Exploring Hospitals in the neighborhoods of Bangalore

DATA SCIENCE
IBM CAPSTONE PROJECT

Problem Description

- **Explore All the neighborhoods of Bangalore**
- **Find the number of Hospitals in Each Neighborhood**
- **Recognize those areas in Bangalore having minimum number of hospitals**
- **Make a data analysis of the number of hospitals in each neighborhood using suitable clustering algorithm**

Target Audience

This analysis is very much helpful to the business people and government who can use this analysis as the basis for identifying the places having minimum number of hospitals and plan for construction.

Dataset

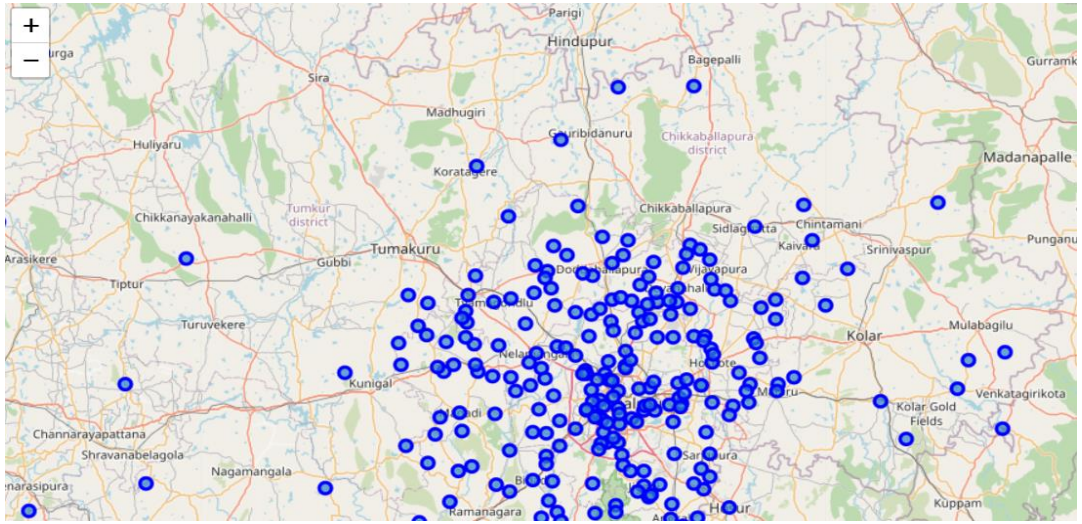
- Bangalore neighborhoods dataset downloaded from Kaggle 'https://www.kaggle.com/rmenon1998/bangalore-neighborhoods' which has the location co-ordinates of each region of Bangalore.

- Use the Foursquare API to explore these neighborhoods filtering on venue category “Hospitals” and visualize them on a map.

Analysis from the dataset

Bangalore Neighborhood Data Set and Plotting Neighborhoods on Map

	Neighborhood	Latitude	Longitude
0	Agram	45.813177	15.977048
1	Amruthahalli	13.066513	77.596624
2	Attur	11.663711	78.533551
3	Banaswadi	13.014162	77.651854
4	Bellandur	58.235358	26.683116



Using Four Square API

- Using Geocoding, we firstly get the location latitude and longitude of Bangalore.
- Next we plot the neighborhoods of Bangalore on map using Folium Library.
- Next we enter the latitude and longitude of each area and using FourSquare Api we find the hospitals surrounding each area within 500 m radius.
- We filter by the venue-category “Hospitals” and use the search endpoint.
- We store the hospital data in a new data frame.

Using Four Square API

	ID	Name	Latitude	Longitude	Neighborhood
0	4f571240e4b01cdf1e06d991	KBC Sestre milosrdnice - referentni centar za ...	45.811628	15.967922	Agram
1	4c930a5c6cfea093b610b78b	KBC Šalata	45.818408	15.983909	Agram
2	4f7d5a07e4b09204d24d545f	Porta Klinike Za Djecje Bolesti Klaiceva	45.809175	15.964371	Agram
3	4d5ea5b55c39b1f7c231ee49	Bolnica Runjaninova	45.804951	15.969430	Agram
4	4f7a097fe4b0d8cda6c75113	RTG Klinike Za Djecje Bolesti Klaiceva	45.809635	15.964857	Agram
5	4f7a1261e4b0a76294aea23c	Operacijska Sala Klinike Za Djecje Bolesti Kla...	45.809313	15.963948	Agram
6	4dd13d68d4c065592fc125cb	Psihijatrijska bolnica za djecu i mladez	45.814630	15.963653	Agram
7	4f76b785e4b0b009ed9630d4	C-Urologija	45.809372	15.963305	Agram
8	4f8abde2e4b029818b66e176	klinika za djecje bolesti Garderoba	45.809088	15.964390	Agram
9	4d9d7d07c99fb60c0b0ec88b	Napuštena Vojna Bolnica	45.813908	15.989718	Agram
10	4fe014b4e4b0e8a928147ff9	Klaićeva, vađenje mandula	45.807465	15.970324	Agram
11	4f7a7814e4b0bd4c7bc26fe9	Tajništvo Kirurgije Klinike Za Djecje Bolesti ...	45.809676	15.964970	Agram
12	50eefd07e4b04e0d10c4402a	Ortopticko-pleopticka ambulanta Klinike za Dje...	45.810221	15.965162	Agram
13	4cfcb4bd20fe370412355bf8	Hrvatski Institut za istraživanje mozga "Neuron"	45.821784	15.985713	Agram
14	51370dd2e4b0a1aee297a506	MR Klinike za dječje bolesti Zagreb	45.810033	15.969427	Agram

Hospital Data Fetched from FourSquare API

Exploratory Data Analysis

	Neighborhood	ID	Name	Latitude	Longitude
0	Adugodi	4	4	4	4
1	Agram	24	24	24	24
2	Amruthahalli	3	3	3	3
3	Anekal	1	1	1	1
4	Banaswadi	13	13	13	13

Hospital Data grouped based on Neighborhood, displaying the number of hospitals in Each Neighborhood

K-means Clustering

- 2 types of analysis.

1. Clustering to group the hospitals in nearby neighborhoods for gathering area statistics

2. Grouping the neighborhoods based on the count of hospitals.

- a) Areas with very less number of Hospitals are put in 1 cluster.

- b) Areas with maximum number of hospitals are put in another cluster and so on

Results

- Number of clusters chosen K =5 with different cluster resul

	Neighborhood	Longitude
0	Adugodi	4
7	Byatarayanapura	6
8	Chickpet	5
9	Chikkalasandra	6
11	Doddakallasandra	5
19	Hosur	6
27	Konanakunte	4
29	Kundalahalli	4
32	Mallathahalli	4
33	Mathikere	5
37	Nagarbhavi	4
44	Vimanapura	5
45	Yelachenahalli	6
46	Yelahanka	4

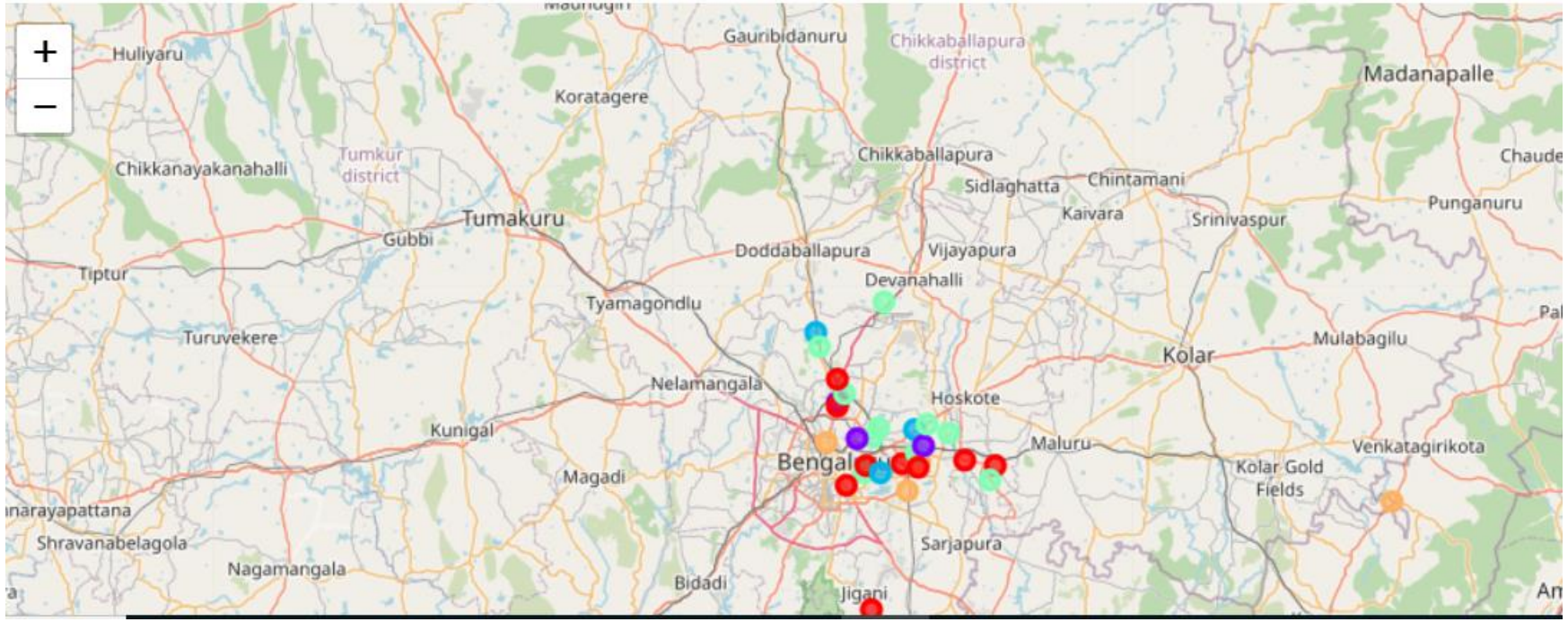
	Neighborhood	Longitude
1	Agram	24
22	Indiranagar S.O (Bangalore)	24
24	Jayanagar H.O	25
28	Koramangala	19

	Neighborhood	Longitude
2	Amruthahalli	3
3	Anekal	1
6	Bhattarahalli	1
10	Deepanjalinagar	1
12	Doddanekkundi	1
14	EPIP	1
16	Gottigere	1
17	Hessarghatta	2
18	Horamavu	2
20	Hunasamaranahalli	1
21	Huskur	1
23	Jalahalli H.O	2
25	Kamakshipalya	1
30	Laggere	1
31	Lingarajapuram	2
38	Nayandahalli	1
39	Peenya Dasarahalli	1

	Neighborhood	Longitude
5	Basaveshwaranagar	9
15	Girinagar S.O (Bangalore)	10
35	Msrit	9
41	Sadashivanagar	8
43	Vijayanagar S.O (Bangalore)	8

	Neighborhood	Longitude
4	Banaswadi	13
13	Domlur	13
26	Kathriguppe	12
34	Mavalli	11
36	NAL	12

Visualization through Map



Conclusion

Cluster4 has the least number of hospitals and these are the areas for which hospital construction recommendations can be given.

Further for better analysis we can consider the population in each area and accordingly do the analysis based on population and hospitals.

Further hospital size, number of beds, ICU count and other features can be explored for better analytical results and providing more valuable insights