Capstone Project - Explore the optimal location for a residence in Bangalore

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1. Introduction

1.1 Background

Bangalore, officially known as **Bengaluru** is the capital of the Indian state of Karnataka. It has a population of over ten million. making it a megacity and the third-most populous city and fifth-most populous urban agglomeration in India. It is located in southern India.

Bengaluru is widely regarded as the "**Silicon Valley of India**" (or "*IT capital of India*") because of its role as the nation's leading information technology (IT) exporter. Indian technological organizations such as ISRO, Infosys, Wipro and HAL are headquartered in the city. A demographically diverse city, Bangalore is the second fastest-growing major metropolis in India. Recent estimates of the metro economy of its urban area have ranked Bangalore either the fourth or fifth-most productive metro area of India

Day by day the population of the city is increasing and there are more visitors to the city. As it's considered as one of the biggest IT hub in India, Due to which a lot of people migrating here.

This leads to a good business opportunity. There is ample scope for building Residential Apartments /investing on property.

1.2 Business Problem

In this project we will try to find a good location/Residential Apartment for a residence in Bangalore city. There are many residential places in the city. But we would like to identify an ideal location where you get all the basic amenities like (restaurants, schools, colleges, bus stop, metros, shopping malls, pharmacy and Hospitals) which are nearby to the location.

Residential Apartment/location having nearby restaurants, schools, colleges, bus stop, metros, shopping malls, pharmacy and Hospitals are normally considered as an ideal place. should propose an optimal location, that should be within the 1kms (ideal distance) from the Residence.

2. Data

2.1 Data requirement

Based on our business problem, we need following data:

a) Identify the locations for restaurants, schools, colleges, bus stop, metros, shopping malls, pharmacy and Hospitals in Bangalore.
b) For each such location, identify the existing Residence within 1km radius.
c) Analyze the obtained data to identify the optimal location

2.2 Data source

Following data sources will be needed to get the required information:

a) Coordinates of Bangalore city center is obtained from **Google Maps**
b) **Foursquare API** is used to get the locations for restaurants, schools, colleges, bus stop, metros, shopping malls, pharmacy and Hospitals. Also, to get the nearby restaurants for each such location.
c) To get the latitude and longitude based on the address, we use **Geopy Nominatim**

Foursquare API is the main API source with which we get all the locations for various categories and then the nearby restaurants for each such location. We use venues/search API for category specific search based on latitude and longitude. We get the category id for all the mentioned categories from Foursquare API documentation.

3. Methodology

In this project we will put our efforts on identifying the optimal location for a residence in Bangalore city within 10km range.

We first identified the categories which are usually basis necessity that will people consider before purchasing or investing on property. Those are **restaurants, schools, colleges, bus stop, shopping malls, pharmacy and Hospitals.** These 7 categories are much necessary compared to other categories such as Art, Museum, Pool etc.

a) In the first step we have collected locations data for different categories. Details for each location includes name, latitude, longitude and category name. Plot these locations on the map with different colors.
b) Second step in our analysis will be getting the nearby residences within 1km distance from each of these locations. We feel 1km is a reasonable distance from any location. Then plotting these locations on the map to display the nearby residences along with locations.
c) Third step is to analyze the consolidated data which we obtained in step 2. This analysis will shed light on the recommended locations.
d) Final step is to recommend the optimal location to the stakeholders.

4. Analysis

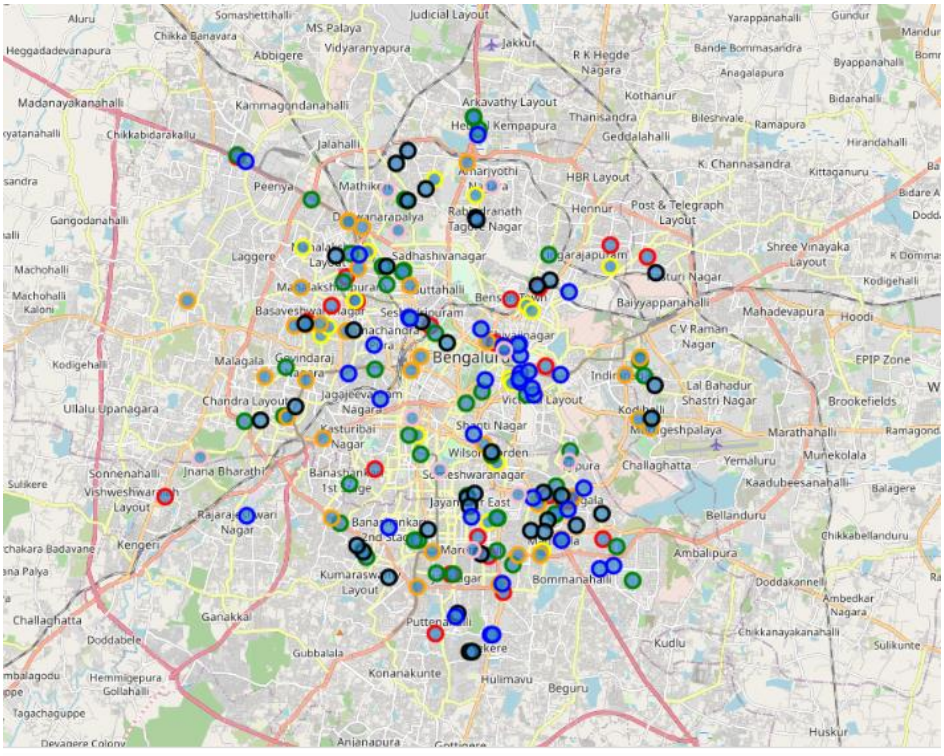
Let's perform some basic exploratory data analysis and derive some additional info from our raw data.

Let's view the snapshot of the list of residences and count of nearby places category wise, which we obtained based on location.

	location	Number of Restraunts	Number of Bus stops	Number of schools	Number of Colleges	Number of hospitals	Number of Pharmacy	Number of Shopping Malls
0	Magan Silver Hill Apartments	1	NaN	NaN	NaN	5.0	2.0	NaN
1	Palace Cross Road	1	NaN	NaN	1.0	5.0	1.0	NaN
2	Kormangala 8Th Block	1	1.0	NaN	1.0	4.0	5.0	5.0
3	HM World City	1	NaN	NaN	NaN	NaN	NaN	NaN
4	Brigade Gateway	1	3.0	3.0	1.0	5.0	3.0	5.0
5	Platinum Lifestyle	1	NaN	NaN	NaN	NaN	NaN	NaN
6	Ansal Krisna	1	1.0	NaN	1.0	5.0	4.0	5.0
7	Khb Platinum	2	NaN	NaN	1.0	NaN	1.0	NaN
8	6th Block Rajaji Nagar	2	1.0	2.0	NaN	5.0	3.0	4.0
9	Prestige South Ridge	2	1.0	NaN	NaN	5.0	1.0	2.0
10	Purvi Lotus	2	NaN	1.0	NaN	4.0	5.0	NaN
11	Mahaveer Lakes	2	NaN	NaN	NaN	3.0	NaN	NaN
12	RMV Clusters	2	NaN	1.0	1.0	2.0	5.0	NaN
13	Ranka Enclave	2	NaN	2.0	NaN	3.0	3.0	NaN
14	Renaissance Temple Bells	2	4.0	4.0	1.0	5.0	2.0	5.0
15	L & T South city	2	NaN	NaN	1.0	3.0	4.0	2.0
16	Axis Aspira	2	NaN	NaN	1.0	2.0	4.0	NaN
17	HM Winchester	2	NaN	3.0	2.0	3.0	4.0	5.0
18	Prestige Falcon City	2	NaN	NaN	3.0	9.0	NaN	2.0
19	Sobha Dew Flower	2	2.0	1.0	NaN	5.0	3.0	1.0
20	Esteem Park Apartments	2	2.0	2.0	1.0	3.0	4.0	5.0

Let’s plot all the nearby places based on different categories on the map which was already rendered to display.

1. Different locations belonging to different category are displayed in different color circle



Let's group the location/Residence name with the existing data frame. This grouping provides the count of nearby places for each location. New data provides clear details on the nearby residences for the given location.

	location	Number of Restraunts	Number of Bus stops	Number of schools	Number of Colleges	Number of hospitals	Number of Pharmacy	Number of Shopping Malls
0	Brigade Gateway	1	3.0	3.0	1.0	3.0	5.0	3.0
1	Renaissance Temple Bells	2	4.0	4.0	1.0	2.0	5.0	2.0
2	Esteem Park Apartments	2	2.0	2.0	1.0	4.0	3.0	4.0
3	Diamond District	2	2.0	1.0	1.0	5.0	5.0	5.0
4	Surabhi Appts.	3	2.0	3.0	1.0	3.0	4.0	3.0
5	11th Cross First Block Rajajinagar	3	1.0	3.0	1.0	3.0	5.0	3.0
6	Mantri Terrace	3	2.0	3.0	1.0	3.0	4.0	3.0

From the above result it's clear that within 1km distance:

Total of 7 locations are having all the basic necessary amenities **within 1km range**. These locations are one of the most ideal places to invest or build a residential Apartments nearby this location based on the criteria we have defined in the project.

5. Result and Discussion

Our overall data analysis shows that Bangalore has many residential places with all the basic amenities nearby. To identify the optimal location, we first identified the locations for restaurants, schools, colleges, bus stop, shopping malls, pharmacy and Hospitals category within the 10 KM range from Bangalore center point. We wanted to get the optimal location within 5KM city radius. Then filtered these data to get top 5 locations for each category.

We could have opted for 10 locations for each category. But with 10 locations for each category, we may be moving away from the city center point. To be near the city center point, I preferred to select the top 5 locations.

Once we got top 5 locations for each category, we got the nearby existing residences/locations for each of these categories using the Foursquare API, which are within 1km of distance from location.

The reason for considering 1km as the radius limit is, we wanted to look for a residence within ideal distance, considering all the necessary category within the mentioned radius.

Then prepared a table to list out the location name and nearby residence. We got 7 such location with all the basic necessary locations nearby.

Recommendations: Based on the obtained result, i would recommend following locations/residential Apartments:

1. **Brigade Gateway**
2. **Renaissance Temple Bells**
3. **Esteem Park Apartments**
4. **Diamond District**
5. **Surabhi Appts**
6. **11th Cross First Block Rajajinagar**
7. **Mantri Terrace**

6. Conclusion

Purpose of this project is to identify the optimal location for investing/finding residential Apartment/location within 5KM range of Bangalore city. This would help the stakeholders/individuals in narrowing

down the search for location. Initially, I identified the top 5 locations for different categories. These categories normally attract individuals/builders. Hence scope for finding an optimal location/Residential Apartment near such location is more. Then we identified the nearby such locations/ Residential Apartment.

My finding and recommendations are already discussed in the *Result and Discussion* section. Please check the recommendations. Selecting the optimal location is left to the stakeholder based on the other dependent factor such as rent, water availability, parking slots, connectivity etc. It is up to the stakeholder who must pick one of the recommended locations.