

# **OPENING A NEW RESTAURANT IN MUMBAI**

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**Final Report**

# Introduction

Mumbai is the financial and cultural capital of India. It is home to Indians of all states and is also a tourist attraction. What is more intriguing than its coastal location is the plethora of cuisines it hosts.

Be it vegetarian or non-vegetarian, the dishes in Mumbai boast of rich taste, fieriness and impressive flavors. The cuisine of Mumbai covers a large assortment of interesting, authentic dishes and zesty seafood dishes. The staple foods consumed by the residents of Mumbai include rice, aromatic fish curries, Indian bread (chapatis and rotis), vegetable curries, pulses and desserts. Coconuts, cashew nuts, peanuts and peanut oil are some of the major ingredients used in many of Mumbai's traditional dishes.

To monopolise on the hunger pangs of its residents, Mumbai is a rather great location for someone looking to enter the restaurant business. But being so populated, the high competition is obvious. Hence, it is sensible to analyse and settle for a location which would be most economically profitable.

This project looks forward to help people make a data driven decision.

## Data Used

In this project neighbourhood data from Wikipedia ([https://en.wikipedia.org/wiki/List\\_of\\_neighborhoods\\_in\\_Mumbai](https://en.wikipedia.org/wiki/List_of_neighborhoods_in_Mumbai)) will be used. The geographical coordinates of these neighbourhoods will be required. Also, the longitudes and latitudes of these neighbourhoods will be required as well. This data can be occupied using the built in Python libraries Geopy and Geocoder.

The venue data with recommendations will be collected using Foursquare API.

The following dataframe is the created initially after scraping the neighbourhood data from Wikipedia.

	Neighborhood	Location	Latitude	Longitude
0	Amboli	Andheri,Western Suburbs	19.129300	72.843400
1	Chakala, Andheri	Western Suburbs	19.111388	72.860833
2	D.N. Nagar	Andheri,Western Suburbs	19.124085	72.831373
3	Four Bungalows	Andheri,Western Suburbs	19.124714	72.827210
4	Lokhandwala	Andheri,Western Suburbs	19.130815	72.829270
5	Marol	Andheri,Western Suburbs	19.119219	72.882743
6	Sahar	Andheri,Western Suburbs	19.098889	72.867222
7	Seven Bungalows	Andheri,Western Suburbs	19.129052	72.817018
8	Versova	Andheri,Western Suburbs	19.120000	72.820000
9	Mira Road	Mira-Bhayandar,Western Suburbs	19.284167	72.871111

The following data was obtained after processing the above mentioned dataframe, to make it more usable.

	Neighborhood	Location	Latitude	Longitude
0	Amboli	Western Suburbs	19.129300	72.843400
1	Chakala, Andheri	Western Suburbs	19.111388	72.860833
2	D.N. Nagar	Western Suburbs	19.124085	72.831373
3	Four Bungalows	Western Suburbs	19.124714	72.827210
4	Lokhandwala	Western Suburbs	19.130815	72.829270
...	...	...	...	...
88	Parel	South Mumbai	18.990000	72.840000
89	Gowalia Tank	South Mumbai	18.962450	72.809703
90	Dava Bazaar	South Mumbai	18.946882	72.831362
91	Dharavi	Mumbai	19.040208	72.850850
92	Thane	Mumbai	19.200000	72.970000

93 rows × 4 columns

The following data was obtained after processing the Foursquare API.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Amboli	19.1293	72.84644	Cafe Arfa	19.128930	72.847140	Indian Restaurant
1	Amboli	19.1293	72.84644	5 Spice , Bandra	19.130421	72.847206	Chinese Restaurant
2	Amboli	19.1293	72.84644	Shawarma Factory	19.124591	72.840398	Falafel Restaurant
3	Amboli	19.1293	72.84644	Jaffer Bhai's Delhi Darbar	19.137714	72.845909	Mughlai Restaurant
4	Amboli	19.1293	72.84644	Narayan Sandwich	19.121398	72.850270	Sandwich Place
5	Amboli	19.1293	72.84644	Persia Darbar	19.136952	72.846822	Indian Restaurant
6	Amboli	19.1293	72.84644	Domino's Pizza	19.131000	72.848000	Pizza Place
7	Amboli	19.1293	72.84644	Garden Court	19.127188	72.837478	Indian Restaurant
8	Amboli	19.1293	72.84644	Subway	19.127860	72.844461	Sandwich Place
9	Amboli	19.1293	72.84644	Sarvodaya Veg. Restaurant	19.123760	72.850893	Indian Restaurant

The following dataset was used for clustering

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Amboli	Playground	Gym	Cocktail Bar	Hookah Bar	Gourmet Shop
1	Bandstand Promenade	Boutique	Scenic Lookout	Chinese Restaurant	Performing Arts Venue	Gastropub
2	Bhuleshwar	Street Food Gathering	Vegetarian / Vegan Restaurant	Cocktail Bar	Hookah Bar	Gym
3	Breach Candy	Indian Restaurant	Ice Cream Shop	Hookah Bar	Gym	Gourmet Shop
4	C.G.S. colony	Airport Lounge	Ice Cream Shop	Smoke Shop	Vegetarian / Vegan Restaurant	Fast Food Restaurant

Top 5 rows of the data set

## Methodology

- The neighbourhood data was first cleaned and processed to make it usable.
- Then the dataframe with neighbourhoods with respective latitudes and longitudes was created.
- The area with maximum number of neighbourhoods was determined to be south Mumbai
- The venue recommendations were collected using Foursquare API.

- One-hot encoding was used to make the venue categories.
- Clusters were formed using KMean clustering method.

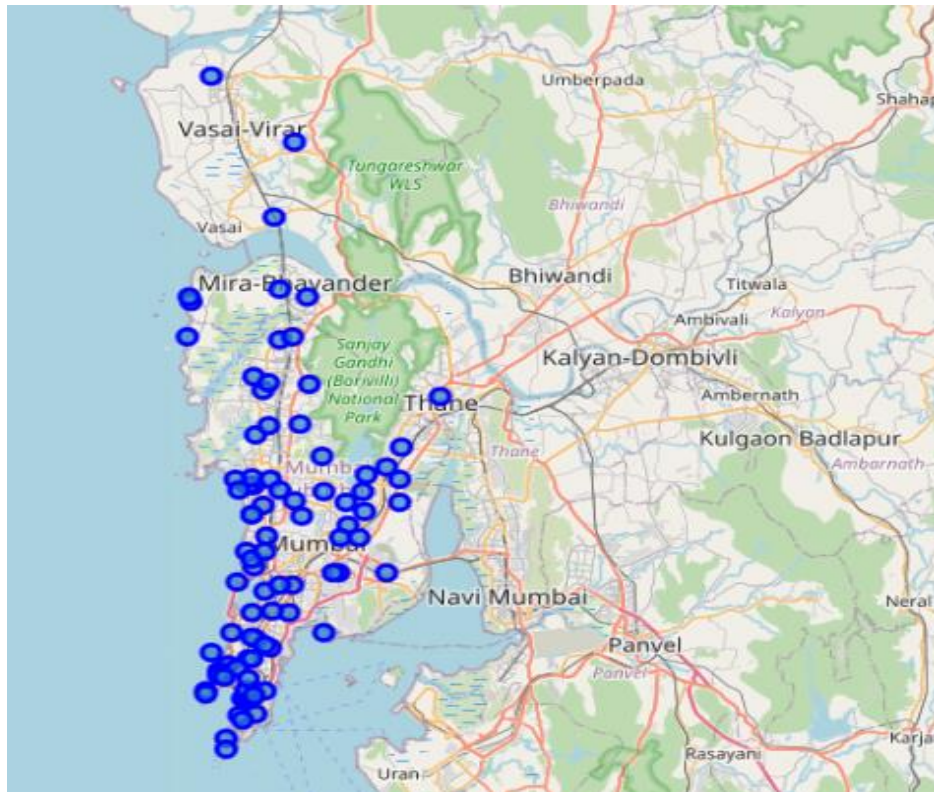
## Data visualization

From the following figure it is visible that the south Mumbai area has the maximum number of neighbourhoods.

```
In [7]: df['Location'].value_counts()
```

```
Out[7]: South Mumbai      39  
        Western Suburbs   36  
        Eastern Suburbs   12  
        Harbour Suburbs    4  
        Mumbai            2  
        Name: Location, dtype: int64
```

We can see how the neighbourhoods are distributed across Mumbai in the map below.



## Clustering

K-means method was used to form clusters of the data. The number of clusters were set to 5 to get optimum results.

## Results

The following five clusters are generated:

	Location	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
77	South Mumbai	Coffee Shop	Vegetarian / Vegan Restaurant	Ice Cream Shop	Hookah Bar	Gym

## Cluster 1

	Location	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Western Suburbs	Playground	Gym	Cocktail Bar	Hookah Bar	Gourmet Shop
1	Western Suburbs	Vegetarian / Vegan Restaurant	Asian Restaurant	Coffee Shop	Hookah Bar	Gym
7	Western Suburbs	Indian Restaurant	Bistro	Gym	Café	Pub
12	Western Suburbs	Boutique	Scenic Lookout	Chinese Restaurant	Performing Arts Venue	Gastropub
13	Western Suburbs	Gourmet Shop	Indian Restaurant	Snack Place	Bar	Burger Joint
15	Western Suburbs	Bakery	Bar	Fast Food Restaurant	Cheese Shop	Dessert Shop
17	Western Suburbs	Train Station	Hookah Bar	Coffee Shop	Hotel	Gym
25	Western Suburbs	Food Truck	Café	Vegetarian / Vegan Restaurant	Coffee Shop	Hookah Bar
26	Western Suburbs	Indian Restaurant	Bar	Chinese Restaurant	Arcade	Seafood Restaurant
30	Western Suburbs	Train Station	Men's Store	Middle Eastern Restaurant	Clothing Store	Vegetarian / Vegan Restaurant
31	Western Suburbs	Train Station	Platform	Hookah Bar	Gym	Gourmet Shop
44	Eastern Suburbs	Indian Restaurant	Fast Food Restaurant	Restaurant	Lounge	Department Store
54	South Mumbai	Street Food Gathering	Vegetarian / Vegan Restaurant	Cocktail Bar	Hookah Bar	Gym
57	South Mumbai	Jewelry Store	Vegetarian / Vegan Restaurant	Coffee Shop	Hookah Bar	Gym
59	South Mumbai	Department Store	Plaza	Vegetarian / Vegan Restaurant	Cocktail Bar	Hookah Bar
62	South Mumbai	Seafood Restaurant	Vegetarian / Vegan Restaurant	Cocktail Bar	Hookah Bar	Gym
63	South Mumbai	Coffee Shop	Music Store	Bakery	Multiplex	Café
65	South Mumbai	Vegetarian / Vegan Restaurant	Restaurant	Cocktail Bar	Fast Food Restaurant	Juice Bar
67	South Mumbai	Bakery	Boutique	Vegetarian / Vegan Restaurant	Coffee Shop	Hookah Bar
69	South Mumbai	Snack Place	Vegetarian / Vegan Restaurant	Cocktail Bar	Hookah Bar	Gym
74	South Mumbai	Shopping Mall	Italian Restaurant	Movie Theater	Sandwich Place	Diner
75	South Mumbai	Café	Pizza Place	Vegetarian / Vegan Restaurant	Coffee Shop	Hookah Bar
76	South Mumbai	Vegetarian / Vegan Restaurant	Food & Drink Shop	Fast Food Restaurant	Ice Cream Shop	Hookah Bar
79	South Mumbai	Airport Lounge	Ice Cream Shop	Smoke Shop	Vegetarian / Vegan Restaurant	Fast Food Restaurant
89	South Mumbai	Concert Hall	Vegetarian / Vegan Restaurant	Ice Cream Shop	Hookah Bar	Gym

## Cluster 2

	Location	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
11	Western Suburbs	Bus Station	Vegetarian / Vegan Restaurant	Coffee Shop	Hookah Bar	Gym
46	Eastern Suburbs	Restaurant	Bus Station	Vegetarian / Vegan Restaurant	Coffee Shop	Hookah Bar
49	Harbour Suburbs	Restaurant	Vegetarian / Vegan Restaurant	Cocktail Bar	Hookah Bar	Gym

## Cluster 3



	Location	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
9	Western Suburbs	Indian Restaurant	Ice Cream Shop	Hookah Bar	Gym	Gourmet Shop
14	Western Suburbs	Indian Restaurant	Bakery	Cupcake Shop	Coffee Shop	Hookah Bar
27	Western Suburbs	Indian Restaurant	Platform	Food Truck	Hookah Bar	Gym
34	Western Suburbs	Indian Restaurant	Bar	Market	Coffee Shop	Hookah Bar
39	Eastern Suburbs	Indian Restaurant	Multiplex	Coffee Shop	Hookah Bar	Gym
48	Harbour Suburbs	Indian Restaurant	Gastropub	Diner	Ice Cream Shop	Hookah Bar
55	South Mumbai	Indian Restaurant	Ice Cream Shop	Hookah Bar	Gym	Gourmet Shop
87	South Mumbai	Indian Restaurant	Dessert Shop	Lounge	Hotel	Asian Restaurant
90	South Mumbai	Indian Restaurant	Market	Cheese Shop	Coffee Shop	Hookah Bar

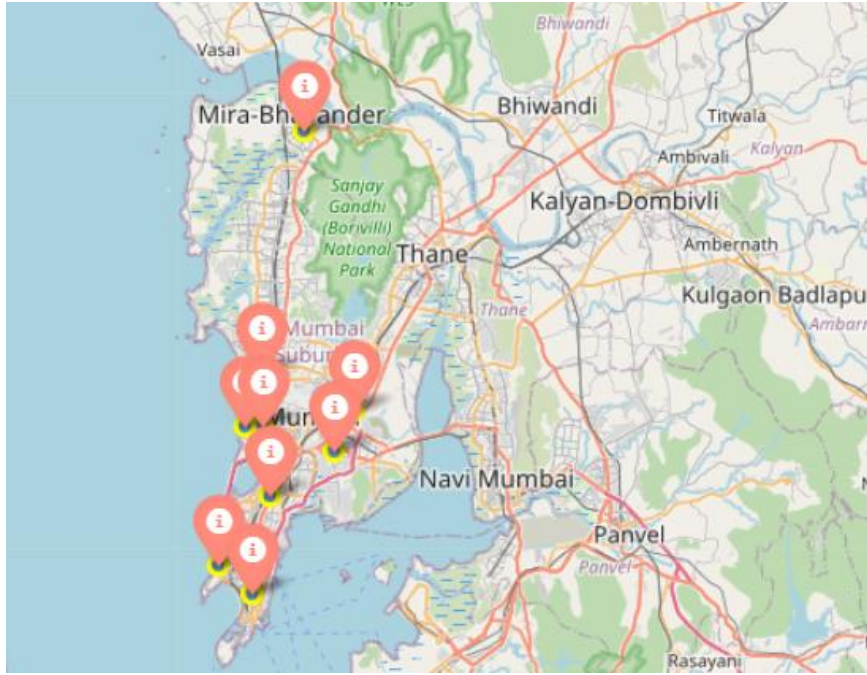
## Cluster 4

	Location	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
73	South Mumbai	Fast Food Restaurant	Vegetarian / Vegan Restaurant	Ice Cream Shop	Hookah Bar	Gym

## Cluster 5

# Discussion

After analyzing the five clusters it is evident that the recommended place to open a restaurant would belong to cluster 4 as it consists of similar venues suitable for opening a restaurant as compared to the other clusters.



Neighbourhoods in this cluster will be most suitable for opening a restaurant.

## Conclusion

We have successfully analysed the data for the neighbourhoods in Mumbai. We have found the area in Mumbai where it is most suitable to open a new restaurant.