

Predicting Best Location to Open a Gym in Bangalore

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1. Introduction:

1.1 Background

ABC Gym is an American chain international co-ed fitness centre. Its branches are located all over the world. The ABC Gym known for continuously updating their gym with all the latest equipment you need. Aside from offering strength training and cardio equipment, their gyms also have several exercise programs including Pilates, endurance training, mixed martial arts, group cycling, yoga and Zumba among others. In addition, they have skilled and certified personal trainers and staff who will attend to your needs.

The client ABC Gym wants to open a branch in Bangalore, India. Bangalore is the IT capital of India. Like any other place, people in Bangalore city are becoming more health conscious. The IT professionals who spends most of their day time sitting in a cubical without any physical activity may harm their health in many ways. Everyone has a special inclination towards maintaining a great physique or health. Gyms are going high on demand among fitness conscious people and this has remained as the key to success for many gyms and fitness centres in India.

1.2 Business Problem:

The client needs the help of analysing the prospect of finding the right location to start the business which will ensure that the business can deliver good amount of profit on a long run.

1.3 Interest

To survive in such competitive market, it is very important to plan strategically. Various factors need to be studied in order to decide on the Location such as:

- Bangalore Population
- Bangalore City Demographics
- Is there any office or commercial place nearby?
- Is there any eatery nearby?
- Is there any IT Park nearby?
- Is there any Residential are nearby?
- Who are the competitors in that location?
- What are the facilities available at the competitors?
- Segmentation of the Neighbourhood

2. Data acquisition and cleaning

ABC Gym need the correct location to start its first venture. If this is successful and they want to replicate the same in other locations in Bangalore city. So, the finding the right location is very important.

For this problem it is required to explore and cluster the neighborhoods in Bangalore. Based on the business problem presented above, here are the factors that influence the potential location:

- The number of existing Gym in a neighbourhood/area
- The number of and distance to existing Gym in the neighborhood/area
- The distance of the neighborhood/area from the city center
- The distance of the neighborhood/are from the nearest Residential area
- The distance of the neighborhood/are from the nearest IT Park
- To analyse the data, I will be using

2.1 Data sources

The web page, <https://www.mapsofindia.com/pincode/india/karnataka/bangalore/> in order to obtain the data of postal codes of Bangalore, Karnataka, India. The geospatial data of India obtained from the website

https://data.gov.in/sites/default/files/all_india_PO_list_without_APS_offices_ver2_lat_long.csv.

3. Methodology

3.1 Scraping the table from the web

Data 1: I will use the Notebook to build the code to scrape the following web page, <https://www.mapsofindia.com/pincode/india/karnataka/bangalore/> in order to obtain the data that is in the table of postal codes and to transform the data into a pandas dataframe. There were 294 entries in the dataframe with four columns: PostalCode, State, District, Location. There were several Postal Codes commonly mapped to many locations. So, I have aggregated all these locations and mapped to the Postal code wherever it was applicable. Then, total number of entries came down to 99.

Picture 1: Data 1

| | PostalCode | State | District | Location |
|---|------------|-----------|-----------|---|
| 0 | 560001 | Karnataka | Bangalore | Bangalore Bazaar, Bangalore., Brigade Road, Cu... |
| 1 | 560002 | Karnataka | Bangalore | Avenue Road, Bangalore City, Bangalore Corpora... |
| 2 | 560003 | Karnataka | Bangalore | Aranya Bhavan, Malleswaram, Palace Guttahalli,... |
| 3 | 560004 | Karnataka | Bangalore | Basavanagudi, Lalbagh West, Mavalli, Pasmpamah... |
| 4 | 560005 | Karnataka | Bangalore | Fraser Town, Jeevanahalli |
| 5 | 560006 | Karnataka | Bangalore | J.C.nagar, Training Command iaf |
| 6 | 560007 | Karnataka | Bangalore | Agram, Air Force hospital |
| 7 | 560008 | Karnataka | Bangalore | H.A.I ii stage, Hulsur Bazaar, Someswarapura |
| 8 | 560009 | Karnataka | Bangalore | Bangalore Dist offices bldg, K. g. road, Subha... |
| 9 | 560010 | Karnataka | Bangalore | Bhashyam Circle, Industrial Estate, Rajajinaga... |

Data 2: The geospatial data of India obtained from the website https://data.gov.in/sites/default/files/all_india_PO_list_without_APS_offices_ver2_lat_long.csv was uploaded to IBM DB2 database. Then it was imported to the Notebook. The columns which were not required for the study, were removed and final dataframe was obtained containing Columns: PostalCode, longitude, latitude.

Picture 2: Data 1

| | PostalCode | longitude | latitude |
|-------|------------|-----------|----------|
| 5154 | 500016 | 78.4468 | 17.4672 |
| 52180 | 560045 | 77.6206 | 13.0291 |
| 52187 | 560103 | 77.676 | 12.9298 |
| 52201 | 560071 | 77.6359 | 12.9611 |
| 52204 | 560077 | 77.6293 | 13.0681 |
| 52206 | 560005 | 77.6164 | 13.0005 |
| 52207 | 560065 | 77.5784 | 13.0781 |
| 52210 | 560008 | 77.6427 | 12.9686 |
| 52213 | 560001 | 77.5915 | 12.9773 |
| 52223 | 560075 | 77.6535 | 12.9695 |

Data 3: Data downloaded or scraped from multiple sources were combined into one table to obtain final location data for Bangalore, Karnataka. There were several missing values in this table which were removed.

Picture 3: Data 3

| | PostalCode | State | District | Location | longitude | latitude |
|----|------------|-----------|-----------|--|-----------|----------|
| 0 | 560001 | Karnataka | Bangalore | Bangalore Bazaar, Bangalore., Brigade Road, Cu... | 77.5915 | 12.9773 |
| 1 | 560001 | Karnataka | Bangalore | Bangalore Bazaar, Bangalore., Brigade Road, Cu... | 77.61 | 12.9739 |
| 2 | 560001 | Karnataka | Bangalore | Bangalore Bazaar, Bangalore., Brigade Road, Cu... | 77.5955 | 12.9814 |
| 4 | 560003 | Karnataka | Bangalore | Aranya Bhavan, Malleswaram, Palace Guttahalli,... | 77.5709 | 13.0002 |
| 5 | 560003 | Karnataka | Bangalore | Aranya Bhavan, Malleswaram, Palace Guttahalli,... | 77.5819 | 12.9993 |
| 6 | 560003 | Karnataka | Bangalore | Aranya Bhavan, Malleswaram, Palace Guttahalli,... | 77.574 | 12.9968 |
| 7 | 560003 | Karnataka | Bangalore | Aranya Bhavan, Malleswaram, Palace Guttahalli,... | 77.5769 | 13.004 |
| 8 | 560004 | Karnataka | Bangalore | Basavanagudi, Lalbagh West, Mavalli, Paspamah... | 77.5741 | 12.9446 |
| 9 | 560005 | Karnataka | Bangalore | Fraser Town, Jeevanahalli | 77.6164 | 13.0005 |
| 12 | 560008 | Karnataka | Bangalore | H.A.I ii stage, Hulsur Bazaar, Someswarapura | 77.6427 | 12.9686 |
| 14 | 560010 | Karnataka | Bangalore | Bhashyam Circle, Industrial Estate, Rajajinaga... | 77.5545 | 12.9932 |
| 15 | 560010 | Karnataka | Bangalore | Bhashyam Circle, Industrial Estate, Rajajinaga... | 77.5612 | 12.9831 |
| 16 | 560011 | Karnataka | Bangalore | Jayangar Iii block, Madhavan Park | 77.5835 | 12.9304 |
| 18 | 560013 | Karnataka | Bangalore | Govindapalya, H M t, Jalahalli, Jalahalli Village | 77.5539 | 13.0506 |
| 19 | 560014 | Karnataka | Bangalore | Jalahalli East | 77.5463 | 13.0728 |
| 22 | 560017 | Karnataka | Bangalore | Bangalore Air port, Nal, Vimapura | 77.6502 | 12.9596 |
| 23 | 560017 | Karnataka | Bangalore | Bangalore Air port, Nal, Vimapura | 77.6679 | 12.9585 |
| 27 | 560021 | Karnataka | Bangalore | Gayathrinaagar, Okalipuram, Ramachandrapuram, S... | 77.5581 | 13.001 |

3.2 Clustering the neighborhoods in Bangalore

I have used the Foursquare API to explore neighborhoods in Bangalore. The Foursquare explore function is used to get the most common venue categories in each neighborhood, and then used this feature to group the neighborhoods into clusters. Here I have used k-means clustering for analysing the data of neighborhoods in Bangalore. Finally, used the Folium library to visualize the neighborhoods in Bangalore and their emerging clusters. For that I have downloaded the required libraries and dependencies.

Picture 4: Map of Bangalore Locations



3.3 Foursquare API was to explore and analyse the Neighbourhood. Top 4 venues were returned by Foursquare for the area of our interest.

Picture 5: Top 4 venues

| | name | categories | lat | Ing |
|---|---------------------------------|------------------|-----------|-----------|
| 0 | Cubbon Park | Park | 12.977042 | 77.595277 |
| 1 | Vidhana Soudha | Capitol Building | 12.979027 | 77.591881 |
| 2 | KSLTA Tennis stadium | Tennis Stadium | 12.975094 | 77.594439 |
| 3 | Cubbon Park Library Play Ground | Dog Run | 12.974522 | 77.590236 |

The venues for all Bangalore neighborhoods were clustered in groups using the common venues. There are 143 unique venue categories found in Bangalore. The neighborhoods were grouped by taking the mean of the frequency of occurrence of each category. Then the top 10 venues per neighborhood were obtained. These venues were analysed and studied.

Picture 6: Top 10 venues per neighbourhood:

| | Neighborhood | 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 |
|---|--|-----------------------|-----------------------|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------------|-----------------------|-----------------------|-----------------------------|
| 0 | Agara, Kendriya Sadan, Koramangala, Koramangal... | Hotel Bar | Breakfast Spot | Indian Restaurant | Pizza Place | Restaurant | Hotel | Arts & Crafts Store | Fish Market | Dance Studio | Deli / Bodega |
| 1 | Amruthahalli, Kodigehalli, Sahakaranagar P.O | Indian Restaurant | Ice Cream Shop | Fast Food Restaurant | Electronics Store | Café | Coffee Shop | Bubble Tea Shop | Brewery | Pizza Place | Chinese Restaurant |
| 2 | Arabic College, Devarjeevanahalli, Nagavara, R... | Indian Restaurant | Gym / Fitness Center | Women's Store | Diner | Farmers Market | Electronics Store | Eastern European Restaurant | Dumpling Restaurant | Donut Shop | Dog Run |
| 3 | Aranya Bhavan, Malleswaram, Palace Gutta Halli,... | Indian Restaurant | Department Store | Vegetarian / Vegan Restaurant | Café | Pizza Place | Ice Cream Shop | Clothing Store | Coffee Shop | Jewelry Store | Snack Place |
| 4 | Ashoknagar, Banashankari, Dasarahalli, State B... | Indian Restaurant | Juice Bar | Breakfast Spot | Park | Plaza | Athletics & Sports | Indie Movie Theater | Szechuan Restaurant | Women's Store | Eastern European Restaurant |
| 5 | Attur, Bsf Campus yelahanka, Crpf Campus yelah... | Clothing Store | Shopping Mall | Dessert Shop | Multiplex | Café | Bus Station | Seafood Restaurant | Farmers Market | Gastropub | Garden |

Weights were assigned to some of the categories which are linked to the Gym. For example: Gym / Fitness Center will get 2, Gym will get 2, Fitness Center will get 2, Playground will get 3, Park will get 3, Sports Bar will get 4. The final table with the weightage was formed.

Picture 7: Weightage to the Neighborhood

| | Neighborhood | Neighborhood Latitude | Neighborhood Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category | weights |
|-----|--|-----------------------|------------------------|----------------|----------------|-----------------|----------------|---------|
| 0 | Bangalore Bazaar, Bangalore., Brigade Road, Cu... | 12.9773 | 77.5915 | Cubbon Park | 12.977042 | 77.595277 | Park | 3 |
| 24 | Bangalore Bazaar, Bangalore., Brigade Road, Cu... | 12.9739 | 77.6100 | Fitness First | 12.971153 | 77.607010 | Gym | 2 |
| 74 | Bangalore Bazaar, Bangalore., Brigade Road, Cu... | 12.9814 | 77.5955 | Cubbon Park | 12.977042 | 77.595277 | Park | 3 |
| 145 | Aranya Bhavan, Malleswaram, Palace Gutta Halli,... | 13.0040 | 77.5769 | Fitness One | 13.001221 | 77.577104 | Gym | 2 |
| 186 | Fraser Town, Jeevanahalli | 13.0005 | 77.6164 | Richard's Park | 13.004262 | 77.617396 | Park | 3 |

4. Results and Discussion

Bases on the weightage the Best scored Neighborhoods were selected:

Picture 8: Best scored Neighborhoods

| | weights | Venue Latitude | Venue Longitude | clusters |
|---|---------|----------------|-----------------|----------|
| 0 | 2 | 12.959639 | 77.610145 | 0.250000 |
| 1 | 3 | 12.966318 | 77.588792 | 1.733333 |
| 2 | 4 | 12.965177 | 77.643796 | 2.000000 |

The top score is 4 for the coordinates, latitude = 12.965177; longitude = 77.643796. The coordinates were plotted on the Bangalore map to show that the Gym can be opened within the circle in green color .

Picture 9: Best scored Neighborhood



5. Conclusion:

So, we finally got a location in the Bangalore to open the Gym. This place is between the Domlur and the H.A.L II Stage.

6. Further Enhancements and drawbacks in continuing this approach

This project can be enhanced by considering many more attributes to define the weights and do the analysis and by extending the LIMIT and Radius of the search that we are giving to extract the number of venues. As we have an API limit in the free trial of four square API we had to limit our search within a small Radius.