Recommend Business and Location.

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1.Introduction

1.1 Problem:

There are many Strat up businesses which fails or comes to a halt due to lack of right decision in the initial period of business, that have been said not all business glooms at any location u pick up even if u have all the capital needed to boost start the business, in India many businesses fails due to this reasons Top 10 Reason of Business fail and many other reason as well but here we will focus on location based guidance .

1.2 Interest:

Obviously if an investor is willing to invest a hefty amount of capital in a business, then will be more interested to invest it where ROI is high and invest their money

with assurance that the business will have a good start because of the location selected.

2.Data

2.1 Data Sources and Feature Selection:

Based on definition of our problem, factors that will influence our decision are:

- number of most common venue in the neighborhood (any type of business)

- Area of the city

- Geolocation of the area

Following data sources will be needed to extract/generate the required information:

- As this project focuses on India so the Dataset is for Indian region, we took a small part of India with the highest GDP, The Mumbai City.

- To grab the Area (aka Neighborhood) of Mumbai city, we scrapped a Website ethically containing all the area of Mumbai city using Beautiful Soup.

- As we have the Area name of Mumbai city we will need the geolocation of the same, so we use arcgis API to extract latitude and longitude of the area in Mumbai city and later map it on to the map of India.

- We have area name, latitude & longitude of the area, now to grab all the top and most common businesses we use foursquare API and use its category column to give us best businesses to bet our money upon in 6 different clusters which we will make by the end of the project.

3.Methodology

3.1 Web Scraping:

First we Scrape the Website by BeautifulSoup() Function which gave us the Html content of the site and later we saw the hierarchy of class and div to sort out the list of content.

- We Used this website to Scrape it further

- Later we find the class by inspecting the website on google chrome and noted that the content we acquire is in class "toctext".


```
<span class="toctext">Western Suburbs</span>
</a>
▼<ul>
  ▼<li class="toclevel-2 tocsection-2">
    ▼<a href="#Andheri">
        <span class="tocnumber">1.1</span>
        <span class="toctext">Andheri</span> == $0
      </a>
    </li>
  ▼<li class="toclevel-2 tocsection-3">
    ▼<a href="#Bhayandar">
        <span class="tocnumber">1.2</span>
        <span class="toctext">Bhayandar</span>
      </a>
    </li>
```

- We obtained a list of all the contents furthermore we convert this list to a Data frame.

- Below is The head of the data frame

	Area
0	Western Suburbs
1	Andheri
2	Bhayandar
3	Bandra
4	Borivali

3.2 Data Cleaning:

There are some Outliers in the above Dataset and some are not an Area like: Western Suburbs and more. So we went further removing all the outlier and useless Data.

- We dropped the index of the data we want to remove as the data size is 39 this was a better choice , we got the data frame as below.

	Area
0	Andheri
1	Bhayandar
2	Bandra
3	Borivali
4	Dahisar

- Although I have kept only one Outlier in the Dataset that is Bhayender which is not a part of Mumbai to examine if our cluster is able to recognize that or not.

3.3 Data 2(Geo Code Locations):

As we have the Area name of Mumbai city we will need the geolocation of the same, so we use ArcGIS API to extract latitude and longitude of the area in Mumbai city and later map it on to the map of India.

- We needed to import Geocoder library to fetch the locations

- I have Used ArcGIS API as it doesn't use any API key and is an open source

- Geocoder takes argument address where address should be in "area name, Mumbai" Format.

- We the join the above data frame with the list of all the longitude and latitude to get the data frame below

	Area	Latitude	Longitude
0	Andheri	19.118459	72.841763
1	Bhayandar	19.307430	72.851840
2	Bandra	19.054370	72.840170
3	Borivali	19.229360	72.857510
4	Dahisar	19.250030	72.859070

3.4 Mapping the location on to the Map:

We Used Folium Map library to map the location on to the Mumbai city.

- To grab the Mumbai location we used Geocode Nominatim API

- Mumbai latitude is 18.9387711 and longitude is 72.8353355
- We popped up the Label as Name of area and plotted every location on to the map of Mumbai using folium's Map() functions.

- We used the location of the data frame and ran for loop to create a sophisticated map
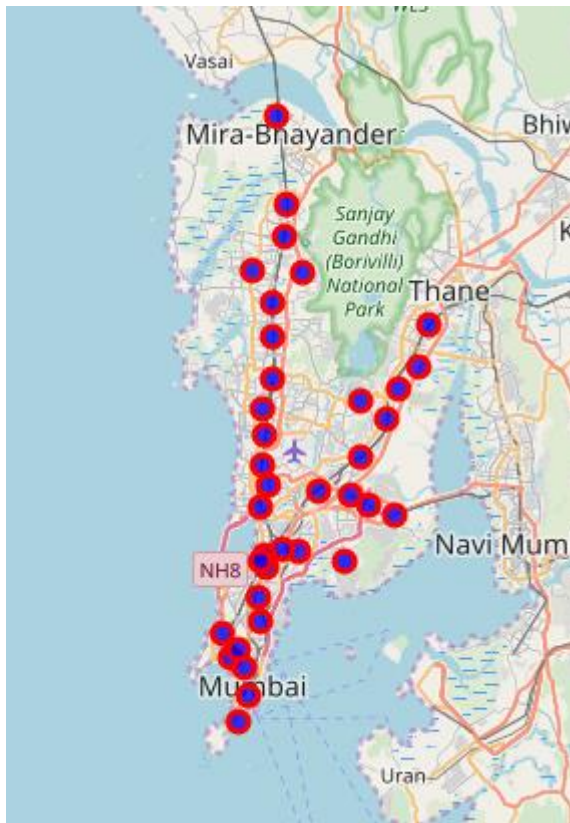
- The above map is the Map of Mumbai with all the areas.

4 .Analysis

4.1 Foursquare API

Like Almost Every API needs some parameters, Foursquare requires parameters too, below are the list of required parameters.

- Client id: Using your Developer Id

- Client Secret: This will recognize you on the basis of which application u r hitting, it's more of a server based

- Version: Version of API

- Limit:100 is max limit of fetched details

- Radius: radius or the scope of exploration

- URL: there are specific URL's for every hit such as, Explore, search, trending, tips and so on Visit the Site for details.

- Here we will use explore to find out the most common consumer Businesses nearby.

4.2 Extracting Venues from Foursquare API

Foursquare Explore API returns many columns from which we are interested In the latitude, longitude, name, category of the venue, so to extract we follow some steps:

- Define variable for parameters

- Create a get request from a URL and convert it into json file

- Extract and analyze key of response which is in dictionary format

- Then we convert json file to data frame

- We get the data frame show below

referralId	reasons.count	reasons.items	venue.id	venue.name	venue.location.address	venue.location.crossStreet	venue.
e-0-4cbc55c37a5d9eb0ac5c31e9-0	0	[{'summary': 'This spot is popular', 'type': '...	4cbc55c37a5d9eb0ac5c31e9	The Westin Mumbai Garden City	International Business Park, Oberoi Garden City	Off Western Express Highway	
e-0-4e7b4508aeb70c2b1be28e00-1	0	[{'summary': 'This spot is popular', 'type': '...	4e7b4508aeb70c2b1be28e00	Sapre	Aarey Rd	off Goregaon Subway	
e-0-4bf7c3695efe2d7fef796934-2	0	[{'summary': 'This spot is popular', 'type': '...	4bf7c3695efe2d7fef796934	PVR Cinemas	Oberoi Mall, Off Western Express Highway	Goregaon (East)	
e-0-511ca611e4b055562c8edc68-3	0	[{'summary': 'This spot is popular', 'type': '...	511ca611e4b055562c8edc68	MadOverDonuts	Level 3	Oberoi Mall	
e-0-4e7477d48998ed82a3fd4f13-4	0	[{'summary': 'This spot is popular', 'type': '...	4e7477d48998ed82a3fd4f13	Sai Veg World	Aarey Road	Goregaon East	

- As you can notice the column names of the data frame is not what we want, so we create a function which fetches proper name of columns and required columns mentioned in the beginning from each and every area of Mumbai.

4.3 Get nearby venues of each area of Mumbai.

Below is the data frame we fetched from the foursquare API by creating a function which fetches all the nearby consumer businesses of the area.

(3664, 7)

	Area	Area Latitude	Area Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Andheri	19.118459	72.841763	Merwans Cake shop	19.119300	72.845418	Bakery
1	Andheri	19.118459	72.841763	Naturals	19.111204	72.837255	Ice Cream Shop
2	Andheri	19.118459	72.841763	Joey's Pizza	19.126762	72.830001	Pizza Place
3	Andheri	19.118459	72.841763	Radha Krishna Veg Restaurant	19.115130	72.843060	Indian Restaurant
4	Andheri	19.118459	72.841763	Prithvi Theatre	19.106157	72.825810	Theater
5	Andheri	19.118459	72.841763	Anand Dosa	19.102982	72.836861	Breakfast Spot
6	Andheri	19.118459	72.841763	Dakshinayan	19.112772	72.825653	Indian Restaurant
7	Andheri	19.118459	72.841763	PVR Cinemas	19.114637	72.827452	Multiplex
8	Andheri	19.118459	72.841763	Mahesh Lunch Home	19.103680	72.826794	Seafood Restaurant
9	Andheri	19.118459	72.841763	Hard Rock Cafe Andheri	19.135995	72.835335	American Restaurant

There are total 3664 nearby venues and 149 unique venues (Note: We set the limit of explore to 100)

5.Exploratory Data Analysis

5.1 Number of Venue head

The below image shows the number of venue from an area do note that we set the limit to 100.

Area	Area Latitude	Area Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
Andheri	100	100	100	100	100	100
Antop Hill	100	100	100	100	100	100
Bandra	100	100	100	100	100	100
Bhandup	100	100	100	100	100	100
Bhayandar	67	67	67	67	67	67

5.2 Top 15 Businesses

The below bar plot shows the number of top consumer businesses in Mumbai city
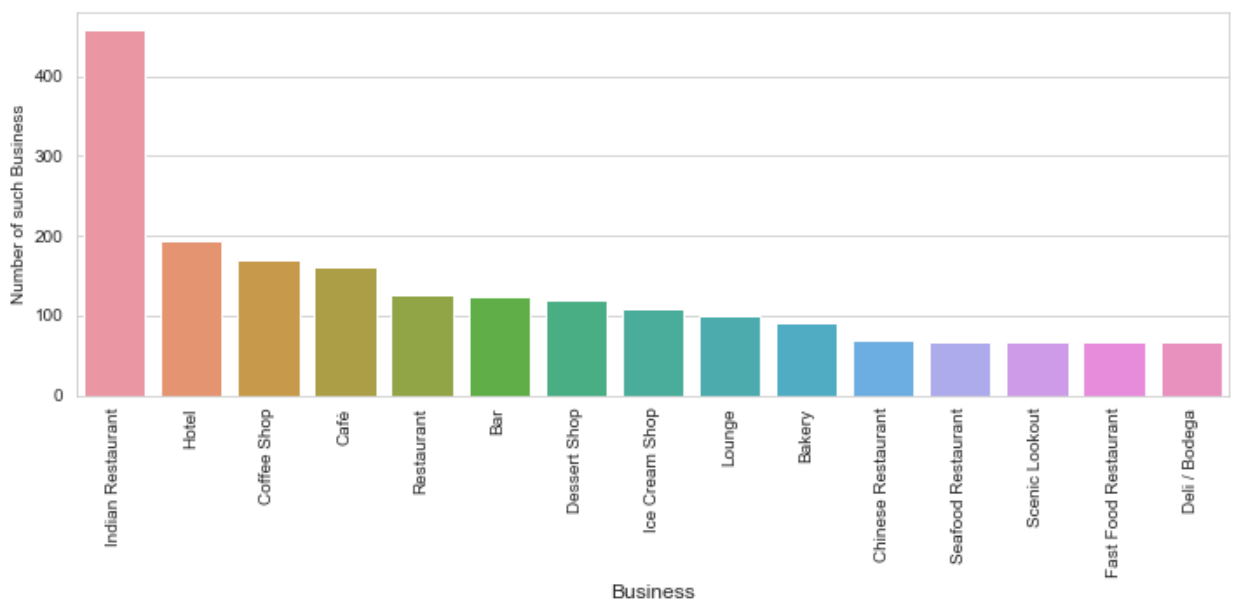
As we evaluate the above image we can confirm that

- The most common business is Indian Restaurant for some obvious Reason(also know that certainly every Indian restaurant has multi cuisine which is why we can see less segregated cuisine restaurants)

P.T.O

- Mumbai being the top tourist place in India making it great deal for people investing in hotel businesses

- We will evaluate further about the business in a particular area later in the project.

5.3 Word Cloud of all businesses in Mumbai

A word cloud is a great way to project most common venues.

6.Clustering

6.1 Top 15 venues:

We will group the above data frame to fetch the top 15 venues of Area in Mumbai, because later we will perform Machine learning algorithm on this data set to cluster it in proper groups.

So to convert categorical columns into numerical we use one hot encoding method, and later group it with the mean of each columns which will help us find the most common venue of a particular Area

Notice it has 5 X 150 which is Area plus all the unique Business

	Area	Airport Service	American Restaurant	Arcade	Art Gallery	Asian Restaurant	Athletics & Sports	Australian Restaurant	BBQ Joint	Bagel Shop	...
0	Andheri	0.01	0.01	0.000000	0.0	0.00	0.00	0.01	0.010000	0.00	...
1	Antop Hill	0.00	0.00	0.000000	0.0	0.01	0.01	0.00	0.000000	0.00	...
2	Bandra	0.00	0.00	0.000000	0.0	0.03	0.00	0.00	0.000000	0.01	...
3	Bhandup	0.00	0.00	0.000000	0.0	0.00	0.00	0.00	0.000000	0.00	...
4	Bhayandar	0.00	0.00	0.014925	0.0	0.00	0.00	0.00	0.014925	0.00	...

5 rows × 150 columns

We then created a function which returns top 15 common consumer businesses for each Area of the above 37 areas

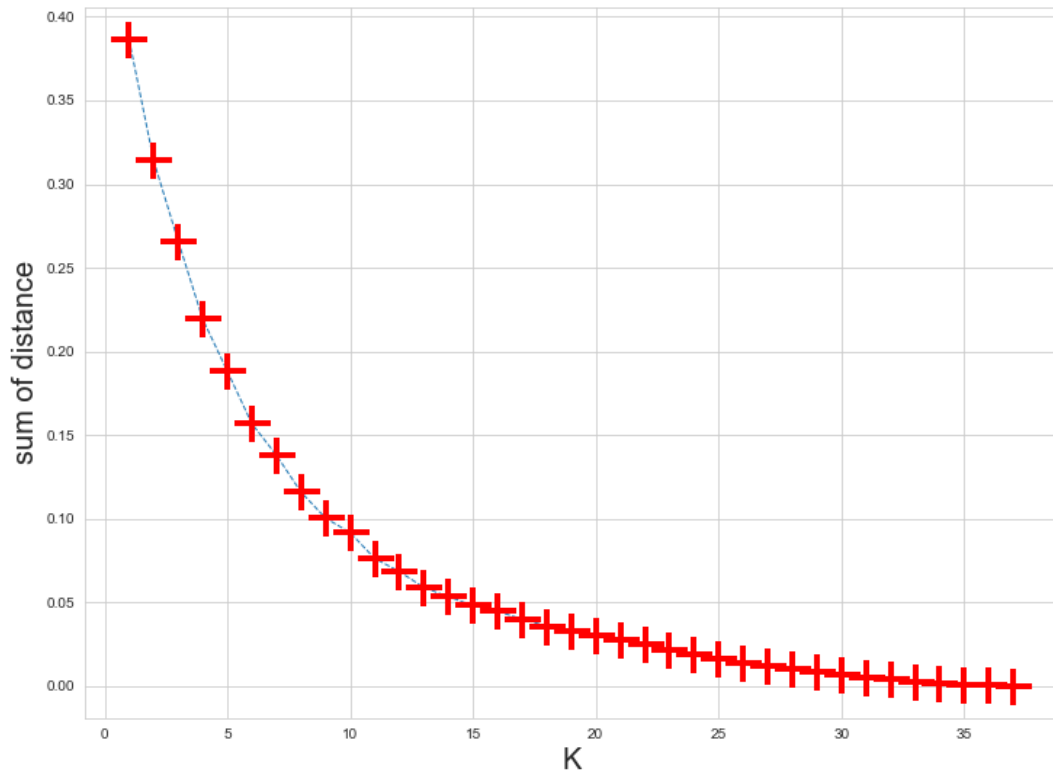|	Area	1st most common venue	2nd most common venue	3rd most common venue	4th most common venue	5th most common venue	6th most common venue	7th most common venue	8th most common venue	9th most common venue	10th most common venue	11th most common venue	12th most common venue
0	Andheri	Hotel	Indian Restaurant	Coffee Shop	Café	Ice Cream Shop	Pub	Beach	Chinese Restaurant	Juice Bar	Bar	Bakery	Seafood Restaurant
1	Antop Hill	Indian Restaurant	Hotel	Café	Deli / Bodega	Bakery	Bar	Dessert Shop	Lounge	Restaurant	Seafood Restaurant	South Indian Restaurant	Scenic Lookout
2	Bandra	Indian Restaurant	Café	Bar	Bakery	Deli / Bodega	Hotel	Coffee Shop	Asian Restaurant	Dessert Shop	Italian Restaurant	Scenic Lookout	Sandwich Place
3	Bhandup	Indian Restaurant	Coffee Shop	Fast Food Restaurant	Lounge	Hotel	Dessert Shop	Ice Cream Shop	Pizza Place	Italian Restaurant	Café	Donut Shop	Diner
4	Bhayandar	Indian Restaurant	Restaurant	Sandwich Place	Fast Food Restaurant	Resort	Seafood Restaurant	Ice Cream Shop	Train Station	Café	Bus Station	Food	Flower Shop

6.2 Finding the k Value for Clustering

To find the k value we will use elbow method which is obtain by plotting k value vs sum of the distance between data's aka inertia of the model.

By looking at the image below we can evaluate that k value from range 6 to 15 is optimal , but as the size of the data in this dataset is less it's better to use small k value that is 6.

In clustering the k value can go until the row of the dataset which will plot 37 different clusters in our case.

That is the reason why we will stick towards 6.

6.3 Clustered data

After clustering the data we got 6 different clusters which we have marked on map,

The map has perfectly divided Mumbai into 6 different clusters

- South Mumbai

- North Mumbai

- Harbor

- Central

- Outskirts

- Outlier (Bhayander)

6.4 Mapping the Clustered Data

Below is the map of Mumbai with the clustered dataset mapped on to Mumbai's Dataset.
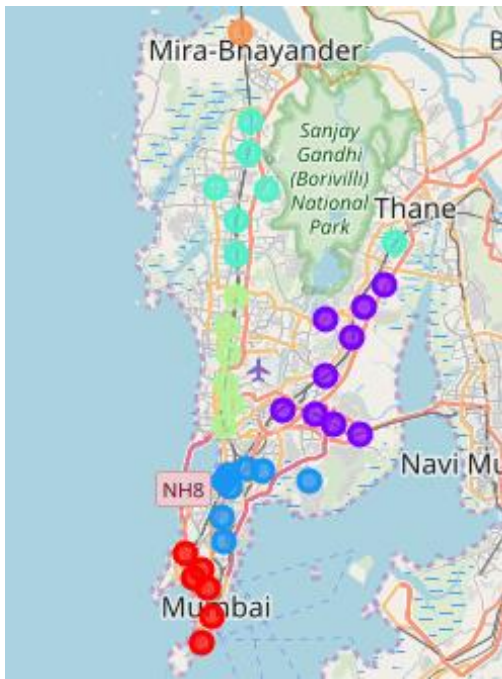
6.5 Clustered dataset"

Below is the final clustered data set we will use to segment and recommend business

	Area	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	Andheri	19.118459	72.841763	4	Hotel	Indian Restaurant	Coffee Shop	Café	Ice Cream Shop	Pub	Beach	Chinese Restaurant	Juice Bar	Bar
1	Bhayandar	19.307430	72.851840	5	Indian Restaurant	Restaurant	Sandwich Place	Fast Food Restaurant	Resort	Seafood Restaurant	Ice Cream Shop	Train Station	Café	Bus Station
2	Bandra	19.054370	72.840170	4	Indian Restaurant	Café	Bar	Bakery	Deli / Bodega	Hotel	Coffee Shop	Asian Restaurant	Dessert Shop	Italian Restaurant
3	Borivali	19.229360	72.857510	3	Indian Restaurant	Restaurant	Fast Food Restaurant	Ice Cream Shop	Coffee Shop	Clothing Store	Pub	Shopping Mall	Multiplex	Chinese Restaurant
4	Dahisar	19.250030	72.859070	3	Indian Restaurant	Fast Food Restaurant	Restaurant	Ice Cream Shop	Coffee Shop	Pub	Bar	Café	Chinese Restaurant	Gym

Note: Although the image shows top 10 but it's actually top 15 as it doesn't accommodate in it.
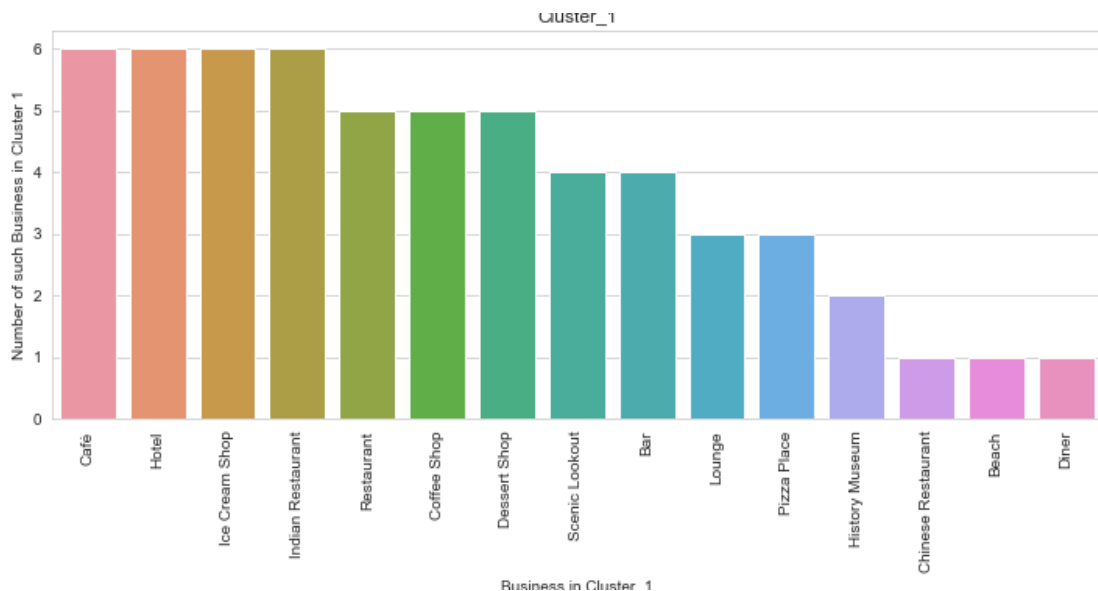
7.Cluster's

Below are the segmented Data set with respect to cluster and its top Businesses

7.1 Cluster 1

- Cluster 1 consist of following Area.

	Area	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
28	Colaba	Indian Restaurant	Café	Hotel	Bar	Coffee Shop	Dessert Shop	Ice Cream Shop	Chinese Restaurant	Pizza Place	Diner
30	Fort	Indian Restaurant	Café	Hotel	Ice Cream Shop	Bar	Coffee Shop	Dessert Shop	Lounge	Pizza Place	Restaurant
31	Girgaon	Indian Restaurant	Hotel	Café	Restaurant	Ice Cream Shop	Lounge	History Museum	Scenic Lookout	Dessert Shop	Coffee Shop
32	Kalbadevi	Indian Restaurant	Café	Ice Cream Shop	Hotel	Restaurant	Bar	Dessert Shop	Scenic Lookout	Coffee Shop	Brewery
33	Kamathipura	Indian Restaurant	Hotel	Ice Cream Shop	Restaurant	Café	Scenic Lookout	History Museum	Lounge	Dessert Shop	Coffee Shop
36	Tardeo	Indian Restaurant	Hotel	Café	Ice Cream Shop	Scenic Lookout	Restaurant	Bar	Deli / Bodega	Beach	Pizza Place

- Number of Business in cluster 1 vs Business in cluster 1 bar plot.


- Café, Hotel, Ice Cream Shop, Indian Restaurant is top most common Business here.

- Comparing Mumbai's top 10 with this I can recommend investing your money upon Café, Hotel, Ice Cream Shop, and Indian Restaurant as they are top in cluster 1 and Bar, Bakery, lounge as it is the underrated Business in this cluster but is in top 10 of Mumbai's Businesses.

- Furthermore we can compare all top 15 with area top 15 for recommendation.

7.2 Cluster 2

- Cluster 2 consist of following Area's

	Area	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	11th most common venue
14	Bhandup	Indian Restaurant	Coffee Shop	Fast Food Restaurant	Lounge	Hotel	Dessert Shop	Ice Cream Shop	Pizza Place	Italian Restaurant	Café	Donut Shop
15	Ghatkopar	Hotel	Indian Restaurant	Coffee Shop	Lounge	Bar	Bakery	Dessert Shop	Italian Restaurant	Restaurant	Chinese Restaurant	Garden
16	Kanjurmarg	Indian Restaurant	Hotel	Restaurant	Coffee Shop	Dessert Shop	Italian Restaurant	Lounge	Diner	Bar	Café	Shopping Mall
17	Kurla	Indian Restaurant	Bar	Hotel	Dessert Shop	Coffee Shop	Café	Lounge	Bakery	Restaurant	Deli / Bodega	Park
19	Powai	Indian Restaurant	Hotel	Restaurant	Coffee Shop	Lounge	Italian Restaurant	Bakery	Dessert Shop	Ice Cream Shop	Bar	Diner
21	Vikhroli	Indian Restaurant	Hotel	Restaurant	Coffee Shop	Lounge	Dessert Shop	Bar	Italian Restaurant	Ice Cream Shop	Bakery	Asian Restaurant
22	Chembur	Indian Restaurant	Hotel	Coffee Shop	Lounge	Dessert Shop	Bar	Café	Restaurant	Vegetarian / Vegan Restaurant	Deli / Bodega	Bakery
23	Govandi	Indian Restaurant	Coffee Shop	Hotel	Bar	Restaurant	Dessert Shop	Lounge	Ice Cream Shop	Bakery	Vegetarian / Vegan Restaurant	Café
24	Mankhurd	Indian Restaurant	Coffee Shop	Bar	Lounge	Dessert Shop	Restaurant	Ice Cream Shop	Fast Food Restaurant	Hotel	Chinese Restaurant	Shopping Mall

- Number of Business in Cluster 2 vs Type of Business in Cluster 2
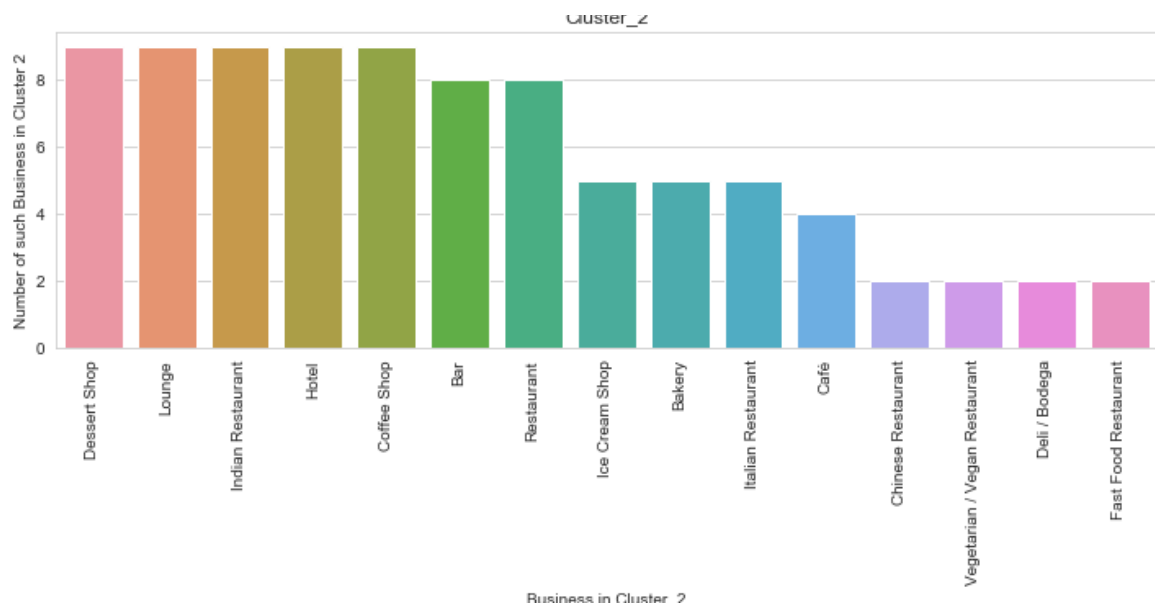
- Dessert Shop, Lounge, Indian Restaurant, Hotel, Coffee shop, Bar Seems to be most common Business in this Cluster, while comparing with Mumbai overall cluster Bakery and Café are good Choice too.

- We can further recommend business by comparing area top 15 with Mumbai and respective cluster

7.3 Cluster 3

- Cluster 3 consist of following Area's

	Area	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
7	Juhu	Indian Restaurant	Bakery	Café	Restaurant	Dessert Shop	Deli / Bodega	Coffee Shop	Lounge	Scenic Lookout	Hotel
20	Vidyavihar	Indian Restaurant	Café	Seafood Restaurant	Bakery	Deli / Bodega	Scenic Lookout	Bar	Dessert Shop	Hotel	Restaurant
25	Trombay	Indian Restaurant	Dessert Shop	Bar	Ice Cream Shop	Snack Place	Lounge	Café	Coffee Shop	Hotel	Fast Food Restaurant
26	Antop Hill	Indian Restaurant	Hotel	Café	Deli / Bodega	Bakery	Bar	Dessert Shop	Lounge	Restaurant	Seafood Restaurant
27	Byculla	Indian Restaurant	Café	Restaurant	Ice Cream Shop	Coffee Shop	Dessert Shop	Lounge	Hotel	Scenic Lookout	Bar
29	Dadar	Indian Restaurant	Café	Bakery	Seafood Restaurant	Restaurant	Scenic Lookout	Deli / Bodega	Dessert Shop	Lounge	Hotel
34	Matunga	Indian Restaurant	Café	Hotel	Deli / Bodega	Seafood Restaurant	Bakery	Coffee Shop	Bar	Restaurant	Lounge
35	Parel	Indian Restaurant	Scenic Lookout	Hotel	Café	Bar	Restaurant	Snack Place	Coffee Shop	Dessert Shop	Chinese Restaurant

- Number of Business in Cluster 3 vs Business in Cluster 3
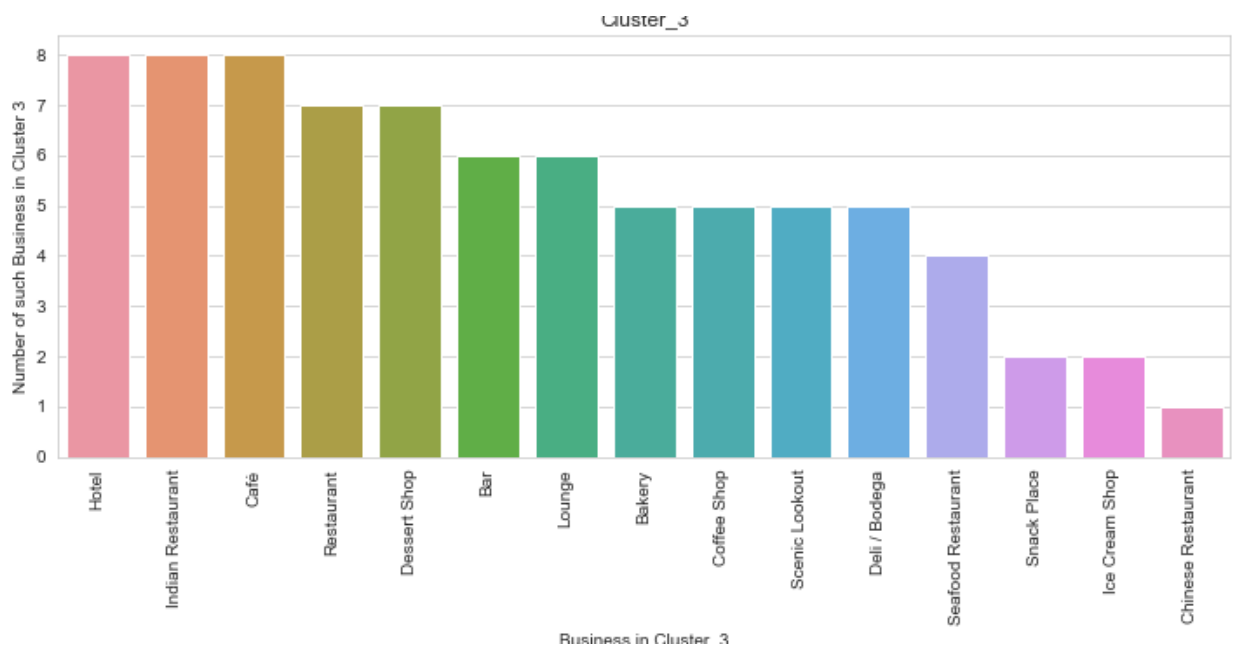
- Hotel , Indian Restaurant, Café, Dessert Shop are some most common and top Businesses in this cluster , now by comparing it with Mumbai top 15 we can say Sea food Restaurant, Deli/Bodega, Fast food Restaurant, Scenic Lookout, Bakery, Bar and Lounge are some good choice too.

- We can further recommend and narrow the choice by comparing area's top 15 with Mumbai's and respective cluster's top 15.

7.4 Cluster 4

- Cluster 4 consist of following Area's

	Area	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	11th most common venue	12th most common venue
3	Borivali	Indian Restaurant	Restaurant	Fast Food Restaurant	Ice Cream Shop	Coffee Shop	Clothing Store	Pub	Shopping Mall	Multiplex	Chinese Restaurant	Sandwich Place	Resort
4	Dahisar	Indian Restaurant	Fast Food Restaurant	Restaurant	Ice Cream Shop	Coffee Shop	Pub	Bar	Café	Chinese Restaurant	Gym	Clothing Store	Food Truck
5	Goregaon	Indian Restaurant	Café	Multiplex	Hotel	Pub	Coffee Shop	Ice Cream Shop	Bakery	Chinese Restaurant	Clothing Store	Brewery	Pizza Place
8	Kandivali west	Ice Cream Shop	Coffee Shop	Indian Restaurant	Beach	Multiplex	Fast Food Restaurant	Pub	Restaurant	Shopping Mall	Dessert Shop	Clothing Store	Hotel
9	Kandivali east	Indian Restaurant	Ice Cream Shop	Coffee Shop	Fast Food Restaurant	Restaurant	Chinese Restaurant	Pub	Clothing Store	Multiplex	Shopping Mall	Snack Place	Mexican Restaurant
11	Malad	Coffee Shop	Ice Cream Shop	Multiplex	Pub	Fast Food Restaurant	Restaurant	Clothing Store	Shopping Mall	Pizza Place	Beach	Bakery	Juice Bar
18	Mulund	Indian Restaurant	Coffee Shop	Café	Fast Food Restaurant	Dessert Shop	Pizza Place	Hotel	Snack Place	Gym / Fitness Center	Pub	Scenic Lookout	Italian Restaurant

- Number of Business in Cluster 4 vs Business in Cluster 4
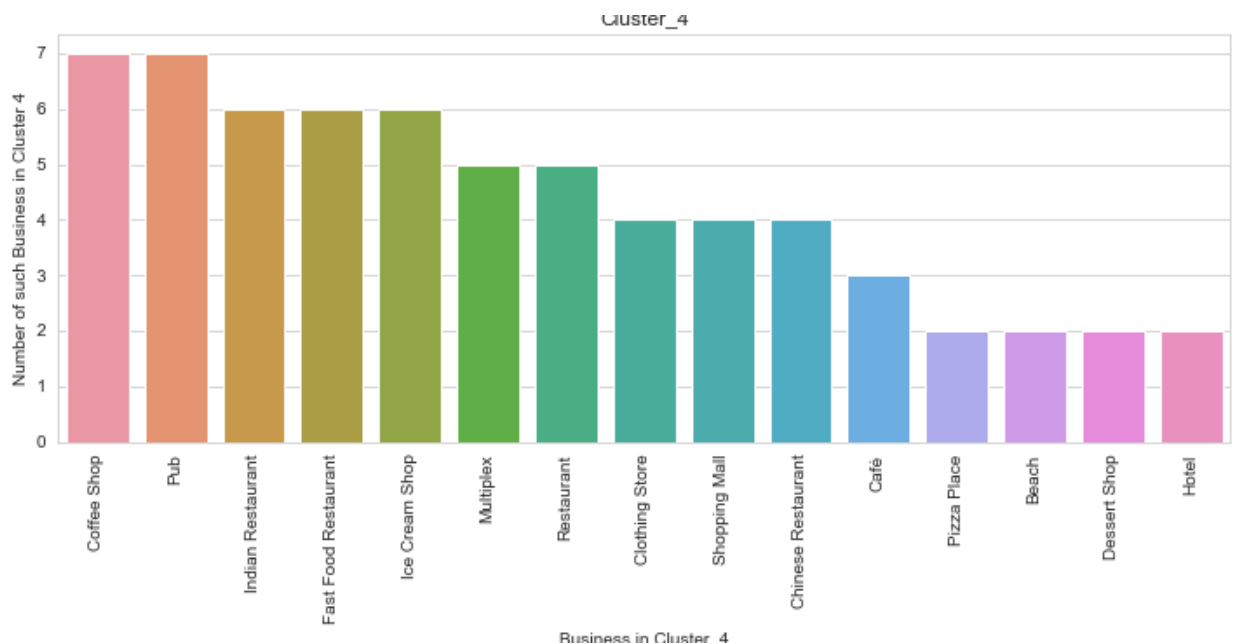
- Coffee Shop , Pub, Indian Restaurant, fast food Restaurant, Ice Cream Shop are some top and common Businesses in this Cluster , now comparing it with Mumbai top 15 Business we can see Desert Shop, Café are good business to invest on too.

- We can further sort more business by comparing area's top 15 with Mumbai's and Cluster's Top 15. We will see one example later in the report.

- Now let's compare say we want to find out best business in Malad which is in Cluster 4.

- Below is the top 15 venues of Malad.

| 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	11th most common venue	12th most common venue	13th most common venue	14th most common venue	15th most common venue
Coffee Shop	Ice Cream Shop	Multiplex	Pub	Fast Food Restaurant	Restaurant	Clothing Store	Shopping Mall	Pizza Place	Beach	Bakery	Juice Bar	Chinese Restaurant	Indian Restaurant	Hotel

- So finally by looking and comparing all three top 15's we can recommend that Coffee Shop, Pub, Ice Cream Shop, Indian Restaurant are good option and hotel as it' 15th most common and in the cluster it says 15th but in Mumbai's top 15 its 2nd.

- Similarly we can recommend for any area and cluster we want by analysis the bar plots.

7.5 Cluster 5

- Cluster 5 consist of following Area's

	Area	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	11th most common venue	12th most common venue
0	Andheri	Hotel	Indian Restaurant	Coffee Shop	Café	Ice Cream Shop	Pub	Beach	Chinese Restaurant	Juice Bar	Bar	Bakery	Seafood Restaurant
2	Bandra	Indian Restaurant	Café	Bar	Bakery	Deli / Bodega	Hotel	Coffee Shop	Asian Restaurant	Dessert Shop	Italian Restaurant	Scenic Lookout	Sandwich Place
6	Jogeshwari	Indian Restaurant	Hotel	Coffee Shop	Café	Multiplex	Pub	Seafood Restaurant	Brewery	Chinese Restaurant	Juice Bar	Bakery	Bar
10	Khar	Indian Restaurant	Café	Hotel	Bar	Bakery	Deli / Bodega	Coffee Shop	Lounge	Seafood Restaurant	Dessert Shop	Asian Restaurant	Chinese Restaurant
12	Santacruz	Indian Restaurant	Hotel	Bar	Coffee Shop	Seafood Restaurant	Café	Bakery	Deli / Bodega	Ice Cream Shop	Lounge	Park	Gym / Fitness Center
13	Vile Parle	Hotel	Indian Restaurant	Coffee Shop	Café	Seafood Restaurant	Bar	Ice Cream Shop	Deli / Bodega	Sandwich Place	Dessert Shop	Cocktail Bar	Multiplex

- Number of Business in Cluster 5 vs Business in Cluster 5

P.T.O
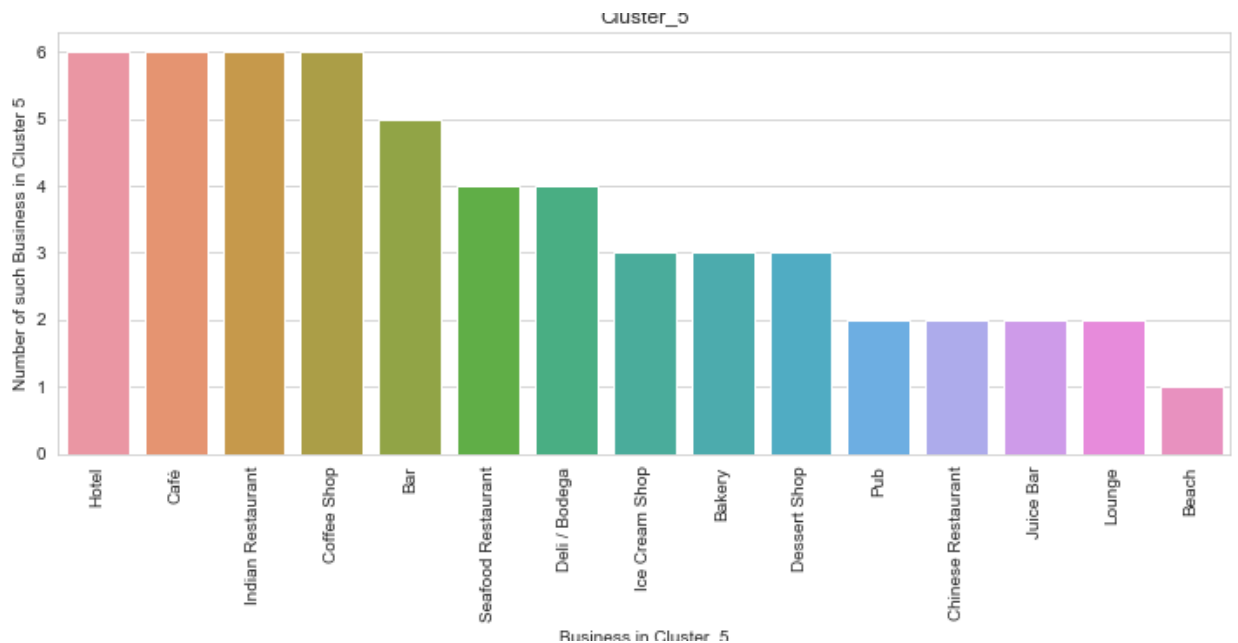
- Hotel , Café, Indian Restaurant, Coffee Shop are top choice for business in this cluster, now comparing it with Mumbai's top 15 are Bar, Ice Cream Shop, Lounge, Seafood Restaurant, Deli Bodega ,Bakery are good choice too.

- We can further recommend business and narrow are list by comparing both with area's top 15

7.6 Cluster 6

- Cluster 6 was added for evaluating our model and it consist of only one area and has only few business so we skip it.

8.Results and Discussion

8.1 What did we gain and got from this analysis.

- We got a good insight of businesses for customers that has flooded the Mumbai's market.

- There are lot of unique Businesses one can opt for.

- If a person is interested to invest in any business one could rely on this analysis.

- Although if a person has any particular business he wants to open as such, this analysis can be used too, like opening Hotel will be more profitable in Andheri (Airport) than in Malad.

Well there is no evaluation as such for cluster model in real world but as we can see our cluster was able to distinguish between south Mumbai, north Mumbai, central, and harbor.

8.2 How did we analyzed best Business to invest in Malad?

- We took top 15 Venues in Mumbai, then we compared it with Cluster 4's top 15 Venues.
  - Here we saw that in cluster 4 Hotel was in the tail, but hotel in Mumbai's list was on 2nd, so we Recommended Hotel as it will have low competition and also there are very less amount such business in this cluster.
  - Then we compared all this top 15 venues with Malad's and every other top 15 venues and it seems it's good to invest in Pub and Fast food Restaurant.

- Similarly we Can compare this three top 15 venues to get any other business in a location, cluster to invest our money upon

8.3 Future of this project

- We can use any dataset , for a state, or for whole country

- We can go further and use foursquare API to locate best location to rent house in a budget.

- Although this is a project but after deploying it can be very user friendly.

- We can add other dataset as such for greater flexibility.

- We can predict the business further by using dataset of that category and predicting our case.

9.Conclusion

Purpose of this project was to recommend business and a location for the business to boost start the business by investing with some sort of assured that if the business is compatible or not in the given location.

Final statements will be made by the Stakeholders.

For code click here.