Restaurant location recommendation in Mumbai

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1. Introduction:

1.1. **Problem Background:** Mumbai is one of the largest cities in the world. It is home to 19.98 Million people. The hospitality industry in Mumbai has been extremely successful; Mumbai is home to some of India's best restaurants and has various Restaurant types that can satisfy different taste buds. There is fierce competition in the hospitality sector, and before undertaking a new venture, Restaurant chains need to decide new locations after a thorough analysis of the market. An accurate analysis will ensure that the new venture will be very successful.

1.2. **Problem Description:** Opening a new restaurant in such a large city is not an easy project. There are a lot of things to consider, such as the location where the restaurant is to be opened, the demographics of the location and the competition that the restaurant may face from other restaurants. Some locations may have a restaurant of one type more than the others. Thus, it is of extreme importance to select a perfect location to launch a new restaurant so that it will be a successful venture.

1.3. **Target Audience:** This project is aimed at restaurateurs who have been in the hospitality sector for a long duration of time, as well as for small scale entrepreneurs for whom profit making is key in a new venture such as opening a restaurant.

1.4. **Business Problem:** "Where should a new restaurant in Mumbai be opened such that it will be a successful venture?"

2. Data:

The Wikipedia page https://en.wikipedia.org/wiki/Category:Suburbs_of_Mumbai contains a list of neighbourhoods in Mumbai, with a total of 42 neighbourhoods. We will use web scraping techniques to extract the data from the Wikipedia page , with the help of requests and BeautifulSoup packages. The geographical coordinates can be obtained using geocoder package. After that, the foursquare API can be used to obtain venue data of these neighbourhoods. This project focuses only on Restaurants data to solve the business problem. Therefore, I will filter out all the different types of restaurants into a separate data frame, and then merge the filtered restaurant dataset with the respective latitudes and longitudes.

3. Methodology:

The data from the Wikipedia page was initially obtained by using requests and BeautifulSoup Libraries. The list of neighbourhoods obtained was made into a Dataframe. After this, the geographical coordinates of each neighbourhood was obtained using the geocoder

package. The coordinates were then added to the neighbourhood dataframe as latitude and longitude columns. In order to visualise the neighbourhoods, the geographical coordinates of Mumbai were obtained. Then using Folium, a map of Mumbai was created to visualise the coordinates. The data from the venues was then obtained from the Foursquare API. The data was prepared using the following methods, It was first grouped by Neighbourhoods, then the venue categories were one hot encoded, after which only restaurants of different types were selected and then made into a separate dataframe. The Machine Learning algorithm I chose was K-Means Clustering as I wanted to cluster the various neighbourhoods into groups based upon Restaurant types. Using these clusters, one can then select an appropriate location.

4. **Results:** The model clustered the neighbourhoods into Three(3) clusters, depending upon the type of restaurants that these locations had. As shown in Figure 2, most neighbourhoods belonged to cluster 1(purple in colour), followed by cluster 0(red in colour) and the rest in cluster 2.

5. **Discussion:** The major restaurant types in most parts are Indian,Chinese,Fastfood and Italian restaurants. Certain restaurant types are present more in some areas than in others. For Example, Juhu in Cluster 0 has more Gastropubs than other parts of Mumbai. Therefore, by using this clustering output, restaurant owners/ entrepreneurs can decide which type of restaurant to open such that they will face the least competition. Many suburbs of Mumbai do not have an authentic Indian restaurant. If Indian restaurants are opened in these suburbs, they will face a much lower competition from other restaurants. Certain suburbs of Mumbai that are more upmarket can open Gastropubs,Bistros,BBQ Joints,Steakhouses,Japanese and Sushi restaurants that can cater to the upmarket crowd. Another lucrative option would be opening a Vegan/Vegetarian restaurant in many suburbs.As for the location, neighborhoods in Cluster 2 are recommended.Various Restaurant types are not present here and will thus face far less competition as compared to clusters 0 and 1.

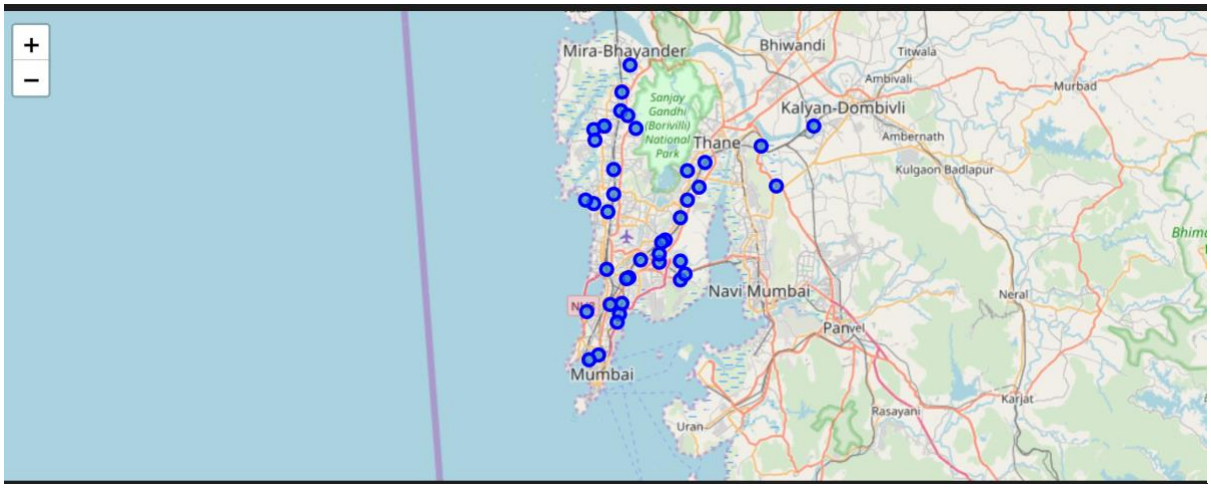

Fig.1.: The map of Mumbai with the neighbourhoods/suburbs on it.

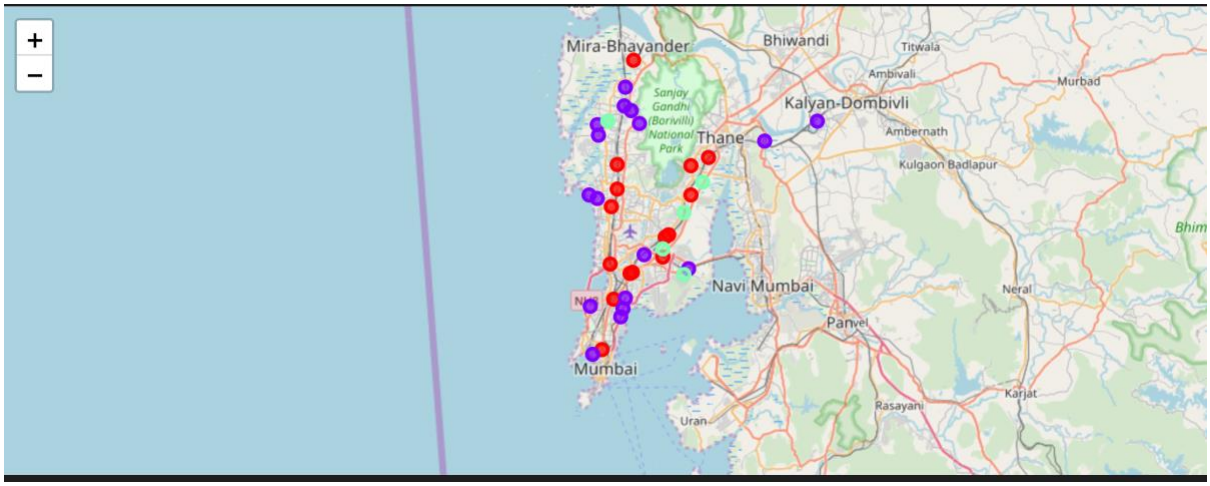

Fig.2.: Output obtained from Clustering the neighbourhoods.

6. **Conclusion:** Opening a new restaurant in a large city is not an easy project. This project, aimed at restaurateurs and small scale entrepreneurs attempted to help make one of the most important decisions with regards to the problem, deciding the location. The data obtained from Wikipedia and foursquare was clustered into three clusters or groups. Based upon the observations obtained from the clustering model, the target audience can make an informed decision about the business problem.