Location Analysis for New Restaurant Opening

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Introduction

- Opening a restaurant is a difficult undertaking.
- But manageable if broken down in sub-tasks.
- Some of the sub-tasks are the following:
  - Choose a restaurant concept
  - Form the menu items
  - Write the restaurant business plan
  - Choose a location
  - Permits and Licenses etc.
- Our focus is on Location Analysis (scope of work).

So, what is Location Analysis?

- It is a technique to find best location for a business.

- Location Analysis for opening a new restaurant focuses on finding the best location in a city neighbourhood to open a new restaurant.

- We need to analyse potential locations and their access to customers, their location in relation to equipment and food suppliers and other important factors.

- Having a good location can give the necessary push for success in the restaurant business.

Data

▶ Neighbourhood data for Bangalore.

[211]:

	Post Office	District	Pincode
0	A F Station Yelahanka S.O	Bangalore	560063
1	Adugodi S.O	Bangalore	560030
2	Agara B.O	Bangalore	560034
3	Agram S.O	Bangalore	560007
4	Amruthahalli B.O	Bangalore	560092

Data

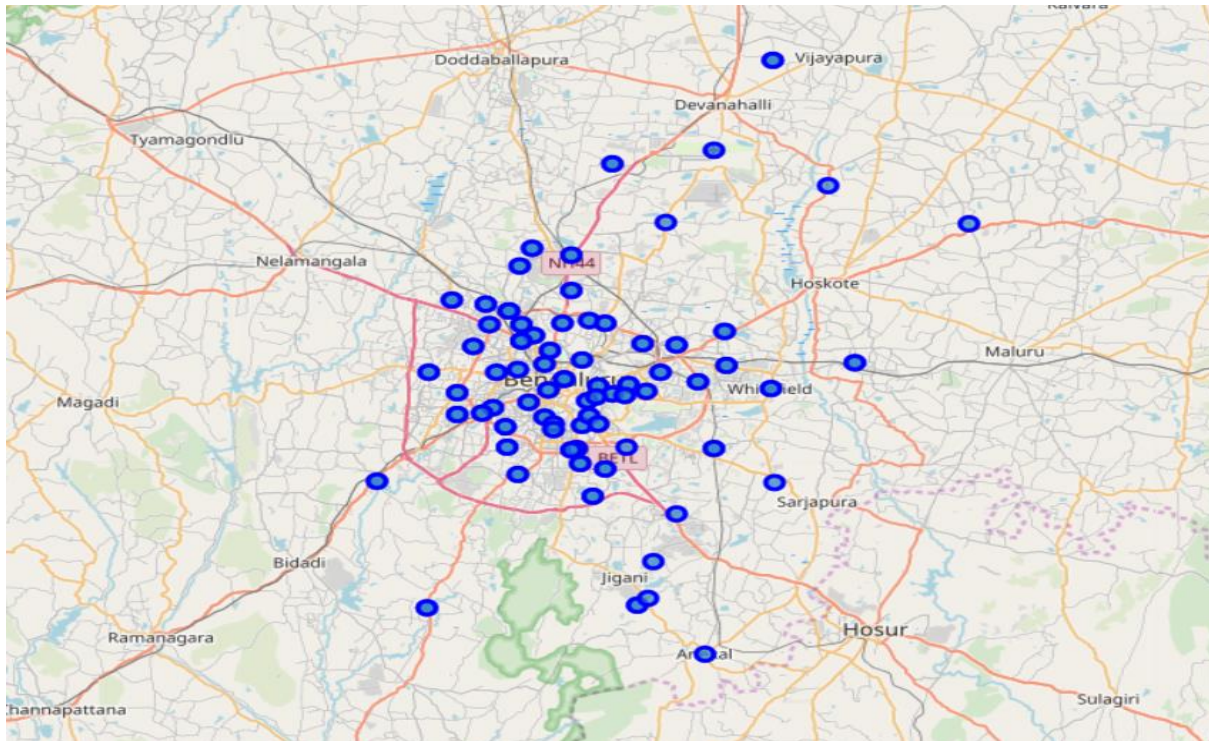▶ Coordinates Details of the neighbourhoods.

[222]:		postcode	neighbourhood	latitude	longitude
	0	560001	M.G Road	12.973015	77.616612
	1	560002	Bangalore City	12.979120	77.591300
	2	560003	Malleswaram	13.016341	77.558664
	3	560004	Basavanagudi	12.941726	77.575502
	4	560006	J.C.Nagar	15.349723	75.137521
	5	560007	Air Force Hospital	12.964027	77.627500

Data

- Neighbourhood details with Coordinates will be used to plot maps of the city.

- Neighbourhood details with Coordinates will be used to pull Foursquare venue details.

- Coordinates details will allow us to calculate distance between neighbourhoods.

- Venue details from Foursquare will let us take out restaurant details in the neighbourhoods.

Data

- Map visualization of Bangalore with Neighbourhoods.

Problem Statement

- Find the best location (Neighbourhood) in Bangalore to set up a new restaurant.

- Location Analysing of neighbourhoods of Bangalore.

- Factors which will influence our decision to find the best location:

  - Number of existing restaurants in the neighbourhood.

  - Distance of neighbourhood from the city centre.

- We will not look into other factors or parameters.

Methodology

- Lot of restaurants in Bangalore.
- Will focus on locations which are not already crowded with restaurants.
- Will calculate a score of the various neighbourhoods.
- Score:
  - Divided into 2 parts as we have taken 2 defining factors.
  - Score1 : Number of existing restaurants in the neighbourhood : total 5.
  - Score2 : Distance of neighbourhood from the city centre : total 5.
- Over total Score 10.
- Neighbourhoods will get a score out of 10, from calculations of both the factors.

Analysis

▶ Foursquare API data for neighbourhoods gives various venue details.

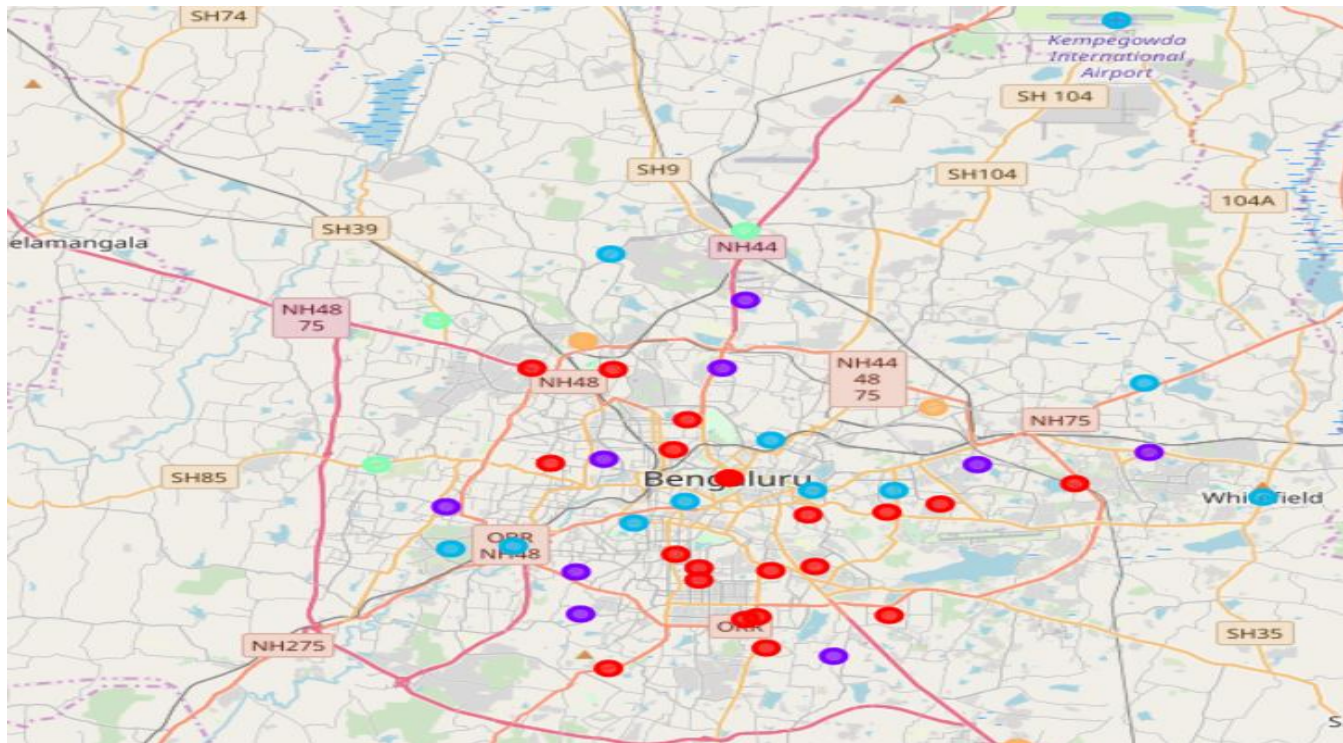|	Neighbourhood	Neighbourhood Latitude	Neighbourhood Longitude	Venue	Venue_ID	Venue Latitude	Venue Longitude	Venue Category
2	M.G Road	12.973015	77.616612	Teppan	4faff6ade4b0c0e08eb8d691	12.975727	77.616879	Japanese Restaurant
4	M.G Road	12.973015	77.616612	Benjarong	4bcaeabafb84c9b639e91d3e	12.975615	77.616916	Thai Restaurant
5	M.G Road	12.973015	77.616612	Yauatcha	523d691011d20523c79c04ca	12.973318	77.620072	Asian Restaurant
13	M.G Road	12.973015	77.616612	Cafe Mozaic	4ba270e9f964a52043f937e3	12.973642	77.619762	Restaurant
14	M.G Road	12.973015	77.616612	Le Jardin	4f484abfe4b0d63740f04e9a	12.973562	77.617864	French Restaurant

[760]: `df_venues.shape`

[760]: `(273, 8)`

Analysis

- We have neighbourhood details combined with Foursquare API venue details.

- Will cluster the neighbourhoods with Kmeans Algorithm, to find which neighbourhoods falls in same groups.

[723]:

	Postcode	Neighbourhood	Latitude	Longitude	Distance	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
0	560001	M.G Road	12.973015	77.616612	0.000000	2.0	Restaurant	Chinese Restaurant	Indian Restaurant	Thai Restaurant	Asian Restaurant	Japanese Restaurant	Mediterranean Restaurant	Modern European Restaurant
1	560002	Bangalore City	12.979120	77.591300	2.828110	0.0	Restaurant	Indian Restaurant	Eastern European Restaurant	Karnataka Restaurant	Japanese Restaurant	Italian Restaurant	French Restaurant	Fast Food Restaurant
2	560003	Malleswaram	13.016341	77.558664	7.905429	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
3	560004	Basavanagudi	12.941726	77.575502	5.646159	0.0	Indian Restaurant	Restaurant	Mediterranean Restaurant	Eastern European Restaurant	Karnataka Restaurant	Japanese Restaurant	Italian Restaurant	French Restaurant
4	560006	J.C.Nagar	15.349723	75.137521	375.187845	4.0	Vegetarian / Vegan Restaurant	Indian Restaurant	Fast Food Restaurant	Kerala Restaurant	Karnataka Restaurant	Japanese Restaurant	Italian Restaurant	French Restaurant

Cluster visualization on Venue Details

Analysis

- We will calculate the score to the neighbourhoods depending on the 2 factors or parameters.

- calculation of Distance of neighbourhood from the city centre.

  - distance 0 to 5 km -> 5points

  - distance 6 to 10 km -> 4points

  - distance 11 to 18 km -> 3points

  - distance 19 to 25 km -> 2points

  - distance 26 and more than 26 km -> 1point

Analysis

- calculation of Number of existing restaurants in the neighbourhood.
  - no. of restaurants 0 to 10 -> 5points
  - no. of restaurants 11 to 15 -> 4points
  - no. of restaurants 16 to 25 -> 3points
  - no. of restaurants 26 to 30 -> 2points
  - no. of restaurants 31 and more than 31 -> 1point

Analysis

- We will take points from both the factors or parameter and give a score out of 10 to a neighbourhood.

- The neighbourhood with the highest score will be the best place to open a new restaurant in the city of Bangalore with the given data and with the chosen factors or parameters.

- We will merge this final data with zonal data as well, to show best neighbourhoods in a zone.

Analysis

▶ Zonal data

	Neighbourhood	Zone
0	Amruthahalli	Northern
1	Anandnagar	Northern
2	Ashoknagar	Central
3	Austin Town	Central
4	Bagalgunte	Northern
5	Banashankari III Stage	Western
6	Banaswadi	Northern
7	Bangalore City	Central
8	Bangalore International Airport	Outskirt
9	Bangalore University	Western

Analysis

▶ Final result

[745]:

	index	Postcode	Neighbourhood	Latitude	Longitude	Distance	Venue Category	Score	Zone	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venu
25	37	560050	Ashoknagar	12.979120	77.591300	2.828110	2	10	Central	0.0	Restaurant	Indian Restaurant	Eastern European Restaurant	Karnataka Restaurant	Japanes Restaurar
21	33	560046	Benson Town	12.997803	77.604175	3.056261	1	10	Central	2.0	Pakistani Restaurant	Vietnamese Restaurant	Fast Food Restaurant	Karnataka Restaurant	Japanes Restaurar
26	38	560053	Chickpet	12.968003	77.578642	4.156842	2	10	Central	2.0	Middle Eastern Restaurant	South Indian Restaurant	Vietnamese Restaurant	Eastern European Restaurant	Japanes Restaurar
1	1	560002	Bangalore City	12.979120	77.591300	2.828110	2	10	Central	0.0	Restaurant	Indian Restaurant	Eastern European Restaurant	Karnataka Restaurant	Japanes Restaurar
34	50	560071	Domlur	12.962467	77.638196	2.616447	6	10	Central	0.0	Indian Restaurant	Vietnamese Restaurant	Rajasthani Restaurant	Italian Restaurant	Chines Restaurar
22	34	560047	Austin Town	12.961274	77.615294	1.306855	2	10	Central	0.0	Indian Restaurant	Italian Restaurant	Vietnamese Restaurant	Mediterranean Restaurant	America Restaurar
14	21	560029	Dharmaram College	12.933841	77.604203	4.538165	5	10	Southern	0.0	Indian Restaurant	Kerala Restaurant	Middle Eastern Restaurant	Fast Food Restaurant	Karnatak Restaurar
48	71	560103	Bellandur	12.979120	77.591300	2.828110	2	10	Eastern	0.0	Restaurant	Indian Restaurant	Eastern European Restaurant	Karnataka Restaurant	Japanes Restaurar
37	54	560076	Bannerghatta Road	12.910639	77.600046	7.130945	7	9	Southern	0.0	Indian Restaurant	Udupi Restaurant	Fast Food Restaurant	Punjabi Restaurant	Vietnames Restaurar
5	7	560010	Rajajinagar	12.988234	77.554883	6.905588	1	9	Western	1.0	Indian Restaurant	Vietnamese Restaurant	Mediterranean Restaurant	American Restaurant	Andhr Restaurar

Analysis

▶ Top 10 neighbourhoods to open a new restaurant in Bangalore.

```
[747]:  25              Ashoknagar
        21              Benson Town
        26              Chickpet
        1               Bangalore City
        34              Domlur
        22              Austin Town
        14        Dharmaram College
        48              Bellandur
        37        Bannerghatta Road
        5               Rajajinagar
```

Analysis

- Top neighbourhoods in some of the zones.

- Central Zone:

[752]:

	index	Postcode	Neighbourhood	Latitude	Longitude	Distance	Venue Category	Score	Zone	Cluster Labels	1st Most Common Venue
1	1	560002	Bangalore City	12.979120	77.591300	2.828110	2	10	Central	0.0	Restaurant
21	33	560046	Benson Town	12.997803	77.604175	3.056261	1	10	Central	2.0	Pakistani Restaurant
22	34	560047	Austin Town	12.961274	77.615294	1.306855	2	10	Central	0.0	Indian Restaurant

- Northern Zone:

[753]:

	index	Postcode	Neighbourhood	Latitude	Longitude	Distance	Venue Category	Score	Zone	Cluster Labels	1st Most Common Venue
13	18	560024	Anandnagar	13.033377	77.589523	7.295879	1	9	Northern	1.0	Indian Restaurant
27	39	560054	Mathikere	13.032888	77.557374	9.228910	2	9	Northern	0.0	American Restaurant
29	42	560057	Peenya Dasarahalli	13.033019	77.533201	11.222554	2	8	Northern	0.0	Fast Food Restaurant

Results and Discussion

- Many good restaurants in Bangalore to open a restaurant.

- Took only restaurants venue category from venue details of the neighbourhoods.

- Calculate best location (neighbourhood) to open a new restaurant based on 2 parameters: distance of neighbourhood from the city centre and no. of restaurants already present in the neighbourhood.

- Exploratory Data Analysis of the neighbourhood data, venue data and coordinates data to do Location Analysis.

- Coordinates data pulled using geopy.

- Venue Details from Foursquare API.

- Neighbourhood data of Bangalore with Zonal data, taken from Web.

Conclusion

- In this assignment we focussed on Location Analysis to open a new restaurant.

- Location Analysis can be done for any Business case.

- Same methodology can be used for Business Analysis to open a new business.

- We can take more parameters like demography of a neighbourhood, labour cost etc. to do Location Analysis.

- With the power of Data Analysis and ML/AI we can always find great insights of things which we don't see from outside.