Neighborhood Analysis of Bangalore, India

IBM-Coursera Data Science capstone project

By

Manish Kumar Lal

Outline

- Introduction: Business problem
- Data
- Methodology
- Analysis
- Results & discussion
- Conclusion & recommendation

Introduction: Business problem

- Bangalore, a city in southern India, is called "The garden city of India". It has moderate climate all year round and is considered as a perfect retirement place. However, in the past few decades, Bangalore has risen to be the "IT capital of India" and is also referred to as the "Silicon Valley of India". It has become a popular destination for many companies from all around the world to open their offices. Likewise, the city has seen tremendous migration of people from all over India. As a result, there is a plethora of new businesses opening in the city.

- In this project we will focus on finding an optimal location for opening an Italian restaurant in the city. For this we will focus on the following three criteria:
    - find locations that have fewer restaurants
    - particularly detect areas with no Italian restaurant in the vicinity
    - give preference to locations closer to the city center if the first two conditions are satisfied.

- We will utilize the tools discussed in the IBM Data Science Professional Certificate course on Coursera to segment and analyze the neighborhoods in Bangalore based upon the above criteria. We will use the analysis to identify the top locations and discuss these to give the stakeholders enough information to decide on the location for opening an Italian restaurant.

Data

- Based upon the project scope, the following factors were considered in the analysis:
  - number of restaurants in the neighborhood
  - number of and distance to Italian restaurants in the neighborhood, if any
  - proximity of neighborhood from city center
- The following data was used for this analysis:
  - List of neighborhoods from two websites: Wikipedia and Popular Neighborhoods in Bangalore
  - Information about number and types of restaurants in the neighborhoods from Foursquare
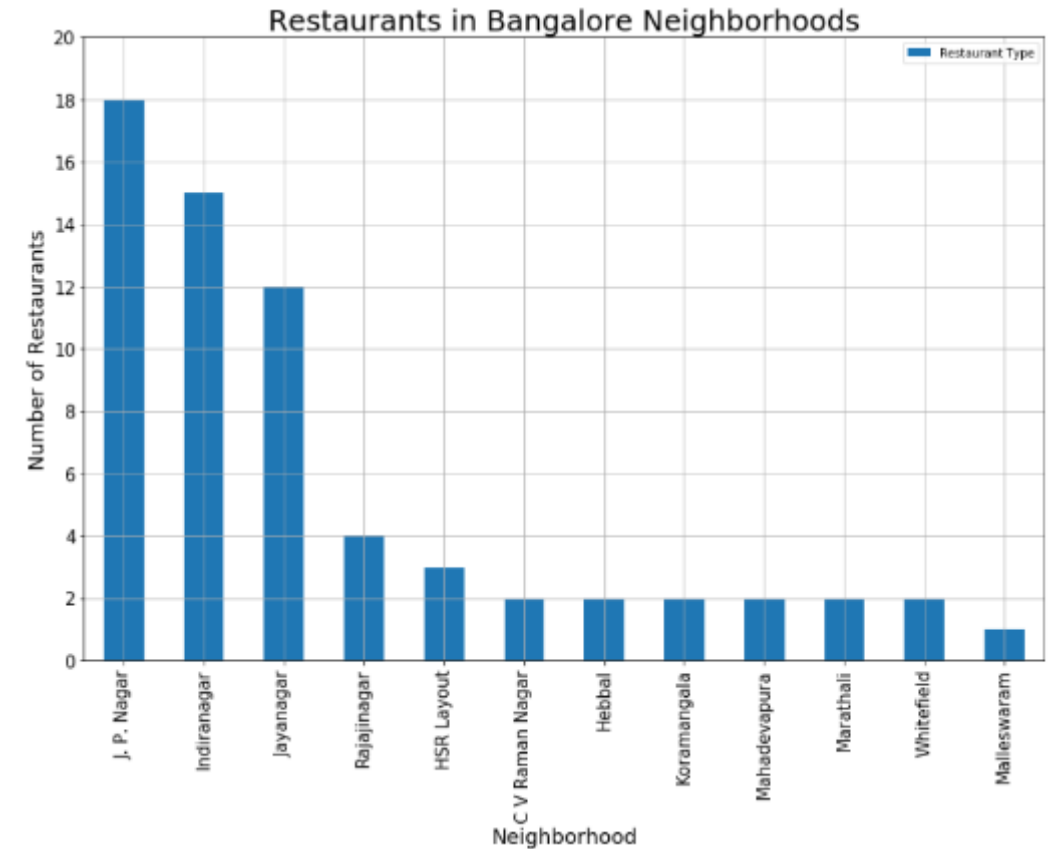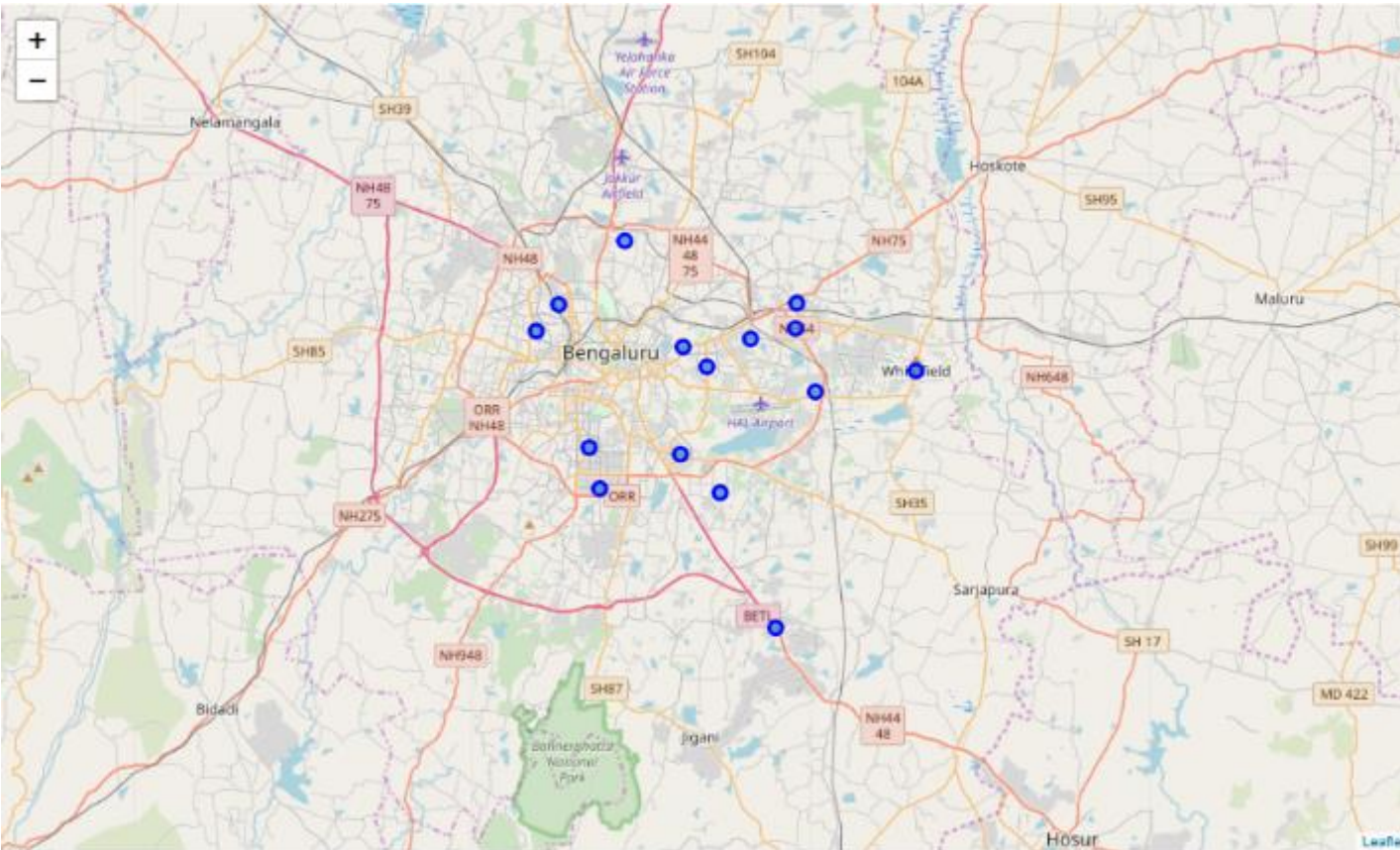 - Geopy library and / or Google Map to get the center coordinates of each neighborhood

Methodology

- Two different websites: Wikipedia and Popular Neighborhoods in Bangalore were used to high-grade neighborhoods in Bangalore.

- Top 15 neighborhoods were used for the analysis to investigate the recommended area to open an Italian Restaurant.

- Search Nearby option on Google Map was used to compile the coordinates for each neighborhood.

- Geopy library was used to get the coordinates of Bangalore City.

- Folium library was used to create a map of Bangalore City with the neighborhoods imposed on top to visualize the neighborhoods.

- Foursquare was utilized to explore the neighborhoods and segment them.
  - API queries were made to get the top 100 venues within a radius of 500 meters of each neighborhood.
  - From the venues queried, all restaurants in the neighborhoods were selected.
  - Some restaurants queried did not have a defined category. These were given the category called "Others".

- From the resulting list of the restaurants the following analysis was done to investigate the recommended neighborhood for Italian Restaurant:
  - Create and visualize the number of restaurants in each neighborhood
  - Review and visualize the different restaurant types in the neighborhoods
  - Visualize the different restaurant types after dropping the "Indian Restaurants" since this restaurant type far exceeded any other restaurant type.
  - Data frame was filtered for Italian Restaurants
  - Italian Restaurants were then plotted on the map with neighborhoods

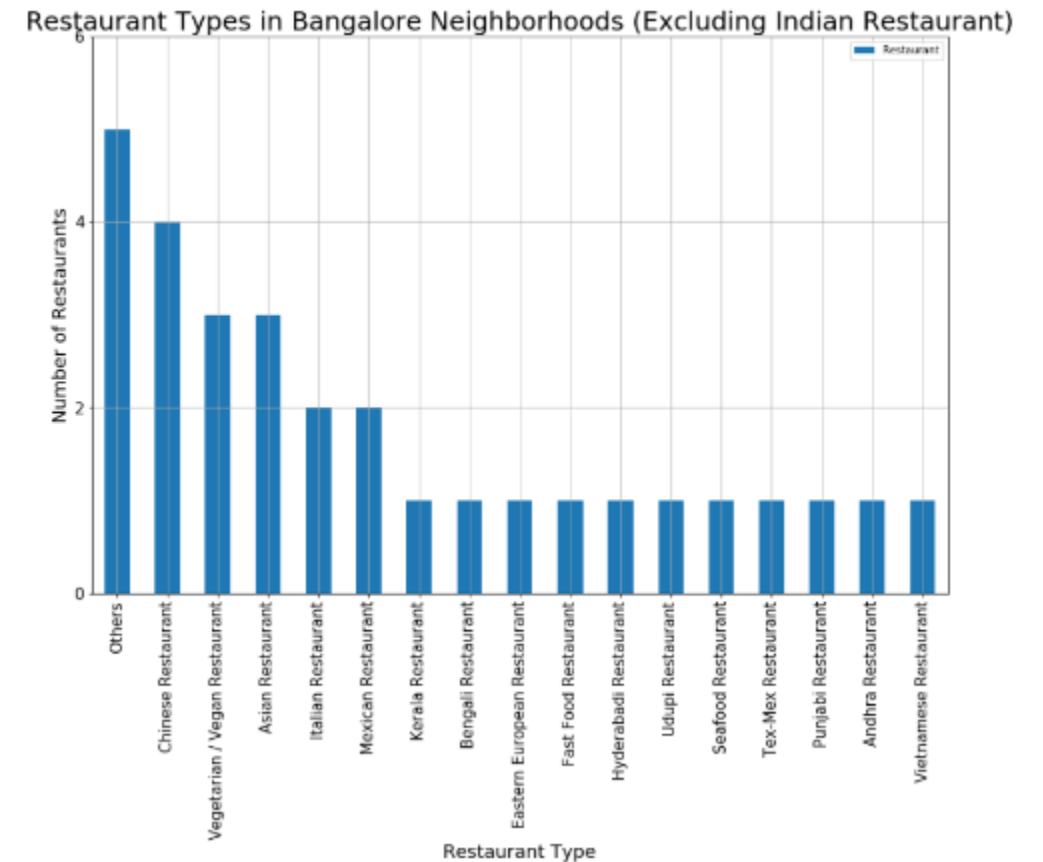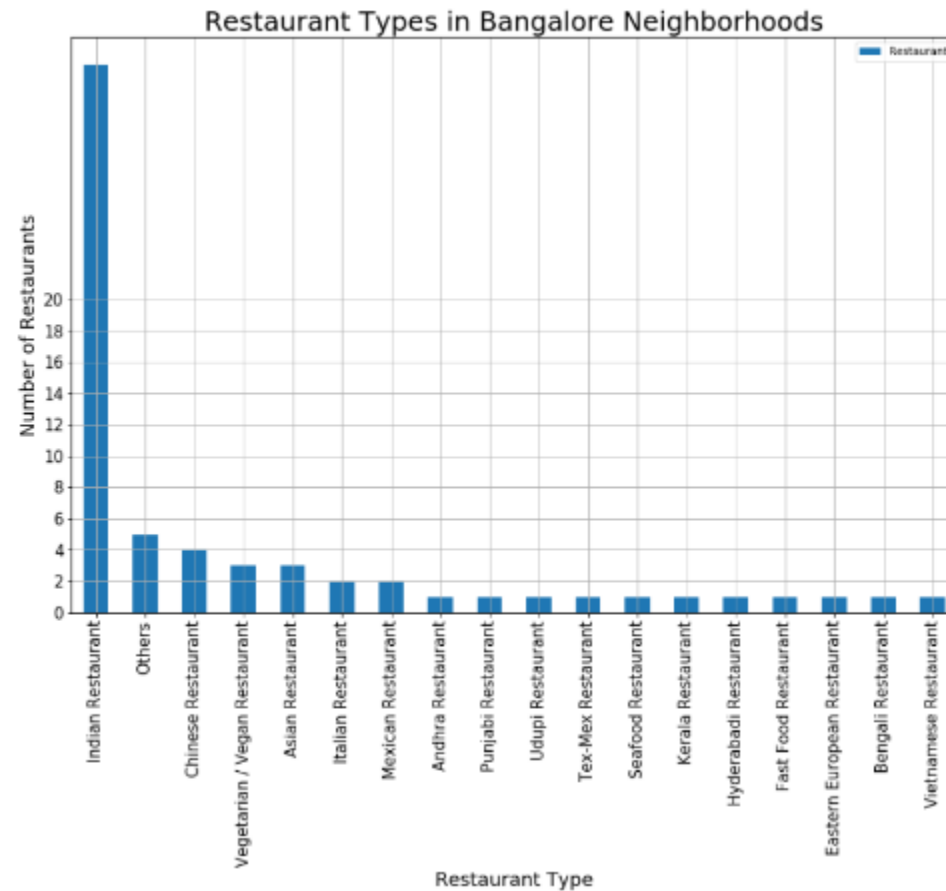- Recommendation was made based upon the above analysis.

Analysis

- The selected neighborhoods are evenly distributed across the city
- J. P. Nagar, Indiranagar, and Jayanagar have the highest restaurant density.

Restaurants in Bangalore Neighborhoods
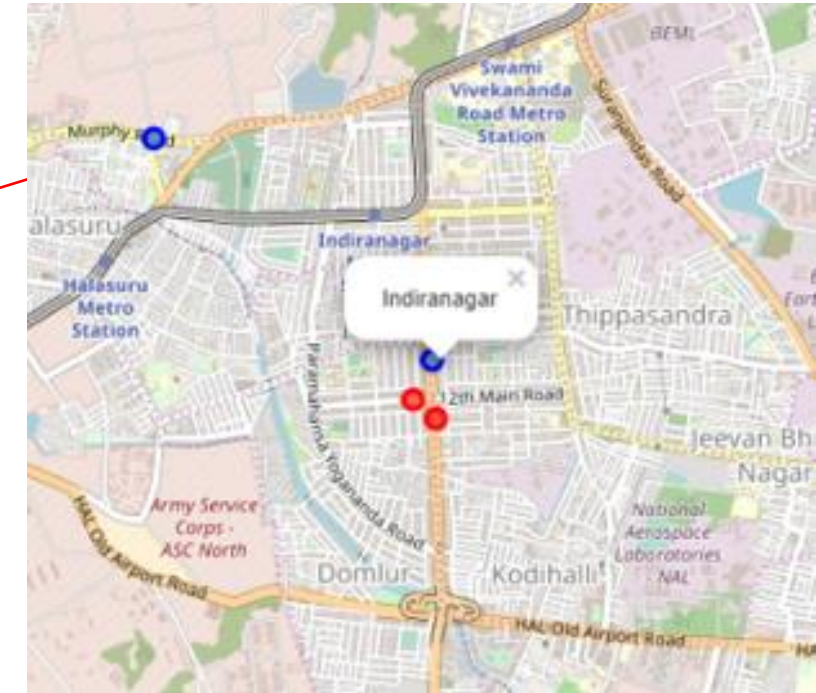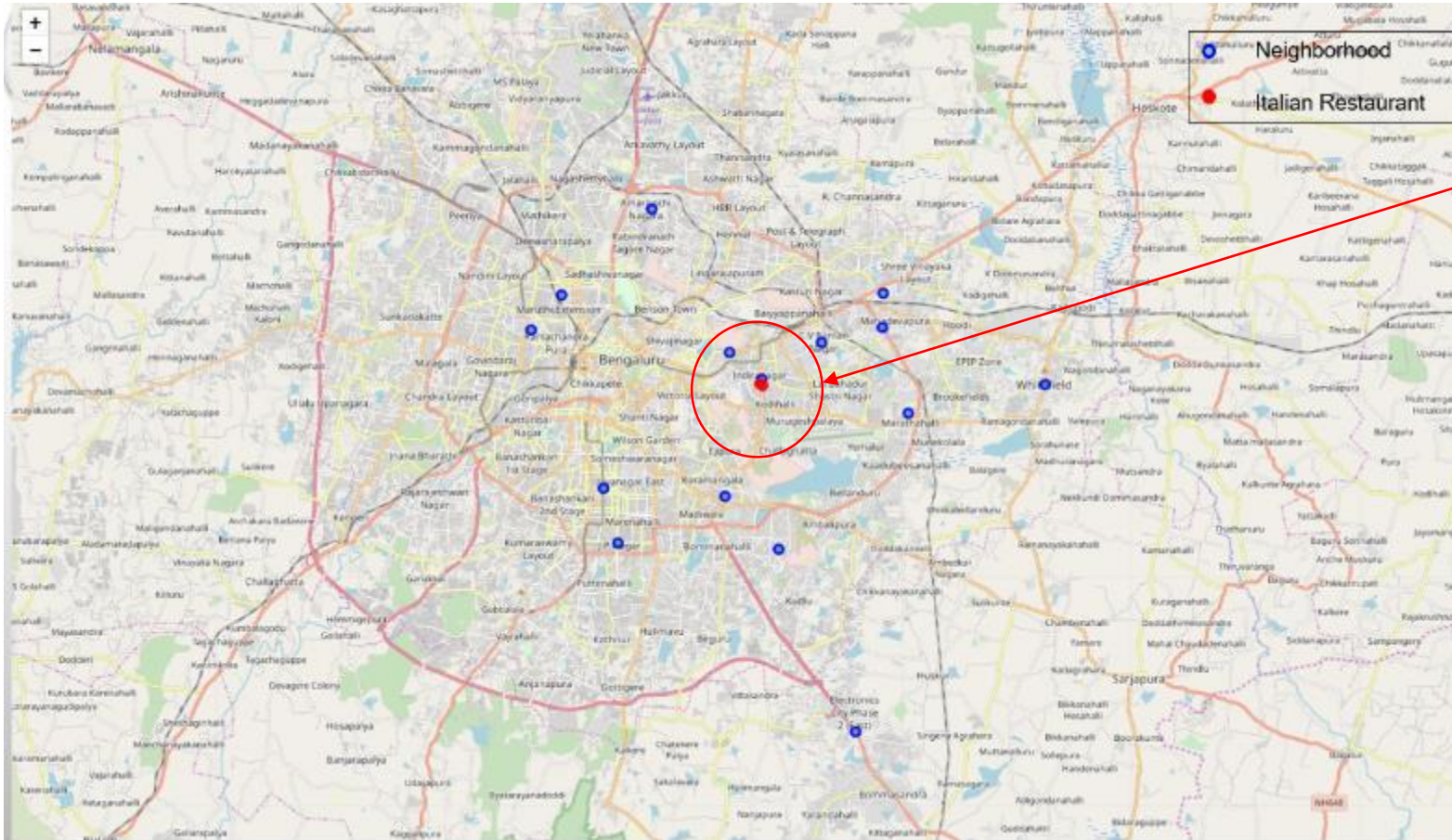
Analysis (contd.)

- Indian restaurant is the major restaurant type
- Excluding the Indian restaurant type, the next higher number of restaurants were Chinese, Vegetarian / Vegan, and Asian

Analysis (contd.)

- There are only 2 Italian restaurants, both in Indiranagar

Results and discussion

- There are ~ 65 restaurants in the 15 popular neighborhoods of Bangalore.

- The top 3 neighborhoods with the highest number of restaurants are J. P. Nagar, Indiranagar, and Jayanagar.

- There is a predominance of Indian Restaurants in the neighborhoods.

- Of the 65 total restaurants in the 15 queried neighborhoods, 35 are Indian Restaurants.

- There are only 2 Italian restaurants, both in Indiranagar.

- Since the neighborhoods of J. P. Nagar and Jayanagar have 18 and 12 restaurants (any kind) respectively, choosing a neighborhood other that these 3 neighborhoods (Indiranagar, J. P. Nagar, and Jayanagar) could serve the dual purpose of lesser competition from any restaurant type and no competition from Italian Restaurant type.

- This does not imply that Indiranagar, J. P. Nagar, and Jayanagar and not good locations for Italian Restaurant.

- The purpose of this analysis was to only provide information about Bangalore neighborhoods that are not crowded with restaurants, particularly Italian.

- It is possible that, for any reason, an Italian Restaurant in a neighborhood with smaller number of restaurants and no Italian Restaurant could be unsuitable for a new restaurant regardless of the lack of competition in the area.

- Recommended neighborhoods should be considered as a starting point for a detailed analysis which considers other factors in addition to the number of restaurants and competition.

Conclusion & recommendation

- The goal of this project was to analyze the neighborhoods in Bangalore, India to identify neighborhoods with lower number of restaurants, particularly Italian Restaurants.

- This would aid the stakeholders in narrowing down the search for an optimal location for an Italian Restaurant in Bangalore.

- By getting the restaurant data from Foursquare, calculating the restaurant density distribution, and visualizing the results in the form of bar charts and maps, it is apparent that:
    - Indiranagar, J. P. Nagar, and Jayanagar have the highest restaurant density.
    - There were only 2 Italian Restaurants, both were in Indiranagar.

- It seems obvious that any neighborhood other than Indiranagar, J. P. Nagar, and Jayanagar could be selected to avoid competition from both the existing restaurants, particularly Italian Restaurants.

- However, for reasons not explored in this study, these 3 locations could also be good candidates for a new restaurant despite competition from the existing restaurants.

- Final decision on optimal restaurant location will be made by stakeholders based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors like attractiveness of each location (number of offices and malls), proximity to major roads and local train locations, potential future growth of residential areas and new offices, social and economic dynamics of each neighborhood etc.