

# **Exploring venues in Varanasi, India using Foursquare and Zomato API**

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## **1. Introduction**

### **1.1 Background**

Whenever a person searches for a venue in a new city, they're highly interested in the best places that the city has to offer. The person might want to know how good a given restaurant is or the price range it falls under. This extra information would help decide which venue to choose amongst the many venues in the city. Combining the location of the venues in the city with their price and rating information would surely help visitors in a city make better informed decisions about the places they should visit.

Varanasi is beautiful city with 112km area. There are many venues (especially restaurants, hotels and cafes) which can be explored. This project explores various venues in Varanasi and attributes the data based on user ratings and average price. To explore this information, this project involves the juxtaposition of both the Foursquare API and the Zomato API to fetch complete information of various venues (including name, address, category, rating, and price). Further, a map of the venues with specific color attributes will be plotted to highlight their position, and information about these venues. Such plots imbibe bountiful information in the form of their colored representations and location on the map. This enables any visitor to take a quick glance and decide what place to visit.

### **1.2 Interested audience**

The target audience for such a project is twofold. Firstly, any person who is visiting Varanasi, India can use the plots and maps from this project to quickly select places that suit their budget and rating preferences. Secondly, a company can use this information to create a website or a mobile application, which is updated on a regular basis, to allow individuals to the city or even expand same functionality to other places.

## **2. Data**

### **2.1 Data Sources**

To get location and other information about various venues in Varanasi, I used two APIs and decided to combine the data from both of them together.

Using the Foursquare's explore API (which gives venues recommendations), I fetched venues up to a range of 6 kilometers from the center of Varanasi and collected their names, categories and locations (latitude and longitude).

Using the name, latitude and longitude values, I used the Zomato search API to fetch venues from its database. This API allows to find venues based on search criteria (usually the name), latitude and longitude values and more. Given that the data from the two APIs did not align completely, I had to use data cleaning to combine the two datasets properly.

From Foursquare API (<https://developers.zomato.com/api>), I retrieved the following for each venue:

- **Name:** The name of the venue.
- **Category:** The category type as defined by the API.
- **Latitude:** The latitude value of the venue.
- **Longitude:** The longitude value of the venue.

From Zomato API (<https://developers.zomato.com/api>), I retrieved the following for each venue:

- **Name:** The name of the venue.
- **Address:** The complete address of the venue.
- **Rating:** The ratings as provided by many users.
- **Price range:** The price range the venue belongs to as defined by Zomato.
- **Price for two:** The average cost for two people dining at the place. I later convert the same to average price per person by dividing by 2.
- **Latitude:** The latitude value of the venue.
- **Longitude:** The longitude value of the venue.

## 2.2 Data Cleaning

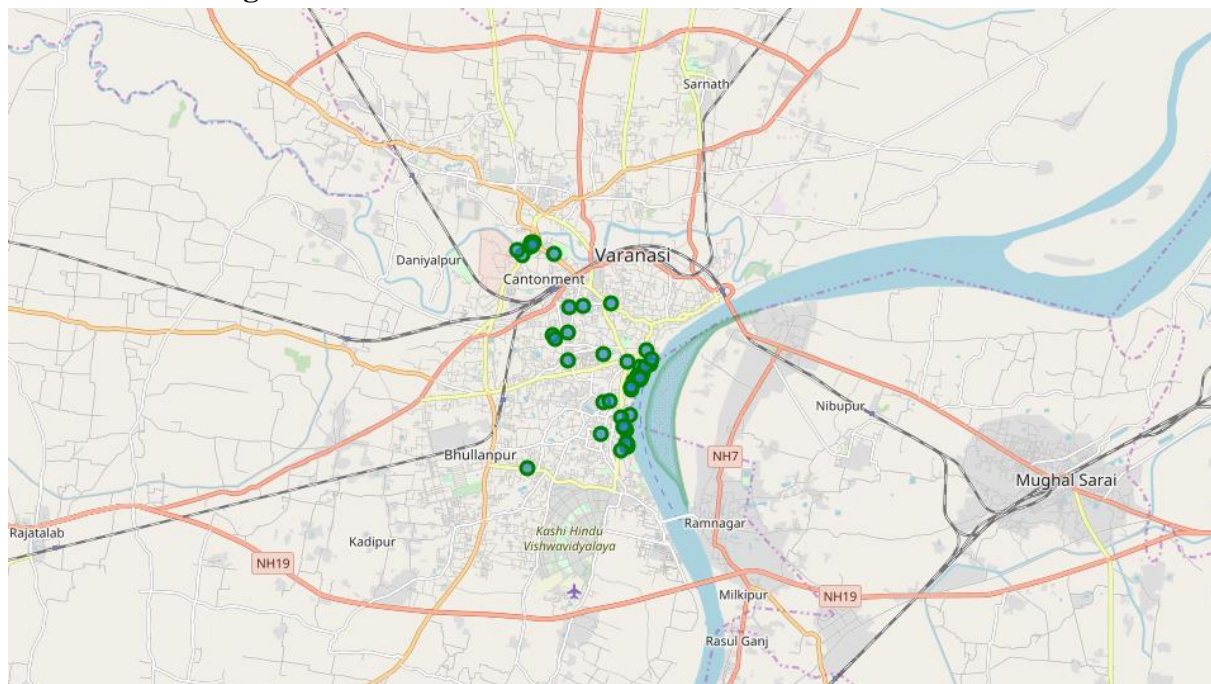


Figure 1: Venues retrieved from Foursquare API

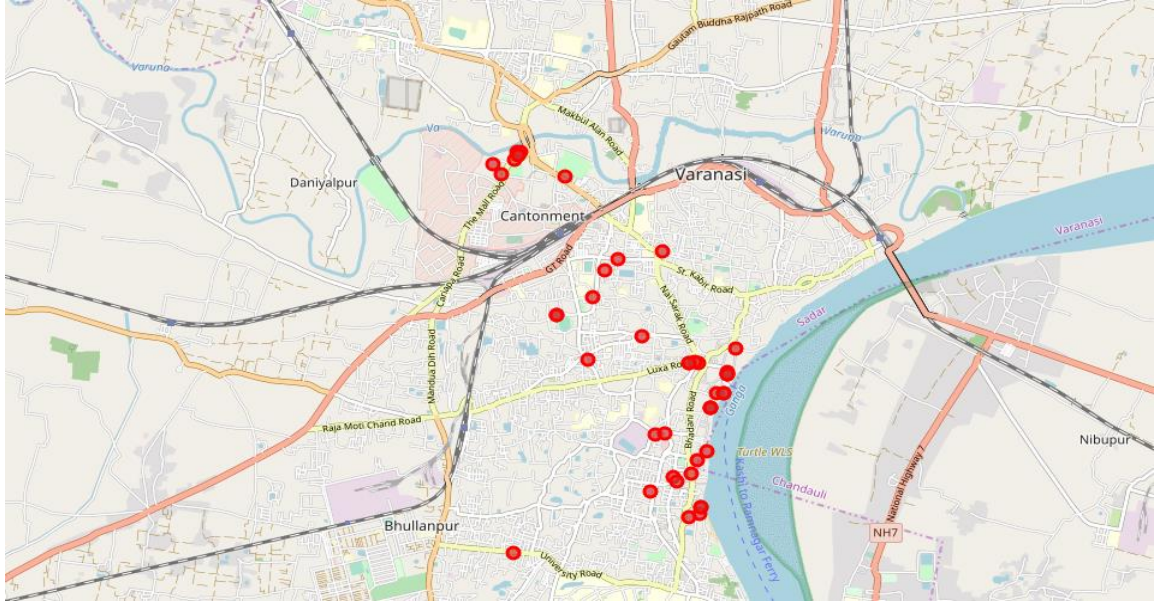


Figure 2: Venues retrieved from Zomato API

From figure 1 and figure 2, we can clearly see that some venues from the two APIs do not align with each other. Thus, I decided to combine them using their latitude and longitude values.

To combine the two datasets, I had to check that the latitude and longitude values of each corresponding venue match. After careful analysis, I decided to drop all corresponding venues from the two datasets that had their latitude and longitude values different by more than 0.0004 from one another. Thus, I rounded both the latitude and longitude values up to 4 decimal places. Then, I calculated the difference between the corresponding latitude and longitude values and saw if the difference was less than 0.0004 which should ideally mean that the two locations are the same. This removed many outliers from the two datasets. Once this was done, I observed that there were still some venues which were not correctly aligned.

Venues belonging to category 1 and 3 are perfect to keep. However, the venues that belong to category 2 should be dropped. After careful inspection and removal, the final dataset had a total of 41 venues with which we can work.

As a final dataset, we're left with 16 venues with 8 columns as described in figure 3.

	categories	venue	latitude	longitude	price_range	rating	address	average_price
0	Indian Restaurant	Kashi Chat Bhandar	25.3094	83.0059	1.0	4.7	D-37/49, Godaulia, Varanasi	75.0
1	Hotel	Sol Bar - Hotel Surya	25.3387	82.9799	4.0	3.6	Hotel Surya, 20/51, A-5, The Mall Road, Varuna...	750.0
2	Pizza Place	Pizzeria Vaatika Cafe	25.2894	83.0061	3.0	4.2	B 1/178 Assi Varanasi	350.0
3	Coffee Shop	Open Hand Shop & Cafe	25.2880	83.0045	2.0	4.2	B1/128-3, Dumraun Bagh Colony, Assi Ghat, Vara...	225.0
4	Pizza Place	Domino's Pizza	25.3161	82.9856	2.0	3.9	14, Ground Floor, Cinema Site, IP Mallvaranasi...	200.0

Figure 3: Final data aggregated from both APIs

### **3. Methodology and Exploratory Data Analysis**

As a first step, I retrieve the venues in Varanasi from Foursquare and Zomato APIs. I extract the location data from the Foursquare API for all venues up to a distance of 4 kilometers from the center of Varanasi. Using this, I fetch the venue information including price and rating data from Zomato API.

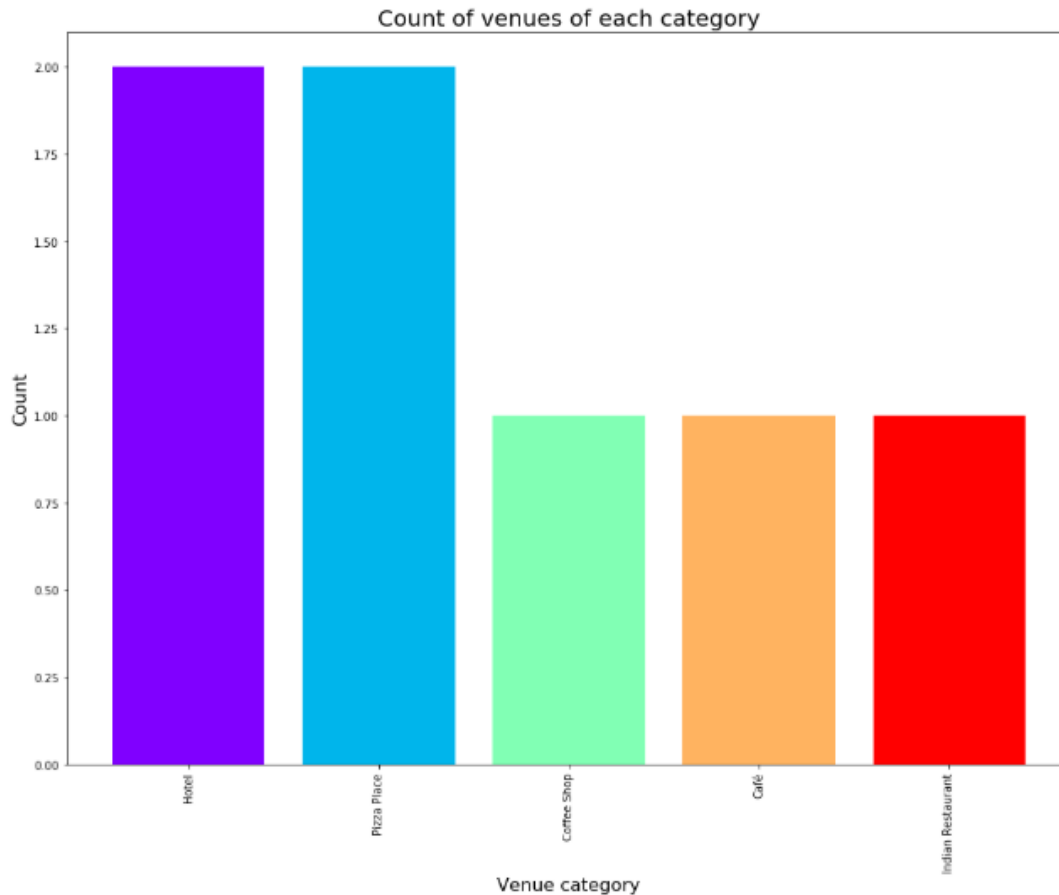
Using data cleaning, the dataset from the two APIs will be combined based on the venue names, latitude, and longitude values. One to one matching and careful data inspection would be used to remove any remaining outliers such as multiple venues at the same location from the two datasets. The final data will include the venue name, category, address, latitude, longitude, rating, price range, and average cost per person.

Using this dataset, I begin by analyzing the top venue types that exist in Varanasi. I will then explore the venues on maps. This will allow us to better understand the location of various venues and the places where many venues co-exist and create place worth visiting. I'll also explore the venues based on the ratings and price range of various venues. The venues will be plot using proper color coding such that a simple glance at the map would reveal the location of the venues as well as give information about them. I aim to identify places which can be recommended to visitors based on their price and rating preferences. I'll also cluster the venues and see if we can draw meaningful information out of what kind of venues exist in Varanasi.

As a final step, I will analyse these plots and try to draw conclusions on what places can be recommended to visitors. I'll discuss my findings and any inferences I can draw.

#### **3.1 Categories**

I begin my analysis by taking a look at the various categories of venues that exist in Varanasi. As there are many hotel,caffe, I believe that the majority venues shall include Hotel and Pizza.



*Figure 4: Count of various types of venues in Chandigarh*

From figure 4, we see that the majority venues are actually Hotel. This is closely followed by Pizza Places.

### **3.2 Rating**

Next, I'll explore the ratings of various venues in Varanasi. I decided to plot a bar chart with x-axis as the rating from 1 to 5 and the y-axis as the count of venues with that rating. I decided to plot the bar chart to see what average rating venues get in Varanasi. This can be seen in figure 5.

While the whole range of rating of venues might stretch from 1 to 5, the average rating is spread across 4 with maximum number of venues scoring between 3 and 5.

I followed this information by plotting the venues on the map of Varanasi. The venues that were rated below 3 were marked by red and orange while the venues that were rated more than or equal to 3 were plot as green and dark green. Taking a look at figure 6 reveals the same results as the bar plot



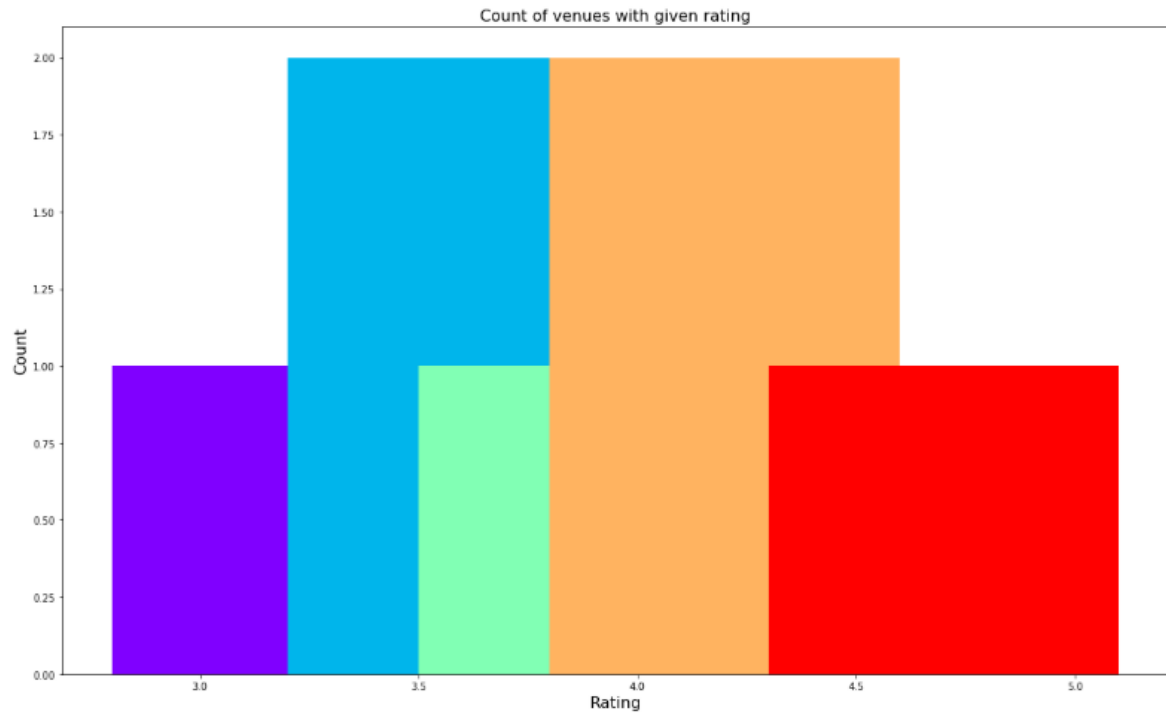


Figure 5: Rating and count of venues with that rating

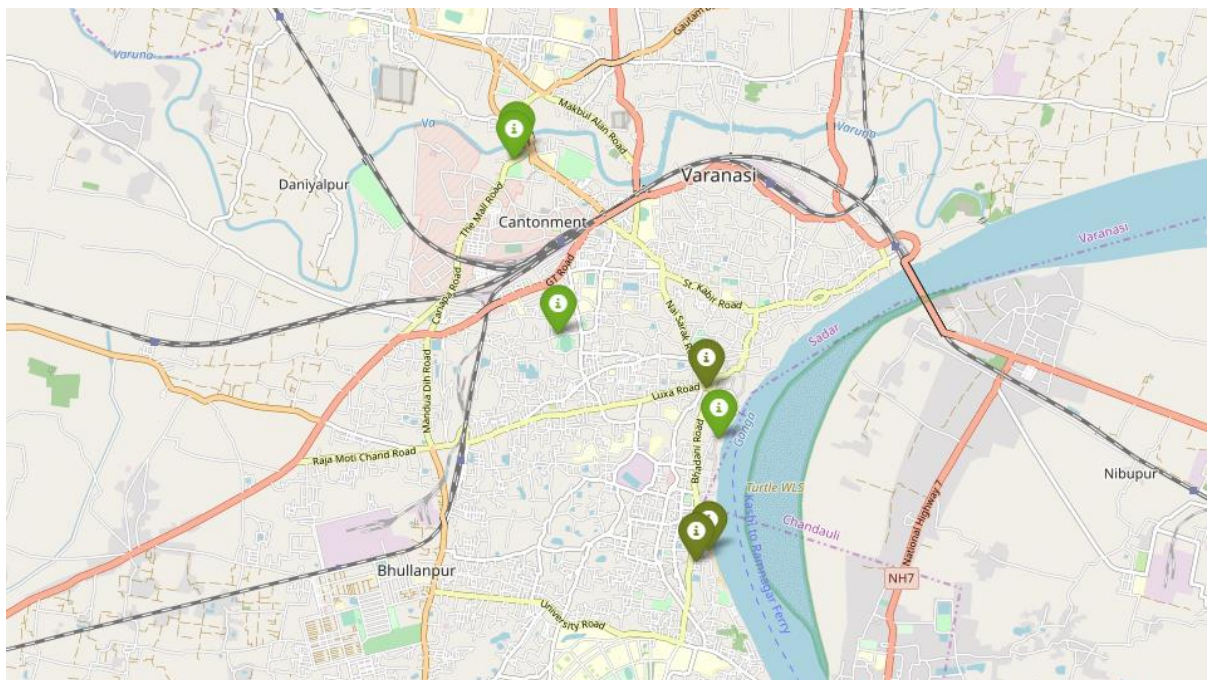


Figure 6: Plot of venues with different ratings

The venues in sectors that do not have many venues have rating more than 3. Overall, Varanasi on an average has good rating for its venues.

I also plot the venues based on their price range.

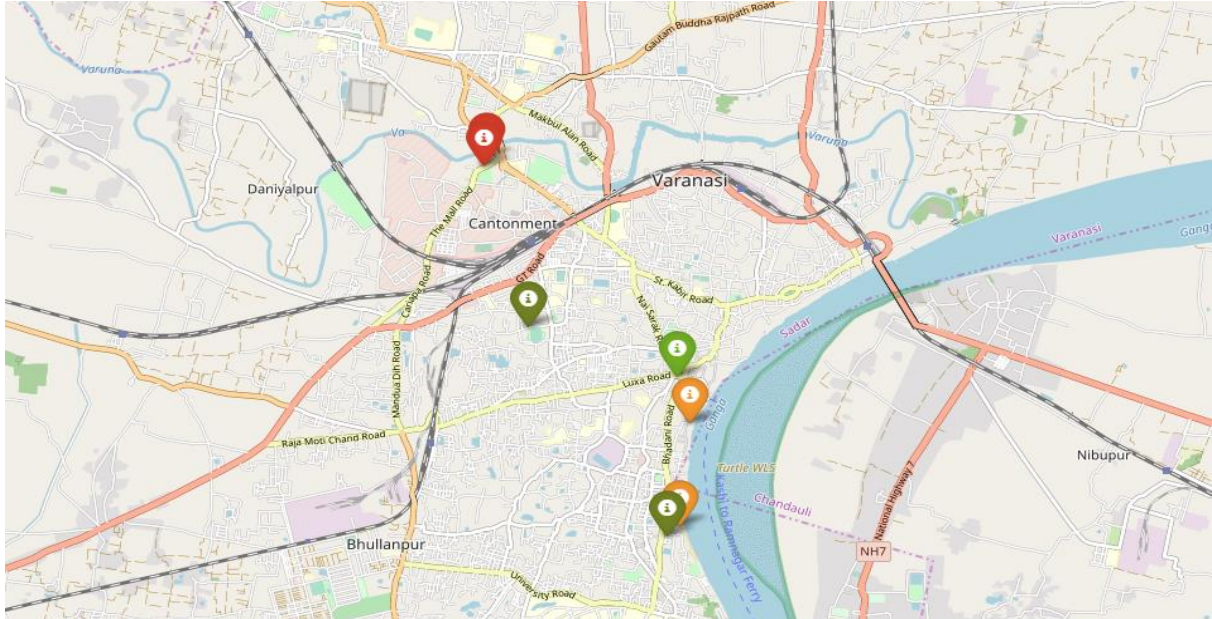


Figure 7: Plot of venues with different prices

Figure 7 includes all the venues where high priced venues are marked by orange and red while the low priced venues are marked with green and dark green.

### 3.3 Clustering

Finally, I cluster all the venues based on their price range, location and more to identify similar venues and the relationship amongst them. I used KMeans clustering and decided to cluster the venues into two separate groups.

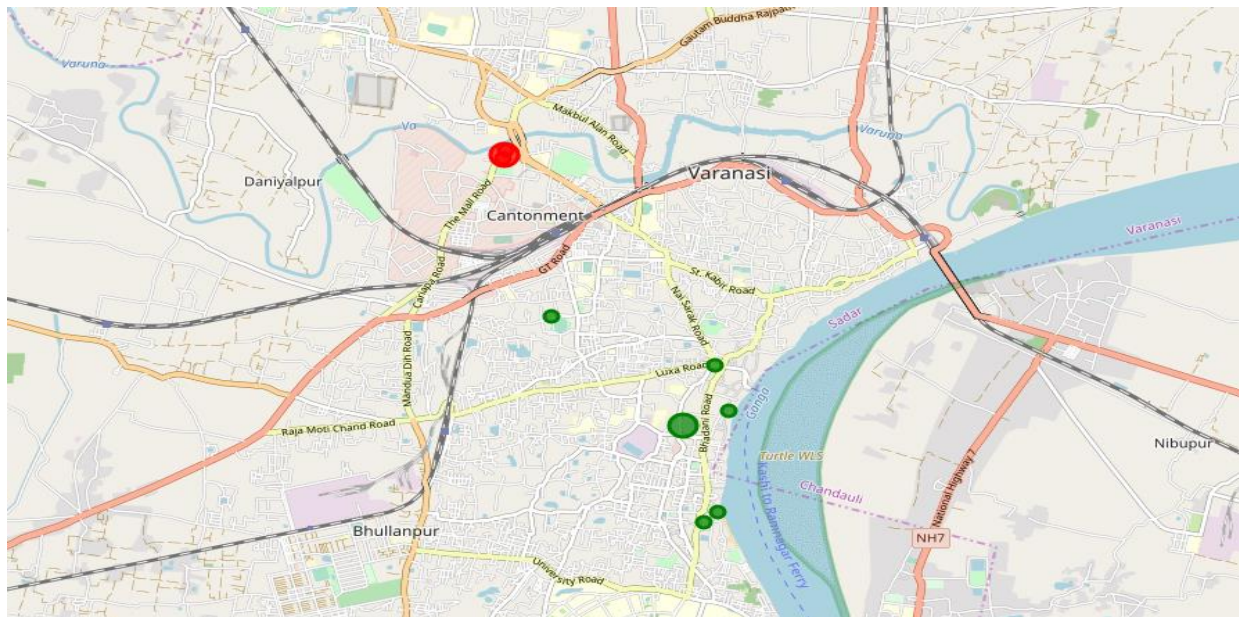


Figure 8: Clusters of venues

In figure 8, we see the two clusters:

1. The first cluster (green) is spread across the fooding areas.
2. The second cluster (red) is very sparsely spread in Hotel areas.

## **4. Results and Discussion**

After collecting data from the Foursquare and Zomato APIs, we got a list of 41 different venues. However, not all venues from the two APIs were identical. Hence, we had to inspect their latitude and longitude values as well as their names to combine them and remove all the outliers. This resulted in a total venue count of 16.

We identified that from the total set of venues, majority of them were Hotel and Pizza Places.

While the ratings range from 1 to 5, majority venues have ratings close to 4. This means that most restaurants provide good quality food which is liked by the people of the city, thus indicating the high rating.

Finally, through clusters we identified that there are many venues which are relatively lower priced but have an average rating of 3.57. On the other hand, there are few venues which are high priced and have average rating of 4.0.

A company can use this information to build an online website/mobile application, to provide users with up to date information about various venues in the city based on the search criteria (name, rating and price).

## **5. Conclusion**

The purpose of this project was to explore the places that a person visiting to Varanasi. The venues have been identified using Foursquare and Zomato API and have been plotted on the map. The map reveals that there are so many places where one can visit during his stay in Varanasi. Based on the visitor's venue rating and price requirements, he/she can choose the places.