

Opening a New Restaurant in Bangalore



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In the city of Bangalore, India if a entrepreneur is looking to open a new restaurant, what type of restaurant would you recommend opening based on the location?

IBM Coursera

Applied Data Science
Capstone

5th Week Final Report

Introduction

India is one of the best target markets to start a business. It is said that India's going to be the third-largest incremental GDP growth engine for the planet by 2030. That's significant if you think about India's size relative to the other massive geographies out there, like China or the US.

The Food and Beverage Sector is one of booming sectors right now given the growth factors aforementioned.

Owning a Food and Beverage Franchise in the given conditions is one of the smartest options for investors who can enjoy a rate of return of 4–5x on an average.

Business Problem

The objective of this capstone project is to analyze different neighborhoods in the city of Bangalore, Karnataka, India to open a new Restaurant. Using data science methodology and machine learning techniques like clustering, this project aims to provide solutions to answer the business question:

In the city of Bangalore, India if a entrepreneur is looking to open a new restaurant, what type of restaurant would you recommend opening based on the location?

Target Audience of this Project

This project is particularly useful to new restaurant owners and investors looking to open or invest in new restaurant in the silicon valley of India ie Bangalore.

Data

To solve the problem, we will need the following data:

- List of neighborhoods in Bangalore. This defines the scope of this project which is confined to the city of Bangalore, India.
https://en.wikipedia.org/wiki/List_of_neighbourhoods_in_Bangalore
- Latitude and longitude coordinates of those neighborhoods. This is required in order to plot the map and also to get the venue data (Geocoders API)
- Venue data, particularly data related to restaurants. We will use this data to perform clustering on the neighborhoods. (Foursquare API)

Methodology

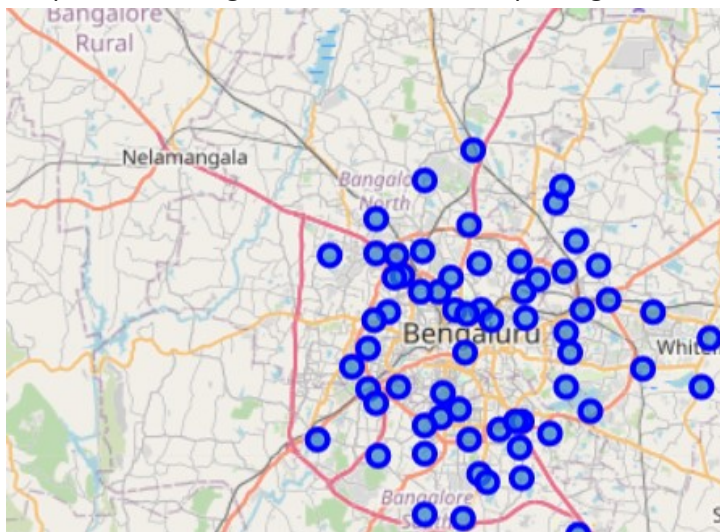
1. We first use web scraping methods to get a list of neighborhoods from the Wikipedia page https://en.wikipedia.org/wiki/List_of_neighbourhoods_in_Bangalore and store it into a pandas dataframe

	Na
0	Cantonment a
1	Dorr
2	Indirana
3	Jeevanbheemana

2. We then obtain the latitude and longitude of each of these neighborhoods and store it in the dataframe with the help of Geocoders API

	Name	Latitude	Lo
0	Cantonment area	12.994350	77
1	Domlur	12.943290	77
2	Indiranagar	13.030060	77
3	Jeevanbheemanagar	12.966010	77

3. We plot these neighborhoods onto a map using the Folium library



- Using Foursquare API, we get the list of venues in each of the neighborhoods

	Neighborhood	Latitude	Longitude	VenueName	VenueLatitude	VenueLong
0	Cantonment area	12.99435	77.59839	Ujwal Bar & Restaurant	12.992280	77.59
1	Cantonment area	12.99435	77.59839	Millers 46	12.991666	77.59
2	Cantonment area	12.99435	77.59839	Jayamahar Palace Hotel	12.996839	77.59
3	Cantonment area	12.99435	77.59839	Desserted	12.993039	77.59

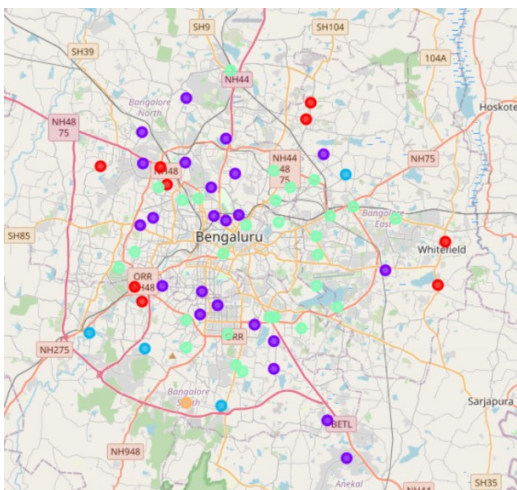
- We use one hot encoding to find out the frequency of each category of places in a neighborhood

	Neighborhood	Afghan Restaurant	American Restaurant	Andhra Restaurant	Asian Restaurant	BBQ Joint	Bagel Shop	Bakery	Bengali Restaurant	Bistro	Breakfast Spot	Burger Joint
0	Anjanapura	0.0	0.00	0.00	0.25	0.00	0.0	0.00	0.0	0.00	0.00	0.00
1	Arekere	0.0	0.02	0.00	0.00	0.02	0.0	0.02	0.0	0.00	0.02	0.02
2	BTM Layout	0.0	0.00	0.02	0.04	0.00	0.0	0.08	0.0	0.00	0.00	0.00
3	Banashankari	0.0	0.00	0.02	0.00	0.00	0.0	0.02	0.0	0.00	0.06	0.02

- Using this frequency, we find out the top 10 most frequent places in each neighborhood

	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
0	Anjanapura	North Indian Restaurant	Snack Place	Wings Joint	Creperie	Dim Sum Restaurant	Diner	Donut Shop	Dump Restau
1	Arekere	Indian Restaurant	Café	Fast Food Restaurant	Pizza Place	South Indian Restaurant	Chinese Restaurant	Sandwich Place	Vegeta / Ve Restau
2	BTM Layout	Indian Restaurant	Bakery	Café	Snack Place	Fast Food Restaurant	Chinese Restaurant	Diner	Pizza Pl
3	Banashankari	Indian Restaurant	Fast Food Restaurant	Pizza Place	Café	South Indian Restaurant	Breakfast Spot	Italian Restaurant	Chin Restau

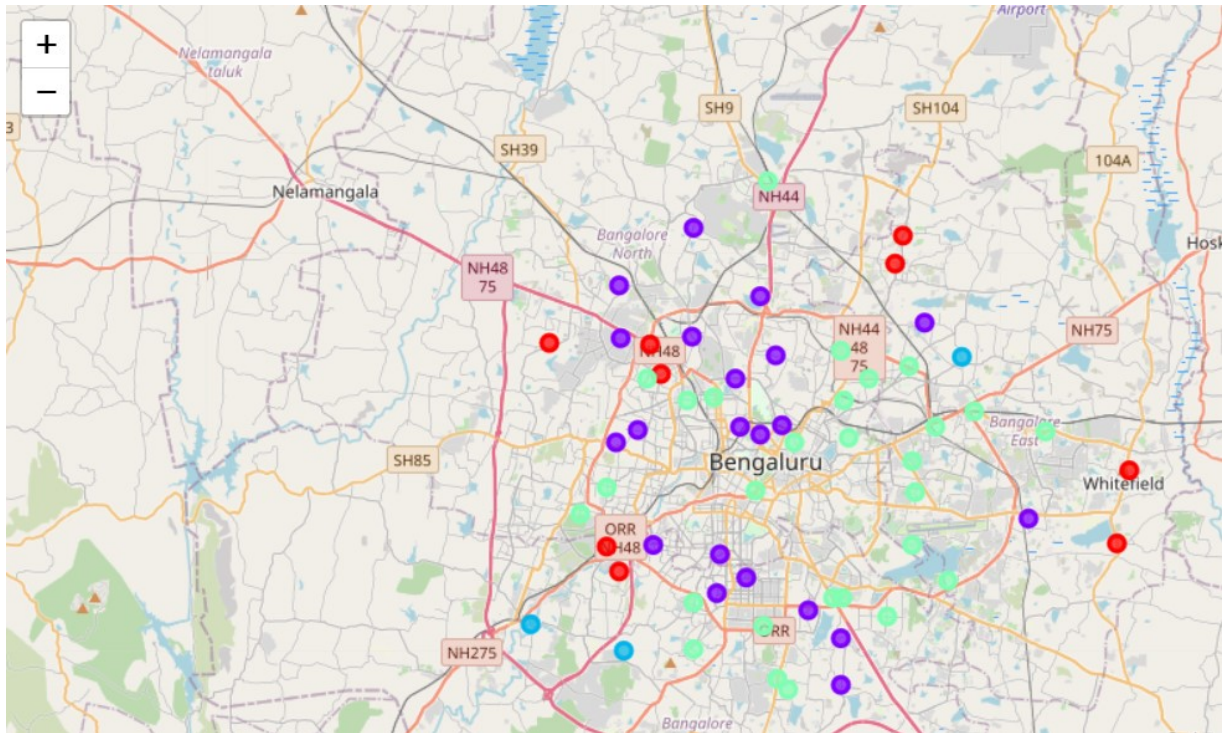
- We now apply Kmeans clustering on this data to cluster the neighborhoods into five different clusters



- We analyze each cluster to find out the top 3 category of restaurants in each of the 5 clusters

Results

By using Kmeans algorithm the neighborhoods in Bangalore were divided into 5 different clusters based on their choices of food joints.



Cluster 1

	Name	Latitude	Longitude	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
2	Indiranagar	13.03006	77.49526	0	Restaurant	Vegetarian / Vegan Restaurant	Fast Food Restaurant	Breakfast Spot	Gastropub	Falafel Restaurant	Dim Sum Restaurant
17	Varthur	12.94348	77.74703	0	Indian Restaurant	Pizza Place	Café	Food Court	Restaurant	Donut Shop	Chinese Restaurant
18	Whitefield	12.97523	77.75238	0	Café	Indian Restaurant	Restaurant	Eastern European Restaurant	Chinese Restaurant	Pizza Place	Fast Food Restaurant
33	Yeshwanthpur	13.02954	77.54022	0	Fast Food Restaurant	Restaurant	Indian Restaurant	Bakery	Punjabi Restaurant	Mediterranean Restaurant	Seafood Restaurant

Neighborhoods:

Indiranagar
Kothnur
Vijayanagar

Varthur
Mahalakshmi Layout

Whitefield
Nayandahalli

Yeshwanthpur
Rajarajeshwari Nagar

Top 3 Favorite Places:

1. Pizza Place
2. Indian Restaurant
3. Fast Food Restaurant

Conclusion:

As we can see from the data the most preferred place for this cluster of neighbourhoods is an Pizza Place followed by Indian Restaurant and Fast Food Restaurant. Opening any of these type of food joints would be profitable in these neighborhoods

Cluster 2

	Name	Latitude	Longitude	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
0	Cantonment area	12.99435	77.59839	1	Indian Restaurant	Café	Chinese Restaurant	Middle Eastern Restaurant	BBQ Joint	Bakery	Snack Place
6	Sadashivanagar	13.01483	77.57771	1	Indian Restaurant	Café	Chinese Restaurant	Pizza Place	Vegetarian / Vegan Restaurant	Fast Food Restaurant	Italian Restaurant
7	Seshadripuram	12.99355	77.57988	1	Indian Restaurant	Chinese Restaurant	Restaurant	Breakfast Spot	Café	Donut Shop	Fast Food Restaurant
10	Vasanth Nagar	12.99073	77.58861	1	Indian Restaurant	Chinese Restaurant	Café	Bakery	Donut Shop	Karnataka Restaurant	Restaurant

Neighborhoods:

Cantonment area	Sadashivanagar	Seshadripuram	Vasanth Nagar
Marathahalli	Horamavu	Hebbal	Jalahalli
Mathikere	Peenya	R. T. Nagar	Vidyaranyapura
Bommanahalli	Bommasandra	BTM Layout	Electronic City
Banashankari	Basavanagudi	Girinagar	Jayanagar
Begur	Basaveshwaranagar	Kamakshipalya	

Top 3 Favorite Places:

1. Indian Restaurant
2. Fast Food Restaurant
3. Pizza Place

Conclusion:

As we can see from the data the most preferred place for this cluster of neighbourhoods is an Indian Restaurant followed by a Fast Food Restaurant and Pizza Place. Opening any of these type of food joints would be profitable in these neighbourhoods

Cluster 3

	Name	Latitude	Longitude	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
25	Ramamurthy Nagar	13.02382	77.67785	2	Indian Restaurant	Asian Restaurant	Pizza Place	South Indian Restaurant	Gastropub	Falafel Restaurant	German Restaurant
48	Uttarahalli	12.89757	77.52830	2	Indian Restaurant	Andhra Restaurant	Restaurant	Fish & Chips Shop	Dim Sum Restaurant	Diner	Donut Shop
52	Gottigere	12.85568	77.58557	2	Indian Restaurant	Italian Restaurant	Food Truck	Fish & Chips Shop	Dim Sum Restaurant	Diner	Donut Shop

Neighborhoods:

Ramamurthy Nagar Uttarahalli Gottigere Kengeri

Top 3 Favorite Places:

1. Indian Restaurant
2. Andhra Restaurant
3. Creeperie

Conclusion:

The 1st preferred place to eat in these neighbourhoods is same as cluster 1 ie Indian Restaurant but Andhra Restaurants and Creeperies are much more popular in these neighbourhoods. Opening or investing in such restaurants would seem profitable if one is looking to invest in these neighbourhoods.

Cluster 4

	Name	Latitude	Longitude	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
1	Domlur	12.943290	77.656020	3	Indian Restaurant	Café	Fast Food Restaurant	Restaurant	Chinese Restaurant	Pizza Place	
3	Jeevanbheemanagar	12.966010	77.657670	3	Indian Restaurant	Café	Restaurant	Burger Joint	Chinese Restaurant	Deli / Bodega	Res
4	Malleswaram	13.006322	77.568416	3	Indian Restaurant	Vegetarian / Vegan Restaurant	Donut Shop	Chinese Restaurant	Fast Food Restaurant	Italian Restaurant	
5	Pete area	12.966180	77.586900	3	Indian Restaurant	Café	Vegetarian / Vegan Restaurant	Italian Restaurant	Breakfast Spot	Japanese Restaurant	Res

Neighborhoods:

Domlur Jeevanbheemanagar Malleswaram Pete area
 Shivajinagar Ulsoor Bellandur CV Raman Nagar
 Hoodi Krishnarajapuram Mahadevapura Banaswadi

HBR Layout	Kalyan Nagar	Kammanahalli	Lingarajapuram
Yelahanka	HSR Layout	Koramangala	Madiwala
J. P. Nagar	Kumaraswamy Layout	Padmanabhanagar	Arekere
Hulimavu	Nagarbhavi	Nandini Layout	Rajajinagar

Top 3 Favorite Places:

1. Indian Restaurant
2. Cafe
3. Fast Food Restaurant

Conclusion:

The preference of people in these neighborhoods similar to the general trend in Bangalore. Indian Restaurants, Cafes and Fast Food Restaurants are very popular in these neighborhoods

Cluster 5

	Name	Latitude	Longitude	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
49	Anjanapura	12.85811	77.55909	4	North Indian	Snack Place	Asian Restaurant	Deli / Bakery	Dim Sum Restaurant	Diner	Donut Shop	Dessert

Neighborhoods:

Anjanapura

Top 3 Favorite Places:

1. North Indian Restaurant
2. Snack Place
3. Asian Restaurant

Conclusion:

There is only one neighborhood in this cluster as the preferences of this neighbourhood differ much more from the general trend in Bangalore. North Indian Restaurant, Snack Place and Asian Restaurants are some of the popular restaurants in this Area.

Discussion

Observing from the results and the map, most of the neighborhoods in Bangalore fall into cluster 2 and cluster 4. The general preference in the city for restaurants is Indian Restaurants. Starting a new Indian themed restaurant or investing in one will prove to be profitable in most of the neighborhoods and is the top choice according to our analysis. Cafes and Snack Places are also great choices for themes of a new restaurant in the city. However, as the frequency of these types of restaurants is also higher, one may face high competition in the business.

According to me there are two choices that a new restaurant owner can take for the theme of his/her new restaurant.

- 1) Go with a theme which is popular in the neighborhood and face tough competition from other restaurants
- 2) Go with a theme which is not so popular in the neighborhood which is risky. But if successful, he/she will face less competition.

Limitations and Suggestions for Future Research

In this project, we only consider one factor i.e. frequency of occurrence of restaurants, there are other factors such as population and income of residents that could influence the location decision of a new restaurant. However, to the best knowledge of this researcher such data are not available to the neighborhood level required by this project. Future research could devise a methodology to estimate such data to be used in the clustering algorithm to determine the preferred locations to open a new restaurant. Several factors such as restaurant ratings, price range etc, would provide helpful to determine the best type of restaurant in each neighborhood and can be added in the future when relevant data will be available.

In addition, this project made use of the free Sandbox Tier Account of Foursquare API that came with limitations as to the number of API calls and results returned. Future research could make use of paid account to bypass these limitations and obtain more results.

Conclusion

In this project, we have gone through the process of identifying the business problem, specifying the data required, extracting and preparing the data, performing machine learning by clustering the data into 5 clusters based on their similarities, and lastly providing recommendations to the relevant stakeholders i.e. new restaurant owners and investors regarding the best theme for a new restaurant in each neighborhood in Bangalore.

To answer the business question that was raised in the introduction section, the answer proposed by this project is:

The most popular type of restaurant in Bangalore is Indian Restaurants. Opening a new Indian Restaurant or investing in one would prove beneficial