

The battle of Neighborhoods

Title: Restaurant recommender system in Bangalore

Data requirements:

To find a solution to the questions and build a recommender model, we need data and lots of data. Data can answer questions which are unimaginable and non-answerable by humans because humans do not have the tendency to analyze such large dataset and produce analytics to find a solution.

Let's consider the base scenario:

Suppose I want to find a restaurant, then logically, I need 3 things:

1. Its geographical coordinates (latitude and longitude) to find out where exactly it is located.
2. Population of the neighborhood where the restaurant is located.
3. Average income of neighborhood to know how much is the restaurant worth.

Let's take a closer look at each of these:

4. To access location of a restaurant, its Latitude and Longitude is to be known so that we can point at its coordinates and create a map displaying all the restaurants with its labels respectively.
5. Population of a neighborhood is a very important factor in determining a restaurant's growth and number of customers who turn up to eat. Logically, the more the population of a neighborhood, the more people will be interested to walk openly into a restaurant and less the population, a smaller number of people frequently visit a restaurant. Also, if more people visit, better the restaurant is rated because it is accessed by different people with different taste. Hence is a very important factor.
6. Income of a neighborhood is also a very important factor as population was. Income is directly proportional to richness of a neighborhood. If people in a neighborhood earn more than an average income, then it is very much possible that they will spend more however not always true with very less probability. So a restaurant's assessment is proportional to income of a neighborhood.

Data collection:

7. Collecting geographical coordinates is not difficult but after googling for more than 2 days, it was not available on open source data websites such as Wikipedia, India gov website, census report websites etc. So I decided to use Google maps API to fetch latitude and longitude but Google API has limited number of calls that I could make with my free account. So, it would take around 15 - 20 days to fetch location of all the neighborhoods in Bangalore. Initially I scrapped list of neighbors using BeautifulSoup4 from [wikipedia](https://en.wikipedia.org/wiki/Bangalore). The table headings becoming the boroughs and data becoming the neighborhoods. Bangalore has 8 borough's and 64 neighborhoods. So I manually googled each neighborhood to find its corresponding latitude and longitude. After doing so, I produced the following dataframe

Borough	Neighborhoods	Latitude	Longitude
Central	Cantonment area	12.972442	77.580643
Central	Domlur	12.960992	77.638726
Central	Indiranagar	12.971891	77.641151
Central	Jeevanbheemanagar	12.962900	77.659500
Central	Malleswaram	13.003100	77.564300
Central	Pete area	12.962700	77.575800
Central	Rajajinagar	12.990100	77.552500
Central	Sadashivanagar	13.006800	77.581300
Central	Seshadripuram	12.993500	77.578700
Central	Shivajinagar	12.985700	77.605700

8.	2	Central	Indiranagar	474289	0.482190	f
	3	Central	Jeevanbheemanagar	527874	0.536668	
	4	Central	Malleswaram	893629	0.908516	

9.	1	Central	Domlur	56837.022198	0.879225	of
	2	Central	Indiranagar	41991.817435	0.649581	nd
	3	Central	Jeevanbheemanagar	6667.447632	0.103140	n idea to
	4	Central	Malleswaram	53270.063892	0.824047	

10. Foursquare API:

Use of foursquare is focused to fetch nearest venue locations so that we can use them to form a cluster. Foursquare api leverages the power of finding nearest venues in a radius (in my case: 500mts) and also corresponding coordinates, venue location and names. After calling, the following data frame is created:

	Neighborhood	Borough	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Cantonment area	Central	12.972442	77.580643	Hotel Fishland	12.975569	77.578592	Seafood Restaurant
1	Cantonment area	Central	12.972442	77.580643	Sapna Book House	12.976355	77.578461	Bookstore
2	Cantonment area	Central	12.972442	77.580643	Vasudev Adigas	12.973707	77.579257	Indian Restaurant
3	Cantonment area	Central	12.972442	77.580643	Adigas Hotel	12.973554	77.579161	Restaurant
4	Cantonment area	Central	12.972442	77.580643	Kamat Yattrinivas	12.975985	77.578125	Indian Restaurant

The following map is produced by marking all the neighborhoods in Bangalore city.

