

# **The Battle of the Neighbourhoods - Week 2(Final Report)**

## **1. Introduction & Business Problem:**

### **Problem Background:**

I was always fascinated by the food culture of Bengaluru. Restaurants from all over the world can be found here in Bengaluru. From United States to Japan, Russia to Antarctica, you get all type of cuisines here. Delivery, Dine-out, Pubs, Bars, Drinks, Buffet, Desserts you name it and Bengaluru has it. Bengaluru is best place for foodies. The number of restaurants is increasing day by day. Currently which stands at approximately 12,000 restaurants. With such a high number of restaurants. This industry hasn't been saturated yet. And new restaurants are opening every day. However, it has become difficult for them to compete with already established restaurants. The key issues that continue to pose a challenge to them include high real estate costs, rising food costs, shortage of quality manpower, fragmented supply chain and over-licensing.

### **Problem Description:**

The basic idea of analyzing the dataset is to get a fair idea about the factors affecting the establishment of different types of restaurant at different places in Bengaluru, Bengaluru being one such city has more than 12,000 restaurants with restaurants serving dishes from all over the world. With each day new restaurants opening the industry hasn't been saturated yet and the demand is increasing day by day. Inspire of increasing demand it however has become difficult for new restaurants to compete with established restaurants. Most of them serving the same food. Bengaluru being an IT capital of India. Most of the people here are dependent mainly on the restaurant food as they don't have time to cook for themselves. With such an overwhelming demand of restaurants it has therefore become important to study the demography of a location. What kind of a food is more popular in a locality? Do the entire locality loves vegetarian food. If yes then is that locality populated by a section of people for e.g. Jain, Marwaris, Gujaratis who are mostly vegetarian. These kinds of analysis can be done using the data, by studying the factors such as

- Location of the restaurant
- Approx. Price of food
- Theme based restaurant or not
- Which locality of that city serves that cuisines with maximum number of restaurants
- The needs of people who are striving to get the best cuisine of the neighbourhood
- Is a particular neighbourhood famous for its own kind of food.

## Target Audience:

To recommend the correct location, XYZ Company Ltd has appointed me to lead of the Data Science team. The objective is to locate and recommend to the management which neighbourhood of Bangalore city will be best choice to start a restaurant. The Management also expects to understand the rationale of the recommendations made. This would interest anyone who wants to start a new restaurant in Bangalore city.

## Success Criteria:

The success criteria of the project will be a good recommendation of borough/Neighbourhood choice to XYZ Company Ltd based on Lack of such restaurants in that location and nearest suppliers of ingredients.

## 2. Data:

One city will be analysed in this project : Bangalore City.

We will be using the below datasets for analysing Bangalore city.

Data 1:

I don't found any prepared database for indicating Bangalore places with their Geolocations.

So I decided to make one on my own.

Firstly, I divided Bangalore city with their respective Pin codes. Using this site for reference "<https://www.mapsofindia.com/pincode/india/karnataka/bangalore/>" to identify pin codes of Bangalore City.

Data 2:

Then using <https://indiamapia.com> site to collect the geolocation of every pin code belong to Bangalore and make one csv file of that data. File name is :

'Bangalore\_pincode\_geolocation.csv'

	Pincode	Location	Latitude	Longitude
0	560001	Bangalore Bazaar, Legislators Home, Dr. ambedk...	12.987485	77.604906
1	560002	Bangalore Fort, Bangalore City, Bangalore Corp...	12.971599	77.594563
2	560003	Vyalikaval Extn, Malleswaram, Palace Guttahall...	13.008350	77.561450
3	560004	Pasmpamahakavi Road, Basavanagudi, Shankarpura...	12.945400	77.577600
4	560005	Jeevanahalli, Fraser Town	13.071300	77.590500

### Data 3:

Bangalore city geographical coordinates data will be utilized as input for the Foursquare API, that will be leveraged to provision venues information for each neighborhood. We will use the Foursquare API to explore neighborhoods in Bangalore City. The below is image of the Foursquare API data.

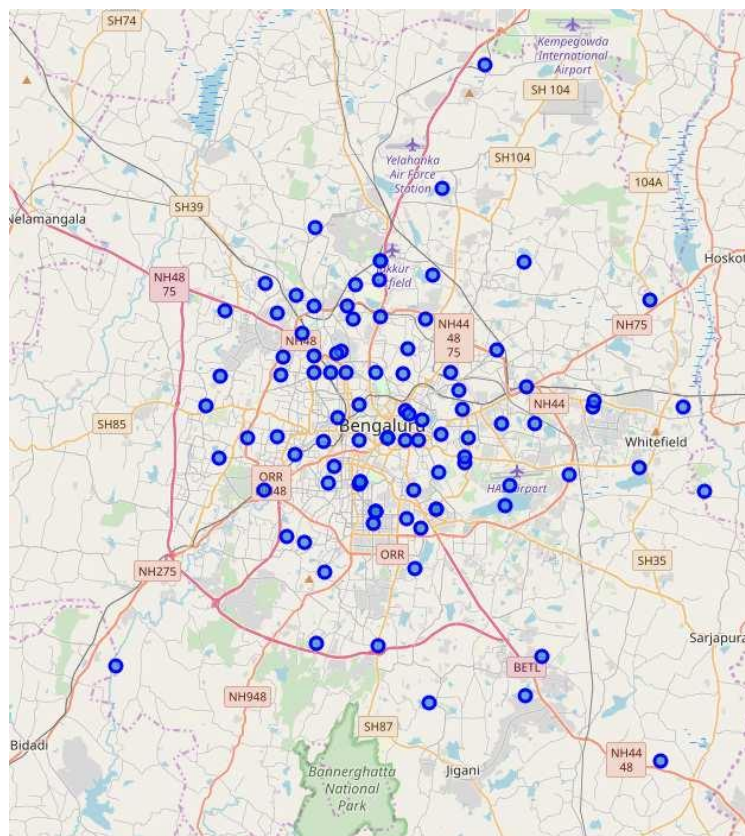
	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Bangalore Bazaar, Legislators Home, Dr. ambedk...	12.987485	77.604906	The Savera Tea Centre	12.985953	77.605011	Tea Room
1	Bangalore Bazaar, Legislators Home, Dr. ambedk...	12.987485	77.604906	Hotel Taj	12.985062	77.607000	Indian Restaurant
2	Bangalore Bazaar, Legislators Home, Dr. ambedk...	12.987485	77.604906	Hotel Hilal	12.985826	77.605160	Indian Restaurant
3	Bangalore Bazaar, Legislators Home, Dr. ambedk...	12.987485	77.604906	Chandini Chowk	12.985919	77.605115	Asian Restaurant
4	Bangalore Fort, Bangalore City, Bangalore Corp...	12.971599	77.594563	JW Marriott Hotel Bengaluru	12.972362	77.595051	Hotel

## 3. Methodology:

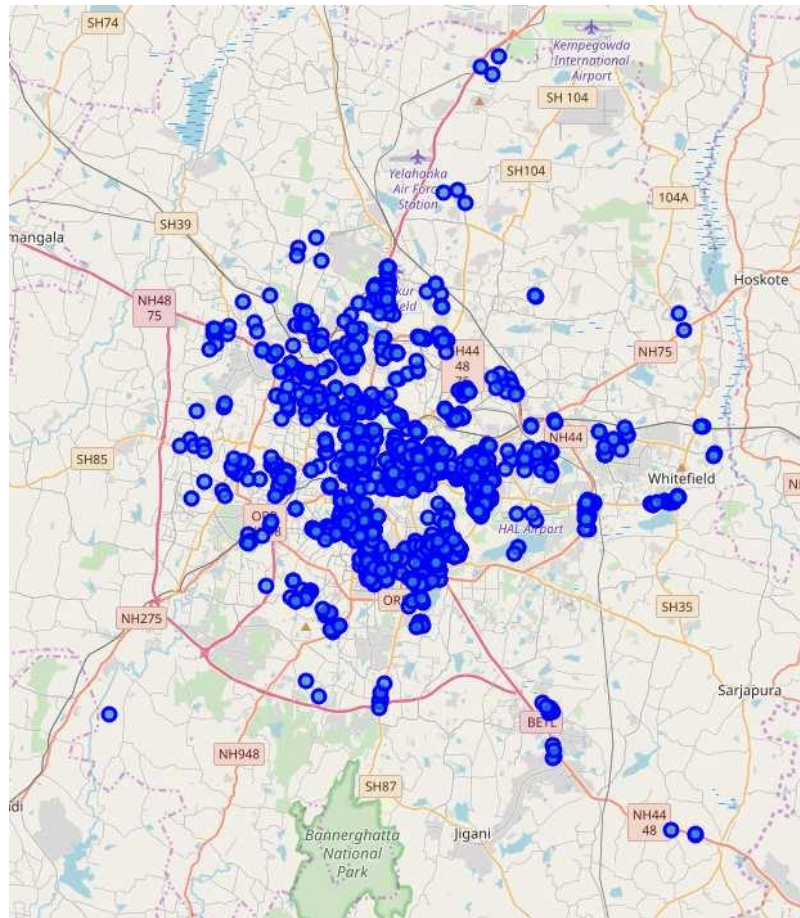
**Business Understanding:** Our main goal is to get optimum location for new restaurant business in New York City for XYZ Company.

**Analytic Approach:** Bangalore city neighbourhood has a total of 99 neighborhoods. In this project first part is clustering of Bangalore City. This is done because of the following Exploratory data analysis. Exploratory Data Analysis:

Data 1- Bangalore city Geographical Coordinates Data according to distributed Pin Codes.



Data 2 - Bangalore city geographical coordinates data has been utilized as input for the Foursquare API, that has been leveraged to provision venues information for each neighborhood. We used the Foursquare API data to explore neighborhoods in Bangalore City.



#### 4. RESULTS :

From this venues data we filtered and used only the restaurant data for Bangalore city clustering.

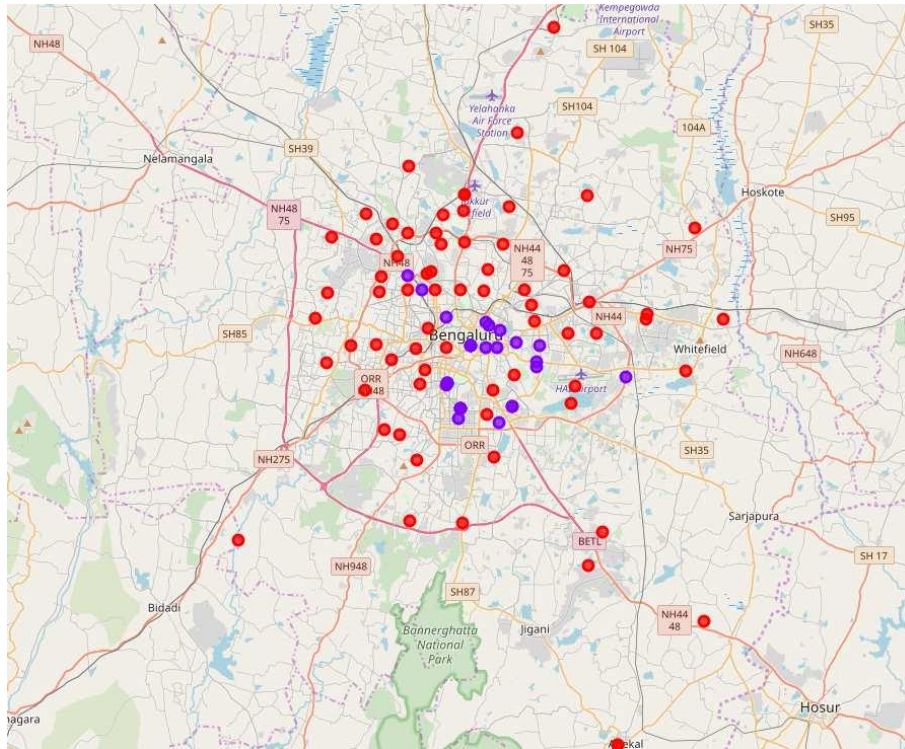
As we focussed only on restaurants business.

##### **Neighborhood K-Means clustering based on mean occurrence of venue category:**

To cluster the neighborhoods into two clusters we used the K-Means clustering Algorithm. k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean. It uses iterative refinement approach.

In the below Map Visualization, we can see the different types of clusters created by using K-Means for Bangalore City.





**Cluster0** : The Total and Total Sum of cluster0 has smallest value. It shows that the market is not saturated.

### Cluster 0 : Untapped Markets

```
M_merged[BM_merged['Total'] == 0].reset_index(drop=True)
```

	Pincode	Neighborhood	Latitude	Longitude	Total	Cluster_Labels
0	560017	Bangalore Air port, Vimapura, Nal	12.945062	77.665135	0.0	0
1	560023	Magadi Road	12.969880	77.557310	0.0	0
2	560032	R T nagar, P&t Col. kavalbyrasandra	13.021820	77.605710	0.0	0
3	560036	Devasandra, Krishnarajapuram	13.000636	77.674624	0.0	0
4	560039	Nayandahalli	12.942580	77.523234	0.0	0
5	560046	Benson Town	13.007590	77.603520	0.0	0
6	560049	Thambuchetty Palya, Bidrahalli, Virgonagar, Mu...	13.049480	77.746130	0.0	0
7	560056	Mallathahalli, Ullalu Upanagara, Bnagalore Vis...	12.960362	77.496712	0.0	0
8	560058	Peenya I stage, Peenya li stage, Peenya Small ...	13.006288	77.497442	0.0	0
9	560059	Rv Niketan	12.843460	77.437270	0.0	0
10	560073	Nagasandra, Bagalgunte	13.043174	77.500299	0.0	0
11	560092	Amruthahalli, Kodigehalli, Sahakaranagar P.o	13.057768	77.575519	0.0	0
12	560097	Vidyaranyapura, Chikkabettahalli	13.090117	77.552179	0.0	0
13	560103	Bellandur	12.933713	77.662194	0.0	0
14	562149	Doddagubbi, Kannur, Bagalur, Bandikodigehalli	13.070584	77.673587	0.0	0
15	562157	Hunasamaranahalli, Doddajala, Vidyanagara, Tar...	13.182027	77.650740	0.0	0

**Cluster1** : The Total and Total Sum of cluster1 has highest value. It shows that the markets are saturated. Number of restaurants are very high.

#### Cluster 1 : Saturated Markets

```
BM_merged[BM_merged['Cluster_Labels'] == 1].reset_index(drop=True)
```

	Pincode	Neighborhood	Latitude	Longitude	Total	Cluster_Labels
0	560001	Bangalore Bazaar, Legislators Home, Dr. ambedk...	12.987485	77.604906	17.0	1
1	560002	Bangalore Fort, Bangalore City, Bangalore Corp...	12.971599	77.594563	35.0	1
2	560003	Vyalikaval Extn, Malleswaram, Palace Guttahall...	13.008350	77.561450	19.0	1
3	560004	Pasmpamahakavi Road, Basavanagudi, Shankarpura...	12.945400	77.577600	24.0	1
4	560007	Air Force hospital, Agram	12.958000	77.639000	21.0	1
5	560008	Hulsur Bazaar, H.A.I ii stage, Someswarapura	12.973750	77.624990	20.0	1
6	560009	K. g. road, Subhashnagar, Bangalore Dist offic...	12.971626	77.594536	35.0	1
7	560010	Rajajinagar Ivth block, Bhashyam Circle, Rajaj...	13.017800	77.551750	18.0	1
8	560011	Madhavan Park, Jayangar Iii block	12.930158	77.587714	38.0	1
9	560020	Seshadripuram, K.P.west	12.990409	77.577690	26.0	1
10	560025	Museum Road, Bangalore Sub fgn post, Cmp Centr...	12.970180	77.611890	30.0	1
11	560028	Tyagrajnagar	12.971611	77.594551	35.0	1
12	560034	Koramangala, Koramangala I block, St. John's m...	12.931667	77.622685	35.0	1
13	560037	Doddanekkundi, Yemalur, Rameshnagar, Kundalaha...	12.951217	77.699747	19.0	1
14	560038	Indiranagar, Indiranagar Com. complex	12.971902	77.641144	28.0	1
15	560041	Jayanagar, Tilaknagar	12.923434	77.586088	40.0	1
16	560042	Sivan Chetty gardens	12.981530	77.614110	28.0	1
17	560050	Banashankari, Ashoknagar, State Bank of mysore...	12.970525	77.604912	32.0	1
18	560051	H.K.p. road	12.985430	77.606700	17.0	1
19	560068	Madivala, Hongasandra, Bommanahalli	12.921111	77.613391	28.0	1
20	560069	Jayangar East	12.930153	77.587719	38.0	1
21	560070	Yediyur, B Sk ii stage, Padmanabhnagar, Jayana...	12.930154	77.587718	38.0	1
22	560071	Domlur	12.960992	77.638726	30.0	1
23	560095	Koramangala Vi bk	12.931673	77.622679	35.0	1
24	560098	Rajarajeshwarinagar, Kenchanahalli	12.947150	77.578880	18.0	1
25	560100	Electronics City	12.947150	77.578880	18.0	1
26	560102	Hsr Layout	12.947150	77.578880	18.0	1

## 5. DISCUSSION:

1. There is scope to open restaurants in untapped Markets showing in the table.
2. There is scope to explore cuisines of various countries in Bangalore City.

```
['Afghan Restaurant',  
'American Restaurant',  
'Andhra Restaurant',  
'Asian Restaurant',  
'Bengali Restaurant',  
'Cantonese Restaurant',  
'Chinese Restaurant',  
'Comfort Food Restaurant',  
'Dim Sum Restaurant',  
'Eastern European Restaurant',  
'Fast Food Restaurant',  
'French Restaurant',  
'German Restaurant',  
'Halal Restaurant',  
'Hyderabadi Restaurant',  
'Indian Restaurant',  
'Italian Restaurant',  
'Japanese Restaurant',  
'Karnataka Restaurant',  
'Kerala Restaurant',  
'Korean Restaurant',  
'Mediterranean Restaurant',  
'Mexican Restaurant',  
'Middle Eastern Restaurant',  
'Modern European Restaurant',  
'Multicuisine Indian Restaurant',  
'North Indian Restaurant',  
'Paella Restaurant',  
'Parsi Restaurant',  
'Punjabi Restaurant',  
'Rajasthani Restaurant',  
'Restaurant',  
'Seafood Restaurant',  
'South Indian Restaurant',  
'Sushi Restaurant',  
'Szechuan Restaurant',  
'Tex-Mex Restaurant',  
'Thai Restaurant',  
'Tibetan Restaurant',  
'Turkish Restaurant',  
'Udupi Restaurant',  
'Vegetarian / Vegan Restaurant',  
'Vietnamese Restaurant']
```

3. In Bangalore City restaurants of cuisines of many varieties are available. So, if risk can be taken with great menu on board. It also shows people love eating cuisines of various varieties.

## **6. CONCLUSION:**

This analysis is performed on limited data. This may be right or may be wrong. But if good amount of data is available there is scope to come up with better results. If there are lot of restaurants probably there is lot of demand. Central Bangalore City has high concentration of restaurant business. Very competitive market. East Bangalore also has good number of restaurants but not as many as required. So, this can be explored. As per the neighbourhood or restaurant type mentioned like Indian Restaurant analysis can be checked. A venue with lowest risk and competition can be identified.