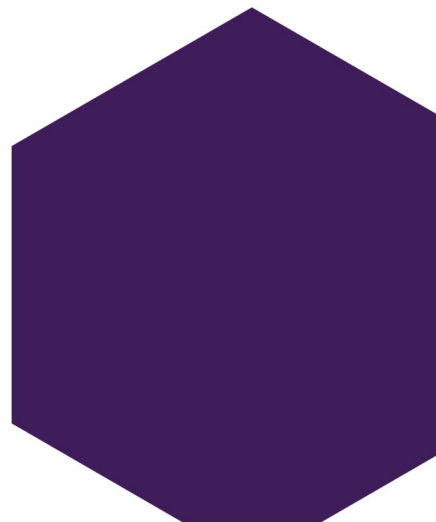
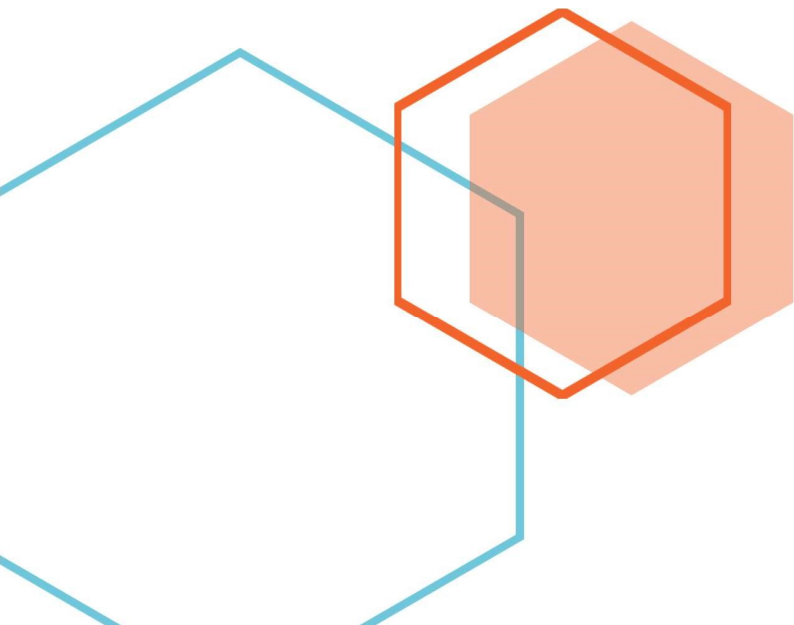




Location Recommendation Engine for Restaurant

(In Mumbai)

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Location Recommendation Engine for Restaurant

Introduction

- The city of Mumbai consists of a large number of restaurants, but still there is always scope for new ones. Finding a suitable location for it to flourish is the most important factor for a restaurant. It has to be set up in a location where one can attract a good crowd as well as it must be located in an area where there is little or no competition.
- We will be able to provide a solution for anyone looking to open a Chinese cuisine (or any other Cuisine) restaurant in the city of Mumbai.
- The Goal of this problem is to find a location that suits the below criteria.
 - A location that has many restaurants in the vicinity (European, Intercontinental, Indian)
 - A location that has no or few Chinese cuisine restaurants, as this will ensure that there very little competition with other competitors.

Data

- The data that will be used in this projects is a csv file having data related to all neighborhoods in the city of Mumbai which has been created manually for this project.

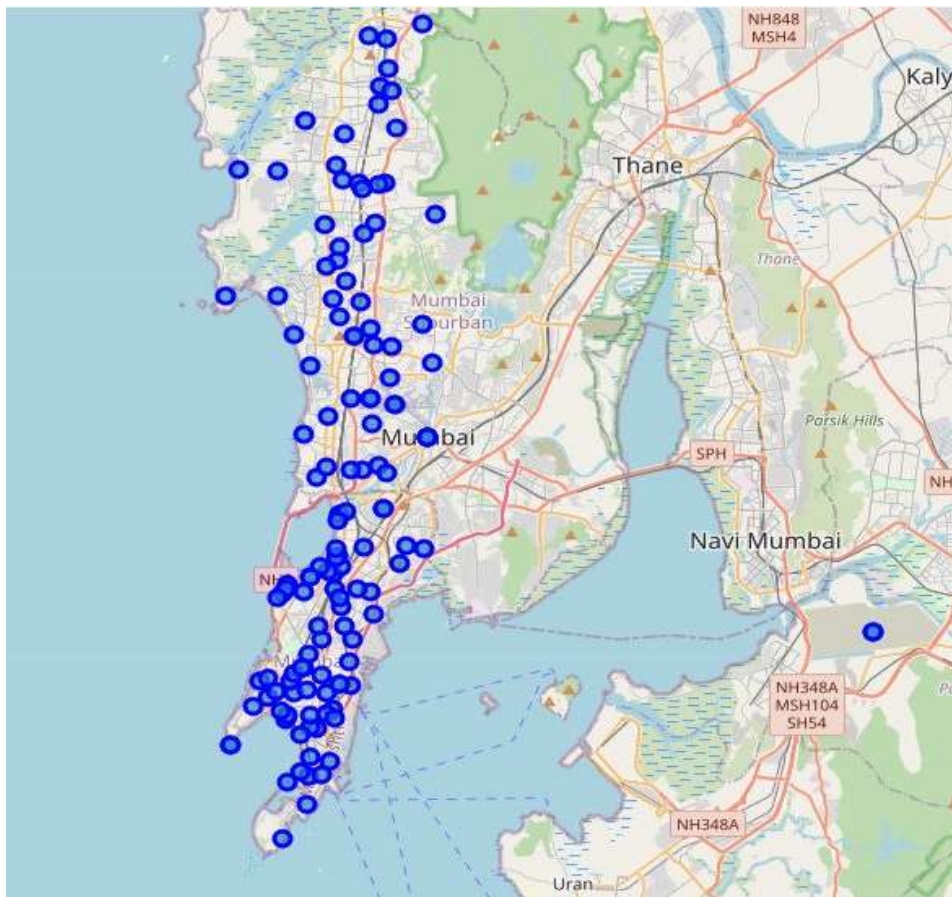
	A	B	C	D	E
1	Location	Pincode	State	District	
2	A I staff colony	400029	Maharashtra	Mumbai	
3	Aareymilk Colony	400065	Maharashtra	Mumbai	
4	Agripada	400011	Maharashtra	Mumbai	
5	Airport	400099	Maharashtra	Mumbai	
6	Ambewadi	400004	Maharashtra	Mumbai	
7	Andheri	400053	Maharashtra	Mumbai	
8	Andheri East	400069	Maharashtra	Mumbai	
9	Andheri Railway station	400058	Maharashtra	Mumbai	
10	Antop Hill	400037	Maharashtra	Mumbai	
11	Asvini	400005	Maharashtra	Mumbai	
12	Azad Nagar	400053	Maharashtra	Mumbai	
13	B P t colony	400003	Maharashtra	Mumbai	
14	B.N. bhavan	400051	Maharashtra	Mumbai	
15	B.P.lane	400003	Maharashtra	Mumbai	
16	Bandra West	400050	Maharashtra	Mumbai	
17	Bandra(east)	400051	Maharashtra	Mumbai	
18	Bangur Nagar	400090	Maharashtra	Mumbai	
19	Bazargate	400001	Maharashtra	Mumbai	
20	Best Staff colony	400012	Maharashtra	Mumbai	
21	Bharat Nagar	400007	Maharashtra	Mumbai	
22	Bhawani Shankar	400028	Maharashtra	Mumbai	
23	Bhamburda	400028	Maharashtra	Mumbai	



- Finding a suitable location for a restaurant to flourish is an important
- We will explore the neighborhoods using Foursquare API to find the venues within 500 meters of each neighborhood.
- The Foursquare API that will be used to explore the neighborhoods is <https://api.foursquare.com/v2/venues/explore>.
- This API returns json response which will be transformed into a Data Frame, taking only the required details into consideration.

Methodology

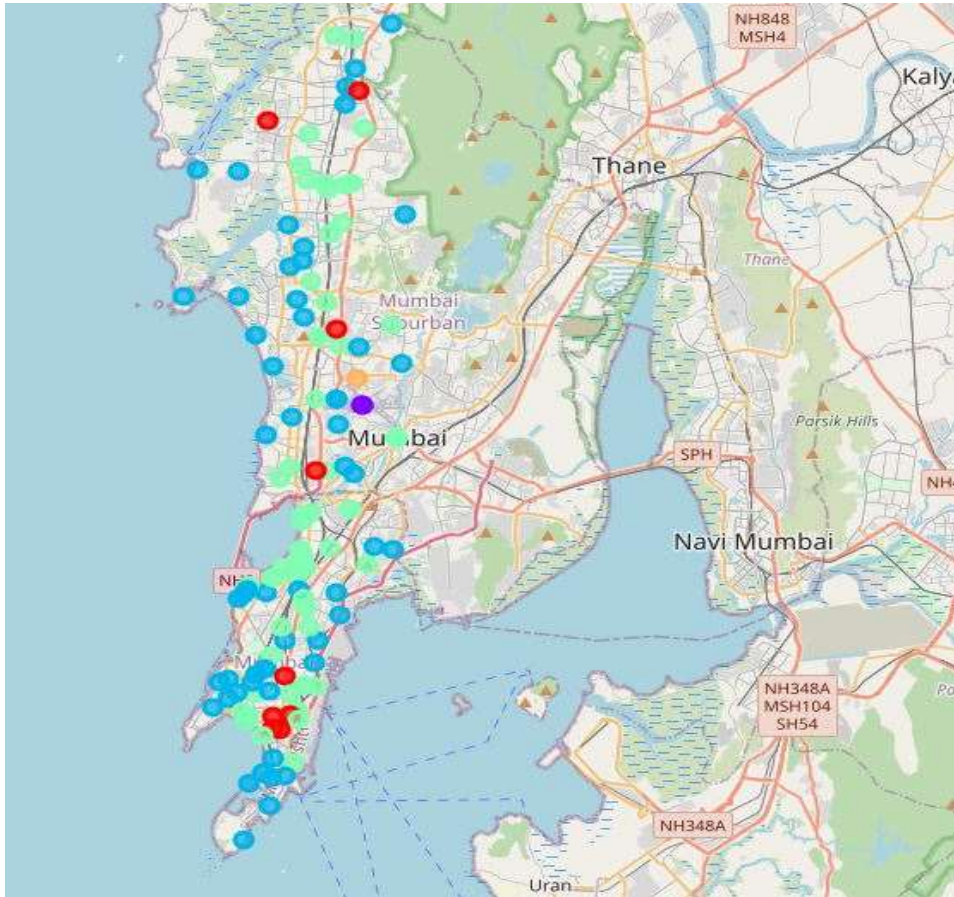
- Using the Foursquare API venue information is obtained in nearby vicinity of postal locations in Mumbai.



Location Recommendation Engine for Restaurant



- A radius is set to cover large neighborhoods in a particular area in Mumbai.
- This data is then merge with the Location dataset (Postal Codes) and a clustering algorithm is applied to the data.
- K-Means Clustering : The data points are clustered into 5 clusters using K-Means algorithm.



- The goal of this algorithm is to find groups in the data, with the number of groups represented by the variable K.
- The algorithm works iteratively to assign each data point to one of K groups based on the features that are provided.

Location Recommendation Engine for Restaurant



Results

- By exploring the requirements, we found three neighborhoods that match the requirements (Many restaurants/food shops in the vicinity & only a few Chinese restaurants)

```
In [32]: Mumbai_merged.loc[Mumbai_merged['Cluster Labels'] == 0, Mumbai_merged.columns[[14]+[0]+[12]+list(range(1, 11))]]
```

Out[32]:

	District	Neighborhood	Pincode	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
20	Mumbai	Borivali East	400066	Indian Restaurant	Gym	Women's Store	Falafel Restaurant	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market	Fish & Chips Shop
25	Mumbai	Charkop	400067	Indian Restaurant	Pharmacy	Café	Bakery	Miscellaneous Shop	Farm	Food Court	Food & Drink Shop	Food	Flower Shop
51	Mumbai	Haines Road	400011	Indian Restaurant	Pizza Place	Cupcake Shop	Coffee Shop	Asian Restaurant	Bar	Farm	Food Court	Food & Drink Shop	Food
52	Mumbai	Hanuman Road	400057	Indian Restaurant	Bar	Snack Place	Wine Shop	Cheese Shop	Ice Cream Shop	American Restaurant	Food	Restaurant	Market
63	Mumbai	Kalbadevi	400002	Indian Restaurant	Food	Market	Café	Cheese Shop	Women's Store	Farm	Food Court	Food & Drink Shop	Flower Shop
69	Mumbai	Kherwadi	400051	Indian Restaurant	Café	Pizza Place	Bar	Farm	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market
75	Mumbai	Madhavbaug	400004	Indian Restaurant	Grocery Store	Food	Arcade	Fast Food Restaurant	Event Space	Food Court	Food & Drink Shop	Flower Shop	Flea Market
82	Mumbai	Mandvi	400003	Indian Restaurant	Smoke Shop	Café	Juice Bar	Arcade	Sandwich Place	Chinese Restaurant	BBQ Joint	Dessert Shop	Convenience Store
95	Mumbai	Nagardas Road	400069	Indian Restaurant	Sandwich Place	Juice Bar	Women's Store	Falafel Restaurant	Food & Drink Shop	Food	Flower Shop	Flea Market	Fish & Chips Shop

```
In [33]: Mumbai_merged.loc[Mumbai_merged['Cluster Labels'] == 1, Mumbai_merged.columns[[14]+[0]+[12]+list(range(1, 11))]]
```

Out[33]:

	District	Neighborhood	Pincode	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
1	Mumbai	Airport	400099	Airport	Airport Service	Women's Store	Farm	Food Stand	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market
55	Mumbai	International Airport	400099	Airport	Airport Service	Women's Store	Farm	Food Stand	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market

```
In [36]: Mumbai_merged.loc[Mumbai_merged['Cluster Labels'] == 4, Mumbai_merged.columns[[14]+[0]+[12]+list(range(1, 11))]]
```

Out[36]:

	District	Neighborhood	Pincode	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
9	Mumbai	B P t colony	400003	Hotel	Convenience Store	Food Stand	Food Court	Food & Drink Shop	Food	Flower Shop	Flea Market	Fish & Chips Shop	Field

Discussion

- According to results we observe that most common venues (Top 10) come out to be restaurants and Pizza places and Snack places, which means any new chef/business man can start a restaurant provided that they need to compete with existing restaurants (Other Types) but only if he provides top class facilities to get to top.

Conclusion

- Based on the Clusters formed it would be a good idea to open a restaurant in Clusters 0,1 & 4 since the other clusters already have Chinese Restaurants in their vicinities.
- Also, cluster 0 has many restaurants in the vicinity (Pizza restaurants, European, Intercontinental, Indian) so one will be able to attract a good crowd.
- Also, there is no other competitors in this neighborhood who have set up Chinese restaurants nearby.
- These results have limitations - The venue data obtained is of top 10 venues in each neighborhood, where we might neglect Chinese restaurants with less frequency.