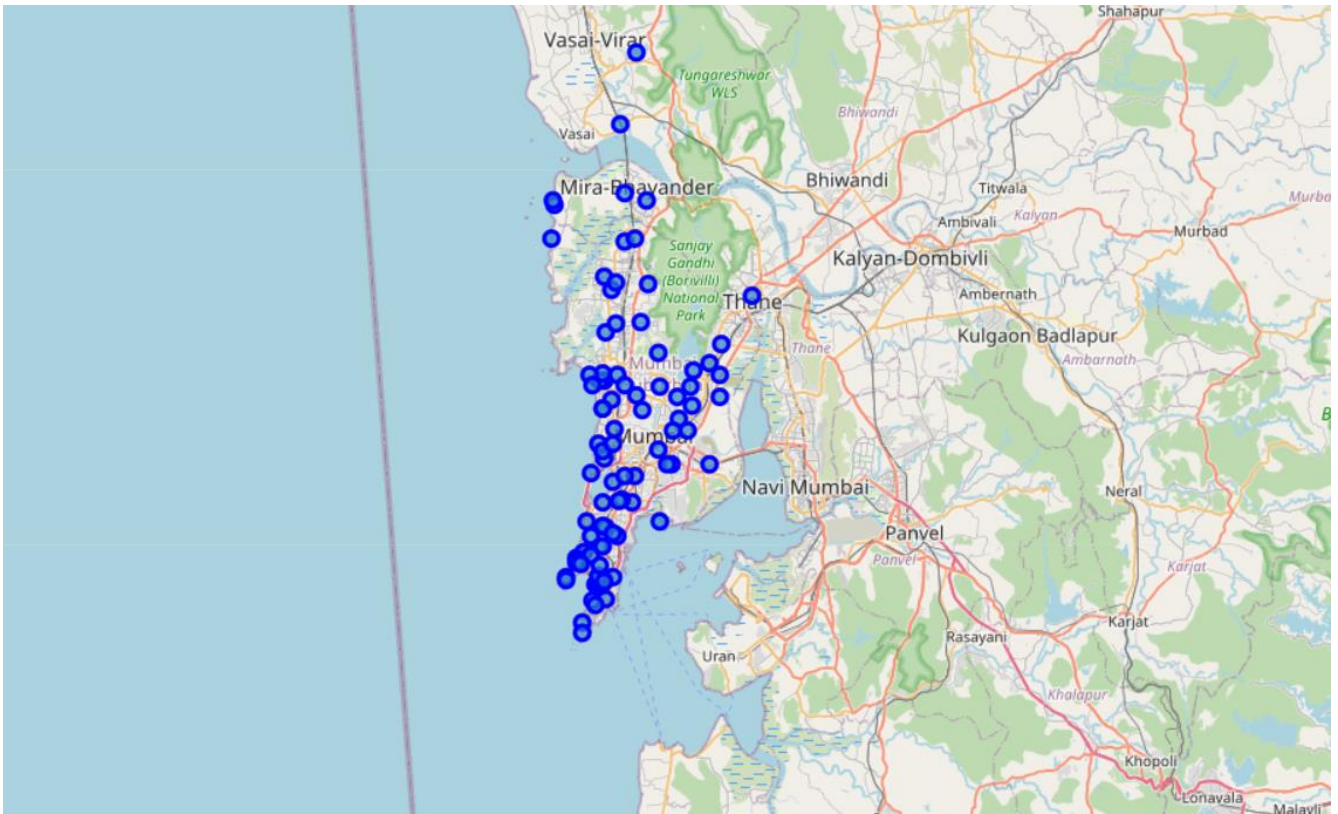


IBM Data Science Capstone Project

The Battle of Neighborhoods – Mumbai

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Neighborhoods Visualization of Mumbai City

1.INTRODUCTION : Business Problem

This project deals with discussing the neighborhoods of **Mumbai**, The Financial Hub of India. This project would specifically help Business people planning to start Restaurants, Hotels, Gym/FitnessCamp/Yoga studio etc.in Mumbai, Maharashtra, India.

Mumbai, formerly known as Bombay, **Capital of Maharashtra state, India**. It is the country's financial and commercial centre and its principal port on the Arabian Sea. Located on Maharashtra's coast, Mumbai is India's most-populous city and it is one of the largest and most densely populated urban areas in the world. Mumbai is home for 1.84 Cr people. The total area of Mumbai is 603.4 sq.km. Average temperature of Mumbai is 26.9°C.

Mumbai - City that never Sleeps

The Foursquare API is used to access the venues in the neighborhoods. Since, it returns less venues in the neighborhoods, we would be analysing areas for which countable number of venues are obtained. Then they are clustered based on their venues using Data Science Techniques. Here the k-means clustering algorithm is used to achieve the task. The optimal number of clusters can be obtained using silhouette score.

Folium visualization library can be used to visualize the clusters superimposed on the map of Mumbai city. These clusters can be analyzed to help small scale business owners select a suitable location for their need such as Hotels, Shopping Malls, Restaurants or even specifically Indian restaurants or Coffee shops or Gym/Fitness camp/Yoga studio.

The major **Target Audience** would be small-scale business owners and stake holders planning to start their business at a location in Mumbai. This project would help them find the optimal location based on the category of their business such as,

- What is the best location to start a new hotel in Mumbai with restaurants around?
- Which area is best suitable for opening a Gym/Yoga/Fitness Camp in Mumbai?

2.DATA Requirements

Mumbai has multiple neighborhoods. Lets use the following dataset which has the list of Neighborhoods in Mumbai along with their Latitude and Longitude:

https://en.wikipedia.org/wiki/List_of_neighbourhoods_in_Mumbai#Mumbai_neighbourhood_coordintes

This Wikipedia page contains a table named "Mumbai neighbourhood coordinates". We will use web scraping techniques to extract the data from the Wikipedia page, with the help of Python requests and beautifulsoup packages.

We will use **Pandas read_html** library to Scrape data from Wikipedia page.

	Neighbourhood	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
10	Bhayandar	Mira-Bhayandar,Western Suburbs	19.290000	72.850000

Fig 1 : Mumbai Neighborhood Data with Latitude and Longitude

Next the details of venues in each neighborhood namely **Venue, Venue Latitude, Venue Longitude, Venue Category** data needs to be obtained. Here, Foursquare API is used to obtain this data.

<https://foursquare.com/>

A total of 1365 venues data have been obtained from Foursquare. The resultant venues dataset, (shown in Fig 2) is used for the analysis process.

```
venues_df.head()
```

(1365, 8)

	Neighbourhood	Location	Latitude	Longitude	VenueName	VenueLatitude	VenueLongitude	VenueCategory
0	Amboli	Andheri,Western Suburbs	19.1293	72.8434	Cafe Arfa	19.128930	72.847140	Indian Restaurant
1	Amboli	Andheri,Western Suburbs	19.1293	72.8434	5 Spice , Bandra	19.130421	72.847206	Chinese Restaurant
2	Amboli	Andheri,Western Suburbs	19.1293	72.8434	Subway	19.127860	72.844461	Sandwich Place
3	Amboli	Andheri,Western Suburbs	19.1293	72.8434	Cafe Coffee Day	19.127748	72.844663	Coffee Shop
4	Amboli	Andheri,Western Suburbs	19.1293	72.8434	Spices & Chillies	19.127765	72.844131	Asian Restaurant

Fig2 : Mumbai Venues Dataset