Finding the eating/drinking venues for the Tourists visiting the “City of lakes” Udaipur, Rajasthan, India

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1. Introduction

Udaipur is a tourist destination and is known for its history, culture, scenic locations and the Rajput-era palaces. It is popularly known as the "**City of Lakes**" because of its sophisticated lake system[1]. Due to its rich heritage, it is one of the **best tourist destinations** of Rajasthan as well India. As I am living in this tourist city from the past a decade, therefore I have chosen to include Udaipur in my project.

Every year more than **one million tourists** visit the Lake City. The tourists find it difficult to search the best venues with budgetary constraints and they also want to visit the venues that are near to the tourist places of Udaipur, as they have limited time. Therefore, I decided to help the tourists of this city by helping them by answering the following questions:

- Which of the eating/drinking venues available within the 4km periphery from center of Udaipur?
- Which of the eating/drinking venues available within the 4km periphery from center of Udaipur are having low prices?
- Which of the eating/drinking venues available within the 4km periphery from center of Udaipur have good ratings?
- Which of the eating/drinking venues available within the 4km periphery from center of Udaipur are cheaper and have good rating?

2. Data Description

- The **folium library** is used **to generate the map of Udaipur**.

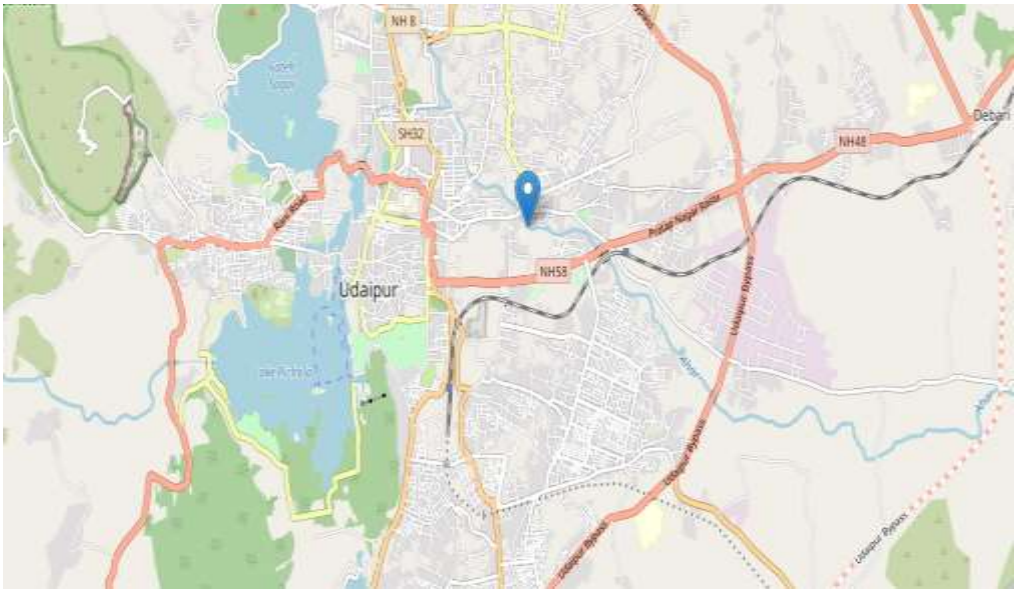

Fig.1: Map of Udaipur

- The **Foursquare API** is **used to fetch the data** about the different eating/drinking venues like name, longitude, latitude, etc. within the radius of 4km from the center of Udaipur.

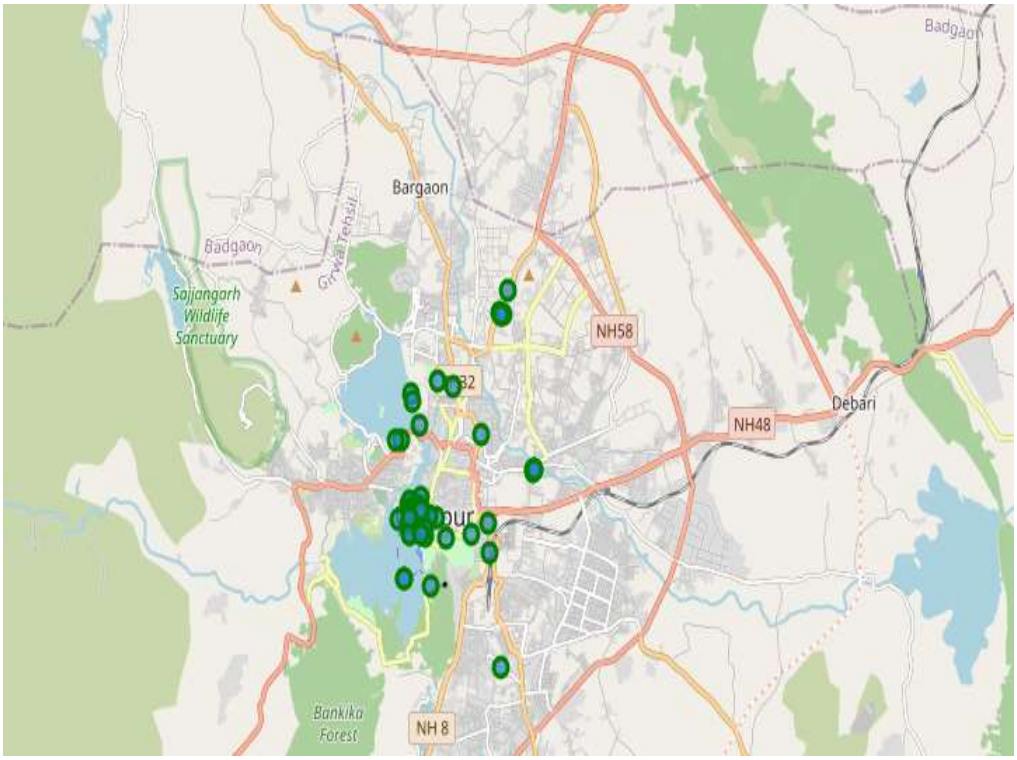

Fig.2: Map of Udaipur with the venues fetched using Foursquare API

- The **Zomato API** shall be **used to fetch the data** about the different eating/drinking venues like name, longitude, latitude, address, rating, category, price etc. within the radius of 4km from the center of Udaipur.

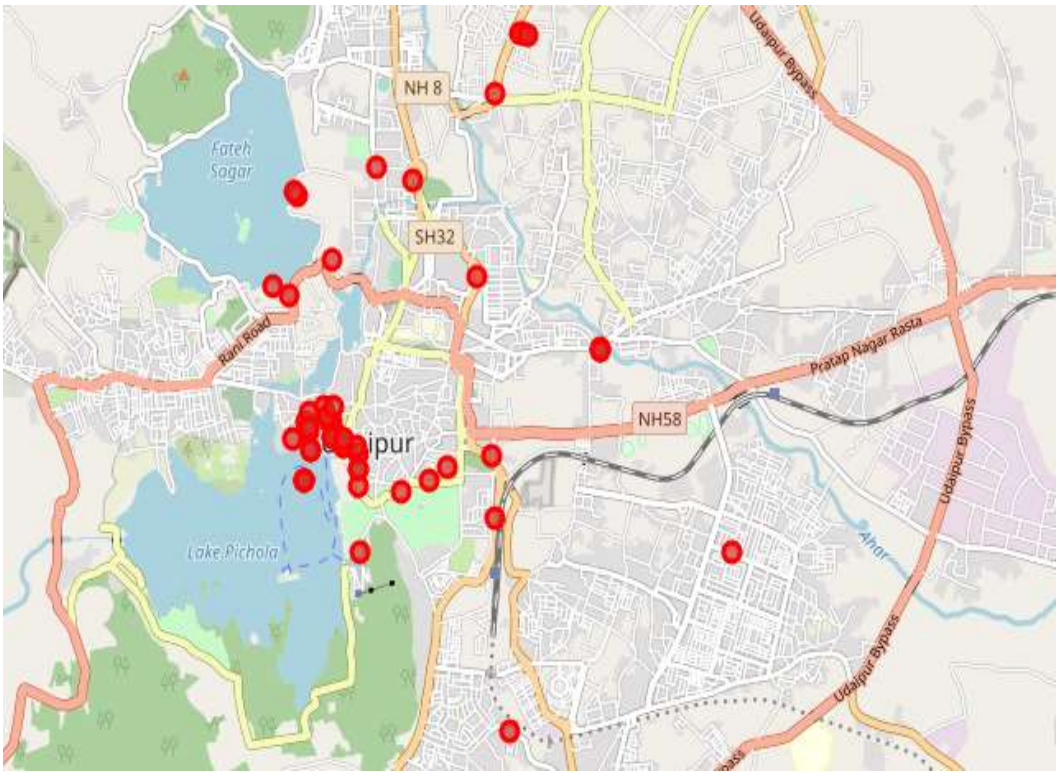

Fig.3: Map of Udaipur with the venues fetched using Zomato API

With the use of Folium library, Foursquare API and Zomato API, the **maps showing the venues** are generated as well as the data fetched from these APIs is cleaned and analysed to fulfil the objective of this project. The visualization of clustering is done through maps.

3. Methodology

The methodology adopted for this project consists of the following steps:

Step 1: Data Collection

As we are concentration on the Udaipur city, therefore data about the category, name, longitude, latitude, rating, price etc. is collected from Foursquare API and Zomato API. Before fetching the data from these APIs, some credentials are required.

(a) The credentials required to fetch the data from Foursquare API are <CLIENT ID>, <CLIENT SECERT>

(b) The credential required to fetch the data from Zomato API is <ZOMATO API KEY>

These credentials are generated after creating the account on the following website: www.foursquare.com and www.Developers.zomato.com.

Step 2: Data Cleaning

Data cleansing or data cleaning is the process of detecting and correcting corrupt or inaccurate records from a record set, table, or database and refers to identifying incomplete, incorrect, inaccurate or irrelevant parts of the data and then replacing, modifying, or deleting the dirty or coarse data[1].

As the dataset for this particular problem has been taken from two different APIs. First, the two datasets are to be merged and then duplicate values and mismatched values are to be removed to get the final dataset on which analysis is to be done.

Step 3: Data Analysis

Data analysis is defined as a process of cleaning, transforming, and modeling data to discover useful information for business decision-making. The purpose of Data Analysis is to extract useful information from data and taking the decision based upon the data analysis [1].

Different types of analysis can be done to answer the queries generated in the introduction section.

Step 4: Results & Discussion

The focus of this step is on what **results** have been obtained and set out clearly what happened in the experiments and/or investigations without worrying about their implications.

In this step, different results can be shown with the help of different visualization tools like bar plots, maps etc. Through these different visualization tools, different results shall be discussed.

Step 5: Conclusion

A conclusion summarizes the report as a whole, drawing inferences from the entire process about what has been found, or decided, and the impact of those findings or decisions.

4. Results

In this section, we shall discuss the results generated from the data collection, data cleaning and data analysis phases which are as follows:

4.1 Data Collection Results

The data obtained from the two APIs is merged and data about a total of 54 venues has been obtained. The sample of the merged dataset is shown in Fig. 4 below:

	name	categories	lat	lng	venue	latitude	longitude	price_for_two	price_range	rating	address	lat_diff	lng_diff
0	Lalit Laxmi Vilas Palace Hotel	Hotel	24.5938	73.6824	Padmini - The LaLiT Laxmi Vilas Palace	24.5939	73.6826	3000.0	4.0	3.7	The Lalit Laxmi Vilas Palace, Opposite Fateh S...	0.0001	0.0002
1	Sankalp	Indian Restaurant	24.5773	73.6992	Sankalp	24.5775	73.6993	600.0	2.0	3.9	Mewar Motor Building, 48, Toran Bawadi, City S...	0.0002	0.0001
2	Natraj Dining	Indian Restaurant	24.5724	73.6997	Natraj Dining Hall & Restaurant	24.5724	73.6996	400.0	1.0	4.5	22-24, City Station Road, City Centre, Udaipur	0.0000	-0.0001
3	Jaiwana Haveli	Hotel	24.5792	73.6826	Jaiwana Haveli Rooftop Restaurant	24.5792	73.6825	1000.0	3.0	4.2	14, Lalghat, Chandpole, Udaipur	0.0000	-0.0001
4	Brewmen Cafe	Cafe	24.6014	73.6871	Royal Brewmen	24.6014	73.6872	400.0	1.0	4.0	Shop 4, Hitawala Complex 2, Saheli Marg, Panch...	0.0000	0.0001
5	Panorama	Hotel	24.5804	73.6798	Panorama Rooftop Restaurant	24.5803	73.6798	800.0	2.0	3.1	Panorama Guest House, Hanuman Ghat, Outside Ch...	-0.0001	0.0000
6	Cafe Namaste	Dessert Shop	24.5804	73.6825	1o9 Cafe	24.5805	73.6826	500.0	2.0	4.1	64, Gangaur Ghat, Jagdish Square, Opposite Gan...	0.0001	0.0001

Fig.4: Sample of merged Data set of venues fetched using APIs

4.2 Data Cleaning Results

In this, the duplicate values and mismatched values from the data that is fetched through the APIs is dropped to make it ready for the analysis step. The Fig. 5 below shows the mismatched value where category is “History Museum” so these types of records has been dropped.

7	Bagore ki Haveli	History Museum	24.5795	73.6823	Mewar Haveli Rooftop Restaurant	24.5796	73.6827	550.0	2.0	3.7	34-35, Lal Ghat, Chandpole, Udaipur	0.0001	0.0004

Fig.5: Sample of mismatched Data set of venues fetched using APIs

The average price per person has been added in the dataset for each eating/drinking venues. The Fig. 6 below shows the few data records.

	categories	venue	latitude	longitude	price_range	rating	address	average_price
0	Hotel	Padmini - The LaLiT Laxmi Vilas Palace	24.5939	73.6826	4.0	3.7	The Lalit Laxmi Vilas Palace, Opposite Fateh S...	1500.0
1	Indian Restaurant	Sankalp	24.5775	73.6993	2.0	3.9	Mewar Motor Building, 48, Toran Bawadi, City S...	300.0
2	Indian Restaurant	Nataraj Dining Hall & Restaurant	24.5724	73.6896	1.0	4.5	22-24, City Station Road, City Centre, Udaipur	200.0
3	Hotel	Jaiwana Haveli Rooftop Restaurant	24.5792	73.6825	3.0	4.2	14, Lalghat, Chandpole, Udaipur	500.0
4	Café	Royal Brewmen	24.6014	73.6872	1.0	4.0	Shop 4, Hiravada Complex 2, Saheli Marg, Panch...	200.0
5	Hotel	Panorama Rooftop Restaurant	24.5803	73.6798	2.0	3.1	Panorama Guest House, Hanuman Ghat, Outside Ch...	400.0
6	Dessert Shop	109 Cafe	24.5805	73.6826	2.0	4.1	64, Gangaur Ghat, Jagdish Square, Opposite Gan...	250.0
7	Restaurant	Pattarzz	24.5924	73.6977	3.0	4.3	5,Bhatt Ji Ki Bari, Residency Road, Near GBH A...	500.0
8	Monument / Landmark	Gaurav Ice Cream&Milk Parlour	24.6004	73.6910	1.0	3.9	Bombay Market, Sukhadiya Circle, Panchwati, Ud...	100.0
9	Roof Deck	TMP Rooftop Restaurant	24.5797	73.6801	3.0	3.3	Hotel Manoharam Palace, 71 - Panchdevri, Hanuma...	500.0
10	Vegetarian / Vegan Restaurant	Millets of Mewar	24.5811	73.6802	2.0	3.9	16, Bhim Parmeshwar Marg, Hanuman Ghat, Outsid...	300.0

Fig.6: Sample of Data set generated after data cleaning

After data cleaning, the data is ready for analysis.

4.3 Data Analysis Results

(a) Analysis on the basis of Category

The analysis on the basis of the category of the venue like hotel, café, restaurant etc. has been done. The bar graph below shows the number of venues in each category. It can be observed from the bar graph that we have maximum number of Hotels and Cafes as compare to other categories of eating/drinking venues.

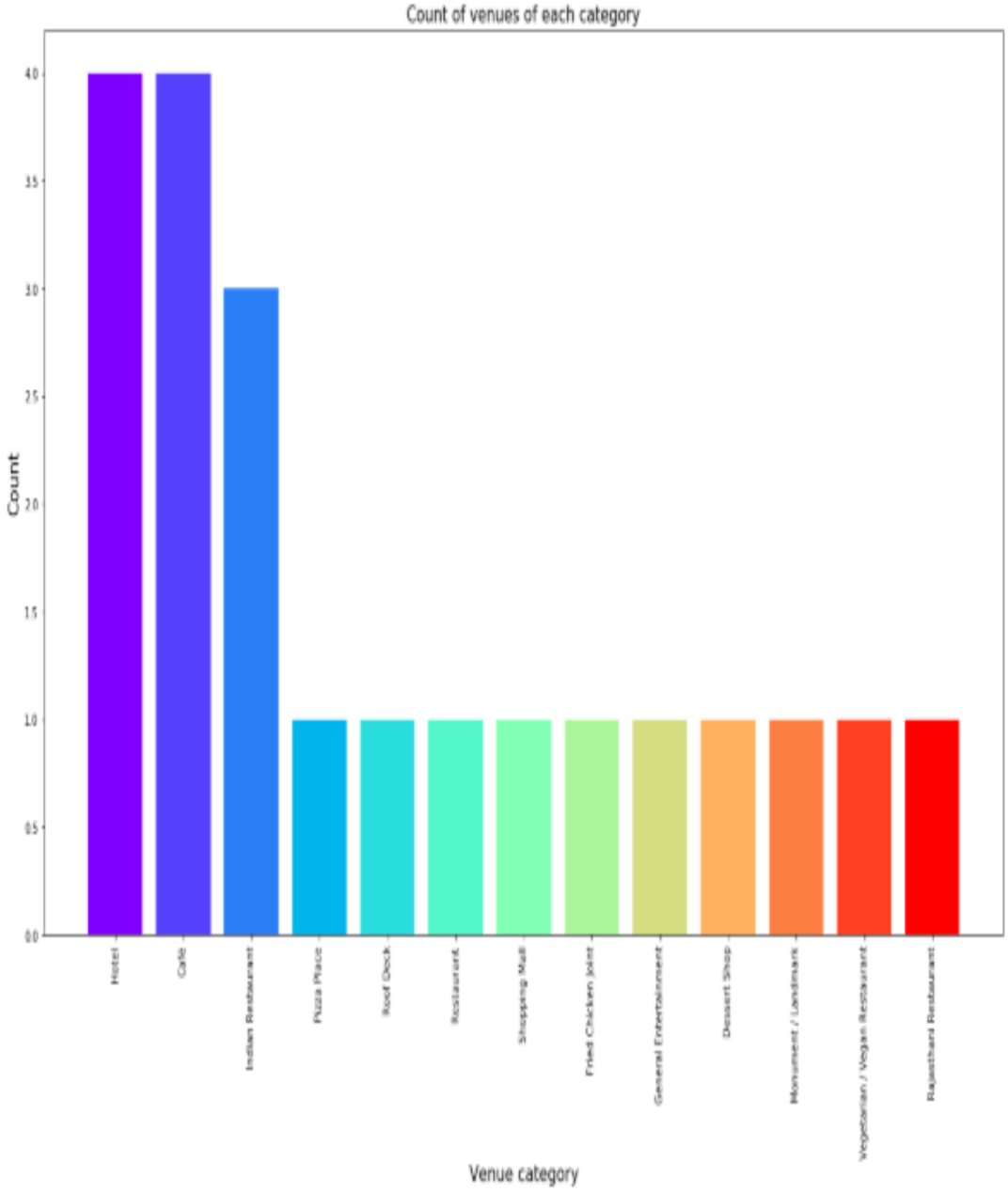

Fig.7: Bar Plot showing the number of venues for each category

(b) Analysis on the basis of Rating of Venues

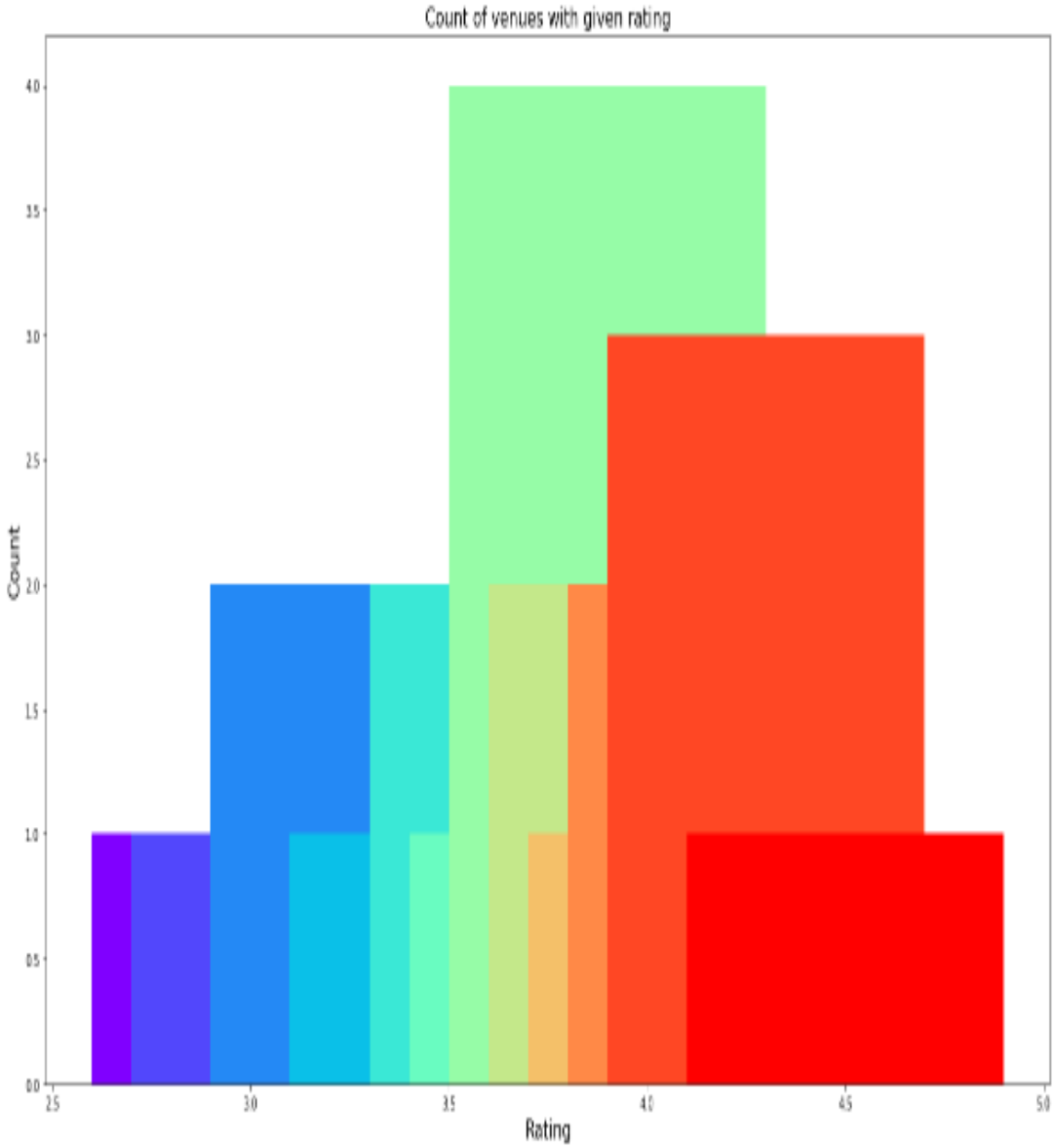

Fig.8: Bar Plot showing the number of venues for each rating

(c) Analysis on the basis of dividing the venues on the basis of ratings into Low, Okay, Good and very good categories

The rating of the venues has been divided in to four categories as follows and shown with different colors on the map shown in Fig. 9.

1 to 2: Low shown with RED

2 to 3: Okay shown with ORANGE

3 to 4 Good shown with GREEN

4 to 5 Very Good shown with DARKGREEN

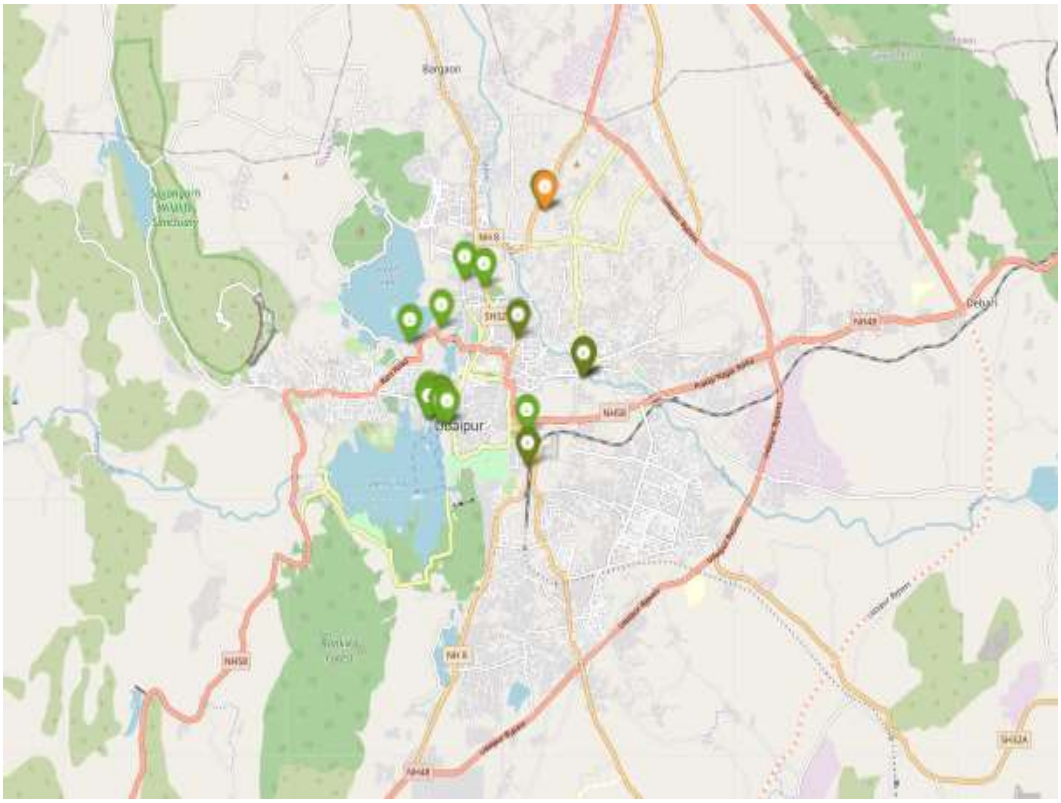

Fig.9: Division of the venues on the basis of ratings into Low, Okay, Good and very good categories

(d) Analysis on the basis of venues with Average Price per Person expenses

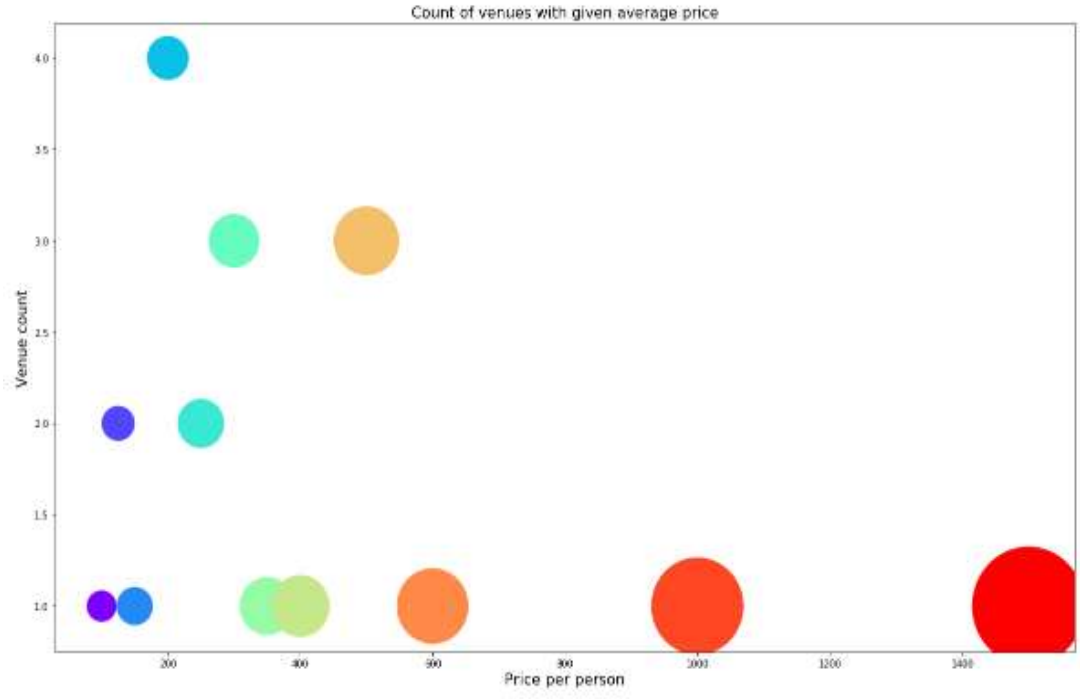

Fig.10: Division of the venues on the basis of Average Price per person expenses

(e) Use of KMeans Clustering

	cluster_labels	categories	venue	latitude	longitude	price_range	rating	address	average_price	rating_bin
0	1	Hotel	Padmini - The LaLiT Laxmi Vilas Palace	24.5939	73.6828	4.0	3.7	The Lalit Laxmi Vilas Palace, Opposite Fateh S...	1500.0	Good
1	0	Indian Restaurant	Sankalp	24.5775	73.6993	2.0	3.9	Mewar Motor Building, 48, Toran Bawadi, City S...	300.0	Good
2	0	Indian Restaurant	Nataraj Dining Hall & Restaurant	24.5724	73.6998	1.0	4.5	22-24, City Station Road, City Centre, Udaipur	200.0	Very good
3	0	Hotel	Jaiwana Haveli Rooftop Restaurant	24.5782	73.6825	3.0	4.2	14, Lalghat, Chandpole, Udaipur	500.0	Very good
4	0	Café	Royal Brewmen	24.6014	73.6872	1.0	4.0	Shop 4, Hitawala Complex 2, Saheli Marg, Panch...	200.0	Good

Fig.11: Sample dataset for dividing the venues into two clusters with label 1 and 0

Cluster 0

	cluster_labels	categories	venue	latitude	longitude	price_range	rating	address	average_price	rating_bin
0	0	Indian Restaurant	Sankalp	24.5775	73.6993	2.0	3.9	Mewar Motor Building, 48, Toran Bawadi, City S...	300.0	Good
1	0	Indian Restaurant	Nataraj Dining Hall & Restaurant	24.5724	73.6998	1.0	4.5	22-24, City Station Road, City Centre, Udaipur	200.0	Very good
2	0	Hotel	Jaiwana Haveli Rooftop Restaurant	24.5782	73.6825	3.0	4.2	14, Lalghat, Chandpole, Udaipur	500.0	Very good
3	0	Café	Royal Brewmen	24.6014	73.6872	1.0	4.0	Shop 4, Hitawala Complex 2, Saheli Marg, Panch...	200.0	Good
4	0	Hotel	Panorama Rooftop Restaurant	24.5803	73.6798	2.0	3.1	Panorama Guest House, Hanuman Ghat, Outside Ch...	400.0	Good
5	0	Dessert Shop	1o9 Cafe	24.5806	73.6826	2.0	4.1	84, Gangaur Ghat, Jagdish Square, Opposite Gan...	250.0	Very good
6	0	Restaurant	Pleterzz	24.5824	73.6877	3.0	4.3	5 Bhatt Ji Ki Bari, Residency Road, Near GBH A...	500.0	Very good
7	0	Monument / Landmark	Gaurav Ice Cream&Milk Parlour	24.6004	73.6910	1.0	3.9	Bombay Market, Sukhadiya Circle, Panchwati, Ud...	100.0	Good
8	0	Roof Deck	TMP Rooftop Restaurant	24.5797	73.6801	3.0	3.3	Hotel Mandiram Palace, 71 - Panchdevri, Hanuma...	500.0	Good
9	0	Vegetarian / Vegan Restaurant	Millets of Mewar	24.5811	73.6802	2.0	3.9	16, Bhim Parmeshwar Marg, Hanuman Ghat, Outsid...	300.0	Good

Fig.12: Sample dataset of Cluster 0

Cluster 1

	cluster_labels	categories	venue	latitude	longitude	price_range	rating	address	average_price	rating_bin
0	1	Hotel	Padmini - The LaLiT Laxmi Vilas Palace	24.5939	73.6828	4.0	3.7	The Lalit Laxmi Vilas Palace, Opposite Fateh S...	1500.0	Good
1	1	Hotel	Bougainvillea Terrace By The Lake	24.5916	73.6764	4.0	3.5	Hotel Lakend, Fateh Sagar Lake Shore, Alkapuri...	1000.0	Good

Fig.13: Sample dataset of Cluster 1

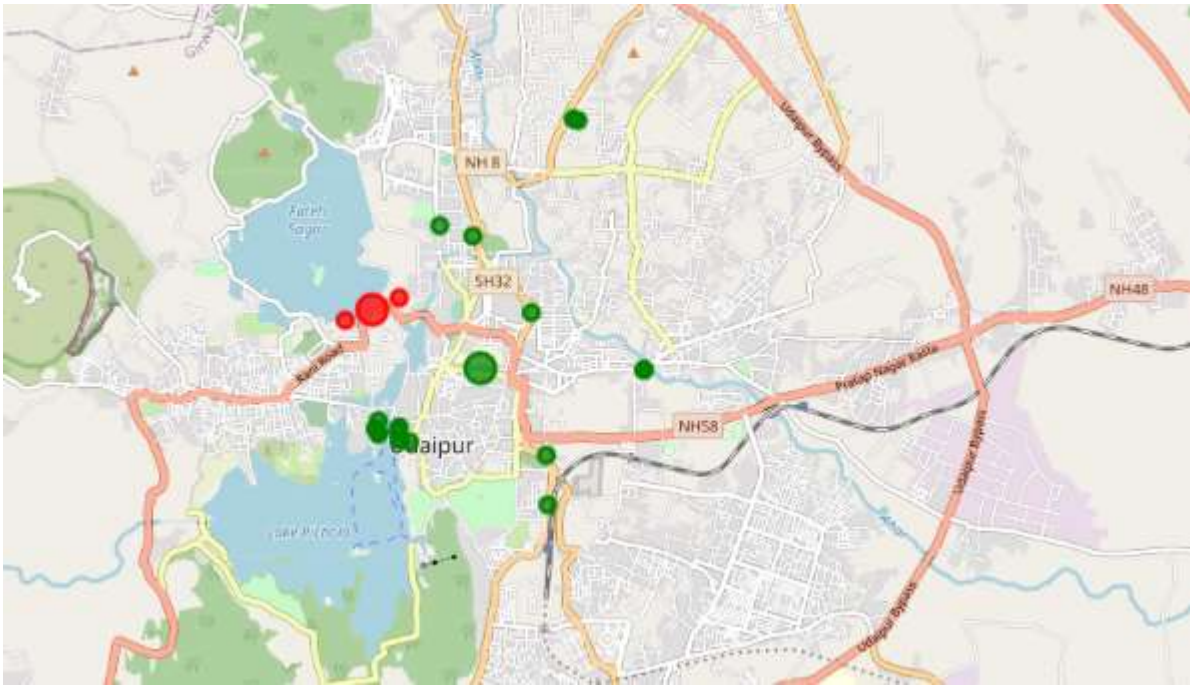

Fig.14: Map showing the two clusters 0 and 1 in green and red colours respectively

5. Discussion

On the basis of the analysis done in a number of conclusions can been drawn which can be useful to the tourists who wants to visit the City of Lakes, Udaipur.

- The data was collected from Foursquare API and Zomato API, within a radius of 4KM, total 54 venues were fetched but some venues were different in both the APIs. After analysing the latitude and longitude data of these venues and removing the mismatched ones. We were left with 21 different venues.
- The ratings of these 21 venues are between 1.0 to 5.0. and majority of the venues are having rating greater than 3.5. Therefore, on the basis of rating, we can conclude that majority of the venues are of good quality in terms of food, location etc.
- After analysing the venues on the basis of their Average Price per person, It has been observed that out of all the venues only two venues are charging More than Rs. 1000 and rest of the venues are having their average price less than Rs. 1000. The minimum average price is Rs. 100 that is very reasonable.
- After applying KMeans clustering, it has been observed that venues with less average price have a mean rating of 3.88 and average price range of 1.79 whereas the venues with higher price have mean price range of 4.00 and rating spread around 3.60.
- It has been concluded from the analysis that if the tourist wants a cheaper venue for eating/drinking he/she should go to Gangaur Ghat and area that is behind Pichola Lake. If he/she is looking for best places with no restriction on budget should try near the Fateh Sagar Lake area.
- If the tourist does not have any restriction on budget as well as rating then he/she should try the venues near city palace, gangaur ghat, lake Pichola and Fateh Sagar Lake.

6. Conclusion

The objective of this project is to help the visitors to find the eating/drinking venues who are visiting Udaipur. The observations have been shown through maps and it is suggested to the tourists to visit Gangaur, Ghat, Cit Palace, Lake Pichola and Fateh Sagar Lake areas for eating/drinking and can find the venues as per their budget as well as ratings of the venues.

Future Scope: An Android App can be developed for this.

References

[1] https://en.wikipedia.org/wiki/

[2] https://foursquare.com

[3] https://developers.zomato.com