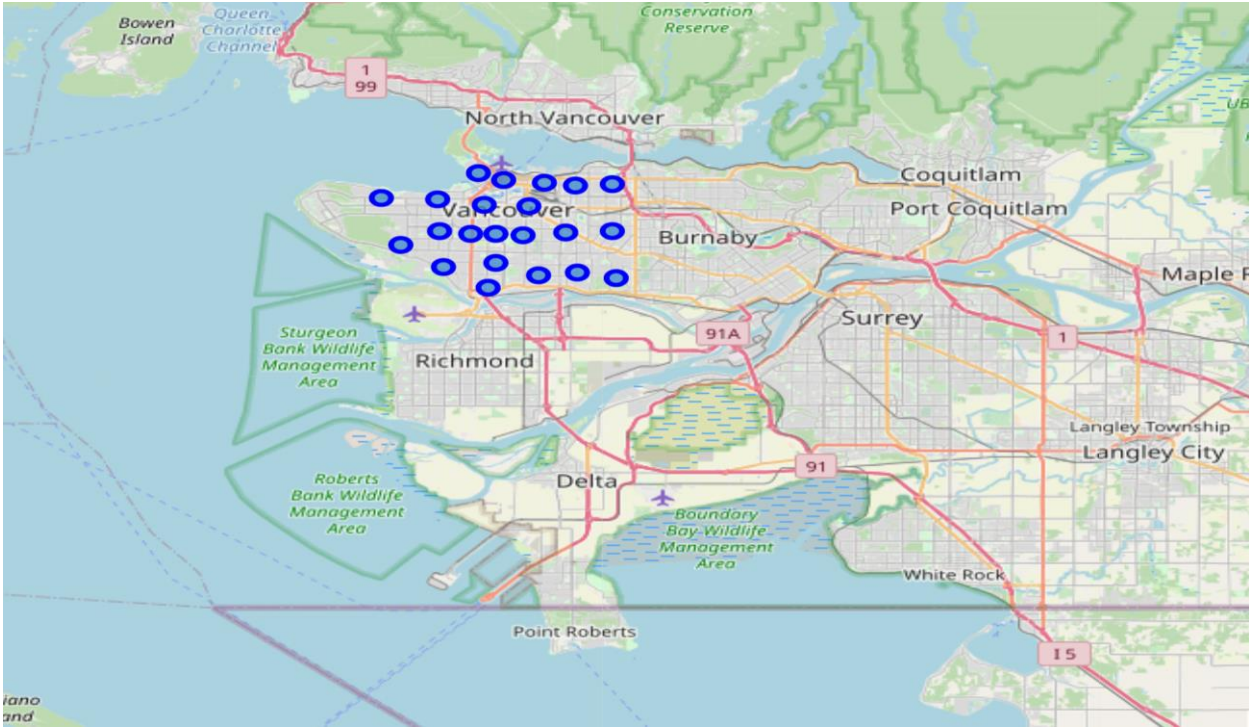
- Then I have used foursquare API to get the venue details for each neighbourhood.

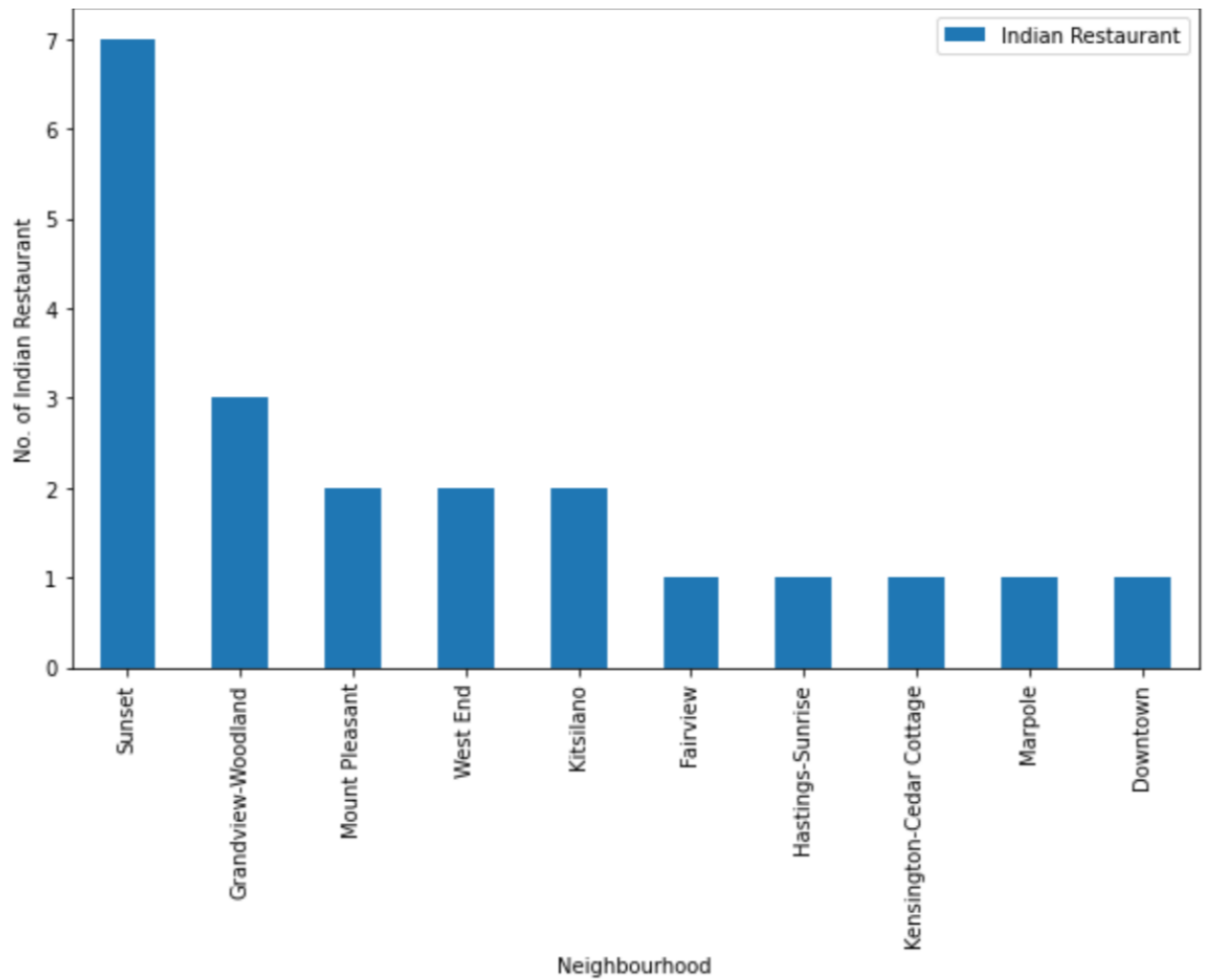|	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Kensington-Cedar Cottage	49.246686	-123.072885	Famous Foods	49.248356	-123.071471	Grocery Store
1	Kensington-Cedar Cottage	49.246686	-123.072885	Anytime Fitness	49.249640	-123.075450	Gym / Fitness Center
2	Kensington-Cedar Cottage	49.246686	-123.072885	House of Dosas	49.250393	-123.076346	Indian Restaurant
3	Kensington-Cedar Cottage	49.246686	-123.072885	Sun Bo Kong	49.250698	-123.077046	Vegetarian / Vegan Restaurant
4	Kensington-Cedar Cottage	49.246686	-123.072885	My Chau	49.247153	-123.069423	Vietnamese Restaurant

- Next, I have utilized one hot encoding technique to analyze the venue categories in each neighbourhood.

	Neighbourhood	Accessories Store	African Restaurant	American Restaurant	Amphitheater	Art Gallery	Arts & Crafts Store	Asian Restaurant	Athletics & Sports	Auto Dealership	...	Trade School	Trail	Vegetarian / Vegan Restaurant	Video Store	Vietnamese Restaurant	Water Park	Waterfront	Wine Shop
0	Kensington-Cedar Cottage	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0
1	Kensington-Cedar Cottage	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0
2	Kensington-Cedar Cottage	0	0	0	0	0	0	0	0	0	...	0	0	0	0	0	0	0	0
3	Kensington-Cedar Cottage	0	0	0	0	0	0	0	0	0	...	0	0	1	0	0	0	0	0
4	Kensington-Cedar Cottage	0	0	0	0	0	0	0	0	0	...	0	0	0	0	1	0	0	0

- The analysis of the most common venue is done in each neighbourhood.

	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 Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Kensington-Cedar Cottage	49.246686	-123.072885	0	Vietnamese Restaurant	Chinese Restaurant	Vegetarian / Vegan Restaurant	Café	American Restaurant	Grocery Store	Bank	Fast Food Restaurant	Liquor Store	Bus Stop
1	Mount Pleasant	49.263065	-123.098513	0	Coffee Shop	Brewery	Bakery	Vietnamese Restaurant	Café	Park	Sushi Restaurant	Yoga Studio	Pizza Place	Outdoor Supply Store
2	Oakridge	49.226403	-123.123025	2	Sushi Restaurant	Men's Store	Fast Food Restaurant	Bike Rental / Bike Share	Bus Stop	Tea Room	Jewelry Store	Shopping Mall	Sporting Goods Shop	Park
3	Renfrew-Collingwood	49.247343	-123.040166	0	Park	Bus Stop	Pizza Place	Dog Run	Bar	Deli / Bodega	Flower Shop	Plaza	Bookstore	Convenience Store
4	Sunset	49.218756	-123.092038	0	Indian Restaurant	Market	Bus Stop	Chinese Restaurant	Bakery	Pharmacy	Park	Bank	Restaurant	Thai Restaurant
5	West Point Grey	49.268401	-123.203468	0	Bank	Sushi Restaurant	Harbor / Marina	Beach	Park	Bakery	Coffee Shop	Garden	Restaurant	Bus Stop

- The analysis of Indian restaurants in each neighbourhood throws light on the neighbourhoods with the most number of Indian restaurants.

- Further, we analyze the number of Indian restaurants in each cluster.

Analysis of each cluster

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In [159]: ▶   cluster0 = vancouver_new.loc[vancouver_new['Cluster Labels'] == 0]
              df_cluster0 = pd.merge(df1,cluster0, on='Neighbourhood')
              df_cluster0
```

Out[159]:

	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	Indian Restaurant	Cluster Labels
0	Kensington-Cedar Cottage	49.246686	-123.072885	Famous Foods	49.248356	-123.071471	Grocery Store	0.017857	0
1	Kensington-Cedar Cottage	49.246686	-123.072885	Anytime Fitness	49.249640	-123.075450	Gym / Fitness Center	0.017857	0
2	Kensington-Cedar Cottage	49.246686	-123.072885	House of Dosas	49.250393	-123.076346	Indian Restaurant	0.017857	0
3	Kensington-Cedar Cottage	49.246686	-123.072885	Sun Bo Kong	49.250698	-123.077046	Vegetarian / Vegan Restaurant	0.017857	0
4	Kensington-Cedar Cottage	49.246686	-123.072885	My Chau	49.247153	-123.069423	Vietnamese Restaurant	0.017857	0
...	...	...	...	...	...	...	...	...	...
1037	West End	49.285011	-123.135438	Simba's Grill	49.291084	-123.136148	African Restaurant	0.020000	0
1038	West End	49.285011	-123.135438	Nook	49.291635	-123.135306	Italian Restaurant	0.020000	0
1039	West End	49.285011	-123.135438	Sheraton Vancouver Wall Centre	49.280314	-123.126474	Hotel	0.020000	0
1040	West End	49.285011	-123.135438	Vancouver Aquatic Centre	49.277002	-123.134949	Pool	0.020000	0
1041	West End	49.285011	-123.135438	The Westin Bayshore	49.292332	-123.129162	Hotel	0.020000	0

- Lastly, a bar graph is plotted to have a comparison of Indian restaurants among all the clusters.

Results

There is a presence of large number of restaurants in most common venues catering to different cuisines in Vancouver city. Most of the Indian restaurants are in cluster 3 and consists of neighbourhoods such as Sunset and Marpole. Based on the analysis of clusters there is ample scope to open an Indian restaurant.

Discussion and conclusion

The highest average of Indian restaurants is in cluster 3 represented by the green bar. The neighborhoods located in the cluster 3 that have the highest average of Indian restaurants are Sunset and Marpole. Clusters 1,2 and 4 have no Indian restaurants but the number of neighbourhoods are not more than two in each of these clusters. The cluster 0 has the greatest number of neighbourhoods but comparatively the presence of Indian restaurants is not much. Having 14 neighbourhoods in the cluster will provide ample footfall for the restaurant to do business. So, it is recommended that the investors can open Indian restaurant in cluster 0. To further refine the results, we can include demographic data and disposable income to get a better understanding and return on the investment.