Capstone project – "The battle of Neighborhoods".

Analytics for an upcoming restaurant with Foursquare location data

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TABLE OF CONTENTS

Problem statement

Mumbai is one of the top 15 cities visited by international visitors. It is a host to 10 million* visitors every year. For most of the visitors it is the entry gate to exploring India, the central area of the city also hosts most of the tourist attractions, thus the central area of the city is a convenient area for International tourists to explore. In to being the financial capital of the country and a multicultural hub, Mumbai is also a well-known destination for great food.

The purpose of this project is to explore a great destination for setting up an Italian food restaurant in the Mumbai neighborhoods. One of the major aspects to look for is the proximity to the airport. Looking at the purpose of tourists for visiting Mumbai, it is evident that it will be either and entry point or exit point to India. Thus, it is a tendency of tourists to stay in areas convenient to the airport location. Also, from exploration perspective, tourist who are running tight on schedule will at least find a day or two to explore the city near and cover many place near their hotel. This increases the probability of setting up and international cuisine restaurant in an area that is in proximity to the international airport.

From a domestic visitor perspective, it is also essential to look for an upmarket area, within a 10 Km radius considering the traffic conditions in city, that will help the nearby residents to visit the restaurant and also order for takeaway food.

The proposal is to analyze and address the above two crucial aspects in consideration and suggestion for opening the new restaurant.

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*https://en.wikipedia.org/wiki/List_of_cities_by_international_visitors

Overview of data

The data that we intend to use for this project is a CSV file that has been prepared from multiple sources and the location details are sourced using the Geopy package. The nearby location data is rendered with the help of Foursquare.

We will first define the neighborhoods for the restaurant based that are close to the upmarket areas and have a proximity to the airport. For classifying an upmarket area, an identifier metric can be the rates of rent prices in that area. The first step is therefore to identify the rent in areas near airport. Using google I was able to source the average rental per unit for a residential property in these areas and also their latitude and longitude co-ordinates. These venues will be further searched in the foursquare database for a later part of the analysis.
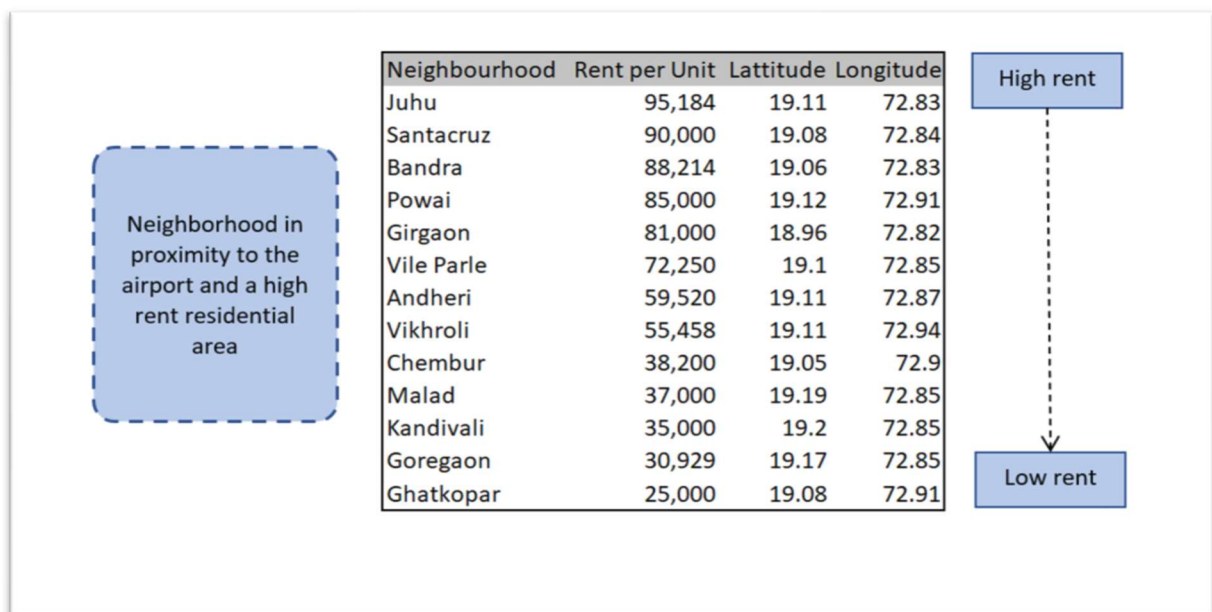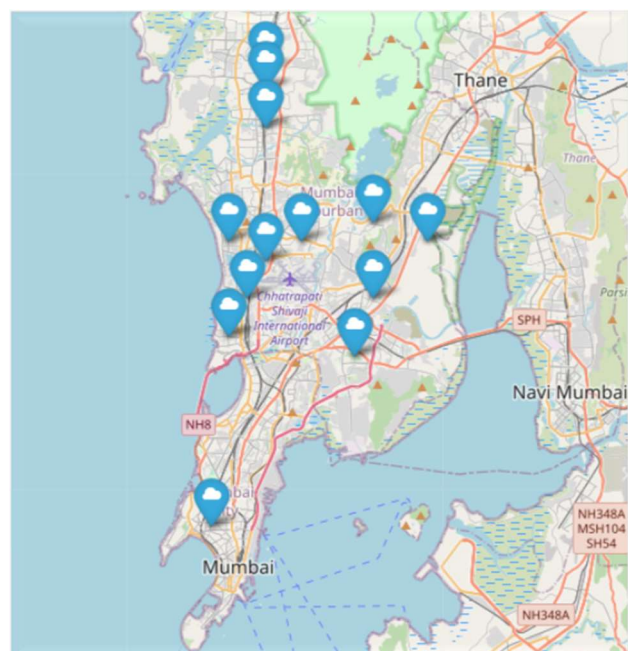
Neighborhood in proximity to the airport and a high rent residential area

Neighbourhood	Rent per Unit	Lattitude	Longitude	
Juhu	95,184	19.11	72.83	High rent
Santacruz	90,000	19.08	72.84	
Bandra	88,214	19.06	72.83	
Powai	85,000	19.12	72.91	
Girgaon	81,000	18.96	72.82	
Vile Parle	72,250	19.1	72.85	
Andheri	59,520	19.11	72.87	
Vikhroli	55,458	19.11	72.94	
Chembur	38,200	19.05	72.9	
Malad	37,000	19.19	72.85	
Kandivali	35,000	19.2	72.85	
Goregaon	30,929	19.17	72.85	
Ghatkopar	25,000	19.08	72.91	Low rent

Fig 1. The CSV data required for initial exploratory analysis.

The initial look at the rendered map data revels the neighborhoods of Bandra, Juhu, Santacruz, Ville Parle, Chembur as good contenders for the restaurant location. These locations need to be further tested in Foursquare for presence of similar establishments nearby to minimize competition. The remaining steps in the project will be to evaluate the most suitable area for setting up a restaurant and also consideration of other factors such as overall restaurant density in the area.

Methodology

As shown above a quick sort by the average rent by neighborhood and geographic proximity to the high rent regions narrows down our search to a few neighborhoods. A few neighborhoods may satisfy the condition for having proximity to the airport however they are too far away from the high rent areas and may decrease the number of people visiting as well as take away orders. Hence for optimum functioning of the business it is of paramount importance to find a place that has average proximity to the airport as well as near the high rent areas.

So, the question arises which of these neighborhoods can possibly be the optimal solution to our problem? Aside from the high rent and airport we also have to consider the amount of commercial activity in the selected neighborhood, tourist traffic and relative competition from

other restaurants. We have already established that there would not be many 'Italian` restaurants available, but we also do not want to enter a region that is over-crowded with options.

We further deep dive into analytics with the help of foursquare. We analyze the existing types of establishments in these neighborhoods within the range of 500 meters. We need to register a Foursquare Developer Account in order to obtain the Foursquare ID and Foursquare secret key. We then make API calls to Foursquare passing in the geographical coordinates of the neighborhoods in a Python loop. Foursquare will return the venue data in JSON format and we will extract the venue name, venue category, venue latitude and longitude. With the data, we can check how many venues were returned for each neighborhood and examine how many unique categories can be curated from all the returned venues. Then, we will analyze each neighborhood by grouping the rows by neighborhood and taking the mean of the frequency of occurrence of each venue category.

```
In [19]: mumbai_venues.groupby('Neighborhood').count()
Out[19]:
```

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Andheri	7	7	7	7	7	7
Bandra	24	24	24	24	24	24
Chembur	7	7	7	7	7	7
Ghatkopar	6	6	6	6	6	6
Girgaon	4	4	4	4	4	4
Goregaon	4	4	4	4	4	4
Juhu	4	4	4	4	4	4
Kandivali	7	7	7	7	7	7
Malad	2	2	2	2	2	2
Powai	25	25	25	25	25	25
Santacruz	5	5	5	5	5	5
Vile Parle	7	7	7	7	7	7

```
In [20]: print('There are {} uniques categories in restaurants'.format(len(mumbai_venues['Venue Category'].unique())))
         There are 16 uniques categories in restaurants
```
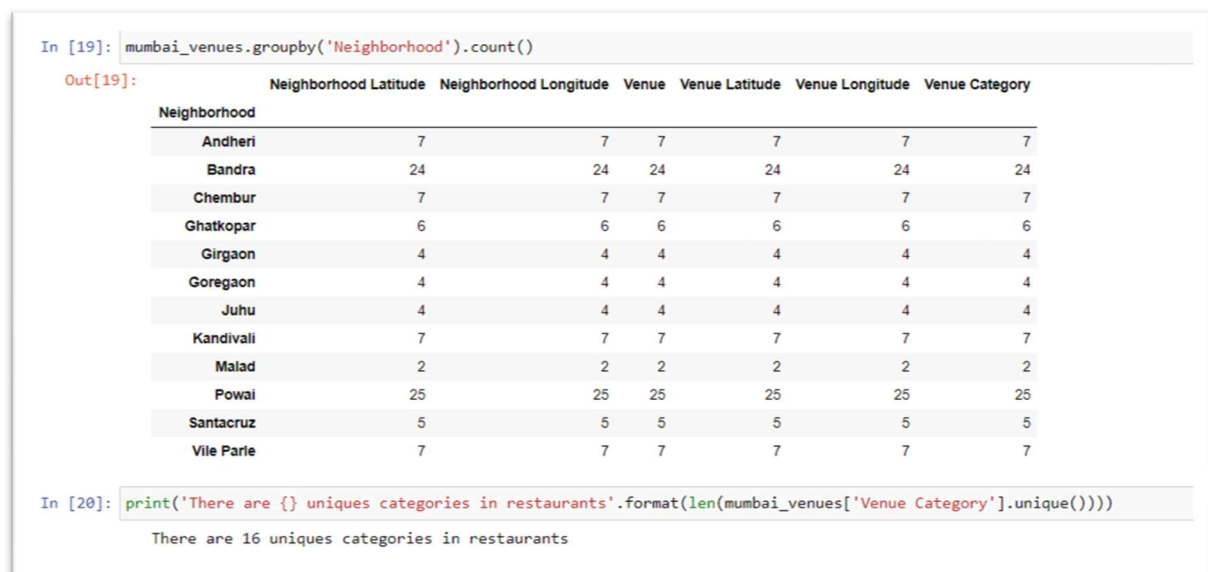
Fig 2. Frequency of existing restaurants in neighborhoods

The data returned by foursquare is then churned to sort the types of available restaurants in the vicinity. I have thus sorted the list by venue type as 'Restaurant` to identify the presence and frequency of an existing Italian restaurants in the vicinity. The outcome to consider are the areas of Bandra, Ville Parle, Powai and Juhu

Recommendation

At the first glance, neighborhoods of Bandra and Powai show dense population of exiting restaurants nearby. While Bandra has a proximity to the airport, Powai is little far away compared to the other contenders. We further analyzed the neighborhoods basis the most common venues nearby.

	Neighbourhood	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
0	Andheri	Indian Restaurant	Vegetarian / Vegan Restaurant	Italian Restaurant	Chinese Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Seafood Restaurant
1	Bandra	Indian Restaurant	Chinese Restaurant	Asian Restaurant	Seafood Restaurant	Spanish Restaurant	Restaurant	Italian Restaurant	French Restaurant
2	Chembur	Indian Restaurant	Fast Food Restaurant	Punjabi Restaurant	Chinese Restaurant	Asian Restaurant	Vegetarian / Vegan Restaurant	Tex-Mex Restaurant	Sushi Restaurant
3	Ghatkopar	Indian Restaurant	Vegetarian / Vegan Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Seafood Restaurant	Restaurant	Punjabi Restaurant
4	Girgaon	Indian Restaurant	Vegetarian / Vegan Restaurant	Fast Food Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Seafood Restaurant	Restaurant
5	Goregaon	Indian Restaurant	Fast Food Restaurant	Vegetarian / Vegan Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Seafood Restaurant	Restaurant
6	Juhu	Indian Restaurant	Chinese Restaurant	Asian Restaurant	American Restaurant	Vegetarian / Vegan Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant
7	Kandivali	Indian Restaurant	Fast Food Restaurant	Vegetarian / Vegan Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Seafood Restaurant	Restaurant
8	Malad	Indian Restaurant	Fast Food Restaurant	Vegetarian / Vegan Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Seafood Restaurant	Restaurant
9	Powai	Indian Restaurant	Restaurant	Italian Restaurant	Chinese Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Seafood Restaurant	North Indian Restaurant
10	Santacruz	Indian Restaurant	Chinese Restaurant	Fast Food Restaurant	Vegetarian / Vegan Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Seafood Restaurant
11	Vile Parle	Indian Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant	Maharashtrian Restaurant	Tex-Mex Restaurant	Sushi Restaurant	Spanish Restaurant	Restaurant

Fig 3. Neighborhoods grouped by most common venues.

Bandra and Powai also show existing Italian restaurants in the neighborhood. Ville Parle is the closest venue to the airport in terms of restaurant and also shows not existing Italian restaurants nearby. However, it is not amongst the top 5 high rent areas in the city. In terms of all the parameters 'Juhu` seems to be most promising alternative amongst all the neighborhoods.

Juhu does not have any Italian restaurant in the vicinity and is a home to many movie celebrities. Juhu is also host to a popular Juhu beach which is one of the tourist hotspots in the city. Finally, in terms of culinary reputation Juhu is known for some most prestigious international restaurant chains with high value and sought-after cuisines.

Conclusion

After evaluating all the options, the neighborhood of Juhu would be the best choice for setting up the restaurant. It is within the radius of 5 Km to the airport. It is one of the high rent neighborhoods and there are no existing Italian restaurants in the vicinity. Although Bandra seems close contender in terms of average rent prices people would likely not travel there specifically to eat. It is also very saturated with existing restaurants and setting up a restaurant in such and area would result in high competition and impact revenue in the long run.