Capstone-Battle of Neighborhoods

1. Introduction

1.1 Background

A symbol of the country's rich past and thriving present, Delhi is a city where ancient and modern blend seamlessly together. It is a place that not only touches your pulse but even fastens it to a frenetic speed. Home to millions of dreams, the city takes on unprecedented responsibilities of realizing dreams bringing people closer and inspiring their thoughts.

Delhi is a popular tourist destination and is the homeland to many history rich architectural wonders. Delhi being the capital of the country is rich in culture and vast in land. The city offers accommodation to roughly 20 million people or more. A populated city results in a boundless number of venues including venues for entertainment, fun, restaurants etc.

1.2 Problem

People are often confused about where to go, when to go etc while choosing a place to go out and eat. This project will help make their job simpler. We will be working with different venues in different neighborhoods and extract information about them to help users decide which location suits them the most. The user may make an informed decision about where to go on the basis of extracted knowledge.

1.3 Target Audience

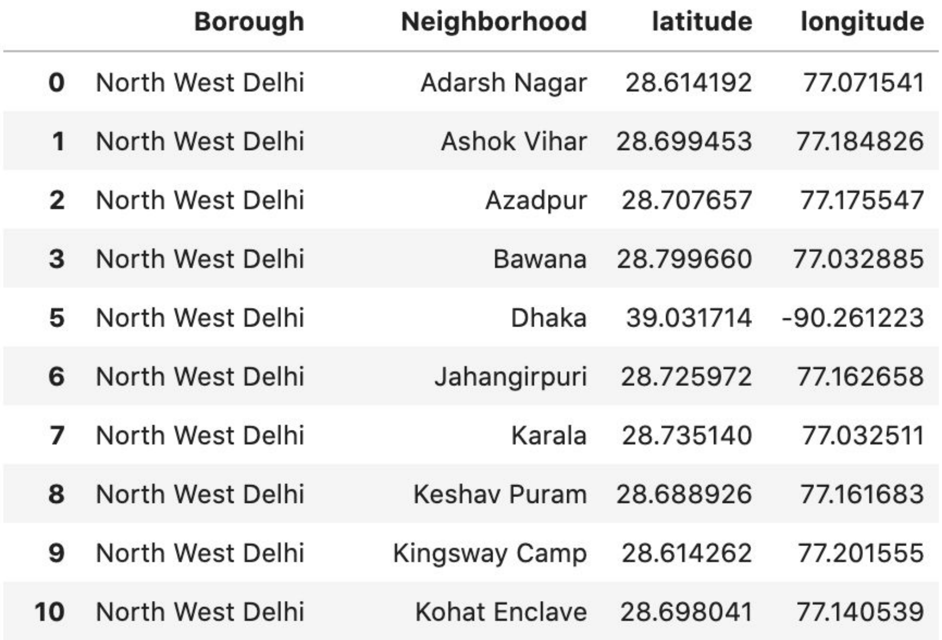
The project will largely benefit two kinds of people:

- **User/Customers**
  People who are looking for places to eat but are confused amongst the various options can use this model which will help them get a summarised idea of all the possible options.
- **Businessmen looking to open a venue in a neighborhood**
  People willing to open a new food joint in an area would usually be drawn to open it some place which already has similar venues. The project will help the user learn the most popular neighborhoods in the area and help them make a better decision.

2. Data Acquisition and Pre-Processing

In this project, two different datasets are used- Delhi Neighborhood Dataset and Foursquare API.

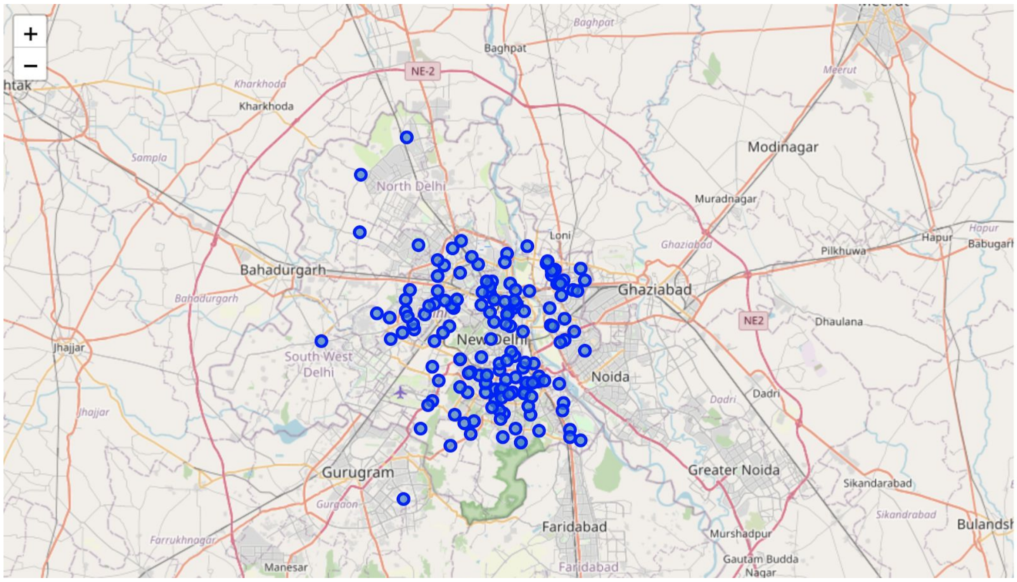
2.1 Delhi Neighborhood Dataset



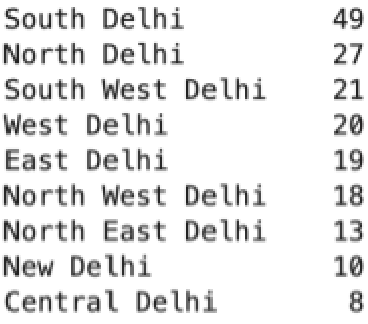
	Borough	Neighborhood	latitude	longitude
0	North West Delhi	Adarsh Nagar	28.614192	77.071541
1	North West Delhi	Ashok Vihar	28.699453	77.184826
2	North West Delhi	Azadpur	28.707657	77.175547
3	North West Delhi	Bawana	28.799660	77.032885
5	North West Delhi	Dhaka	39.031714	-90.261223
6	North West Delhi	Jahangirpuri	28.725972	77.162658
7	North West Delhi	Karala	28.735140	77.032511
8	North West Delhi	Keshav Puram	28.688926	77.161683
9	North West Delhi	Kingsway Camp	28.614262	77.201555
10	North West Delhi	Kohat Enclave	28.698041	77.140539

Shown above is Delhi Neighborhood records classified by *Borough, Neighborhood, Latitude and Longitude.*_There are a total 185 rows in the dataset and 4 columns. Data is roughly divided in 9 major boroughs namely- *North West Delhi, North Delhi, North East Delhi, Central Delhi, New Delhi, East Delhi, South Delhi, South West Delhi and West Delhi.*
On analysing data it was found that for some neighborhoods, the latitude and longitude values were not defined in the records. Therefore, inconsistent records were removed from the dataset, resulting in 163 rows.

This dataset is available on Kaggle:
https://www.kaggle.com/shaswatd673/delhi-neighborhood-data

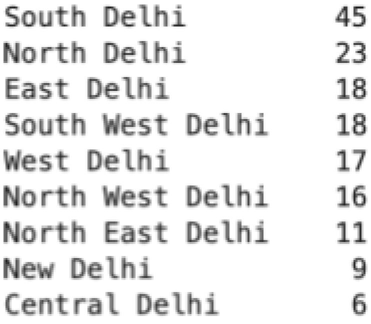


A visual representation of all the neighborhoods in Delhi



```
South Delhi         49
North Delhi         27
South West Delhi    21
West Delhi          20
East Delhi          19
North West Delhi    18
North East Delhi    13
New Delhi           10
Central Delhi        8
```

Before Processing the data

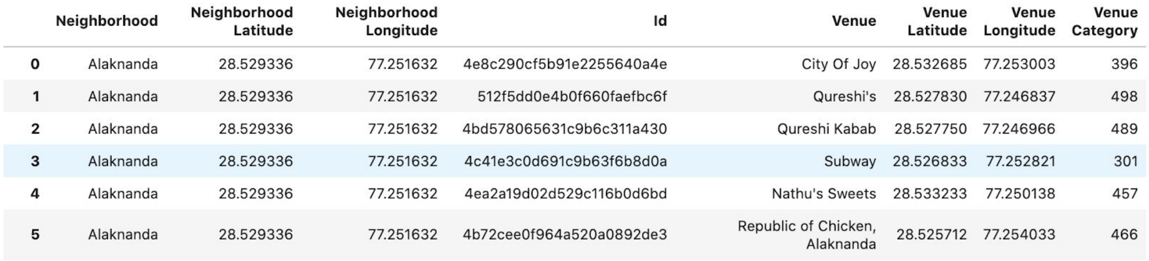


```
South Delhi         45
North Delhi         23
East Delhi          18
South West Delhi    18
West Delhi          17
North West Delhi    16
North East Delhi    11
New Delhi            9
Central Delhi        6
```

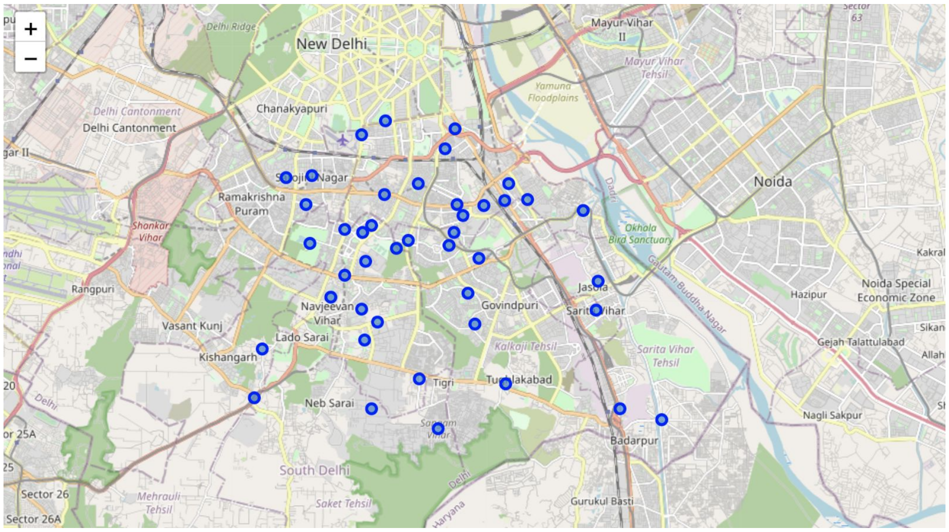
After Processing the data

2.2 Foursquare API

Foursquare API will be called for all the venues in the chosen neighborhood. This will be done using the following features - Venue Id, Latitude, Longitude, Search Query, radius and limit. The data received is in the json format, which is normalised to create a dataframe.



	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Id	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Alaknanda	28.529336	77.251632	4e8c290cf5b91e2255640a4e	City Of Joy	28.532685	77.253003	396
1	Alaknanda	28.529336	77.251632	512f5dd0e4b0f660faefbc6f	Qureshi's	28.527830	77.246837	498
2	Alaknanda	28.529336	77.251632	4bd578065631c9b6c311a430	Qureshi Kabab	28.527750	77.246966	489
3	Alaknanda	28.529336	77.251632	4c41e3c0d691c9b63f6b8d0a	Subway	28.526833	77.252821	301
4	Alaknanda	28.529336	77.251632	4ea2a19d02d529c116b0d6bd	Nathu's Sweets	28.533233	77.250138	457
5	Alaknanda	28.529336	77.251632	4b72cee0f964a520a0892de3	Republic of Chicken, Alaknanda	28.525712	77.254033	466



A visual representation of all the neighborhoods in South Delhi

3. Methodology

3.1 Retrieving Venues for each Neighborhood

The Delhi Neighborhood Dataset consisted Neighborhoods for each Borough along with their Latitude and Longitude values. This information was helpful in retrieving data about different venues in each neighborhood.

In this project we work on Borough: **"South Delhi"**.

The Foursquare API was called using the following attributes:

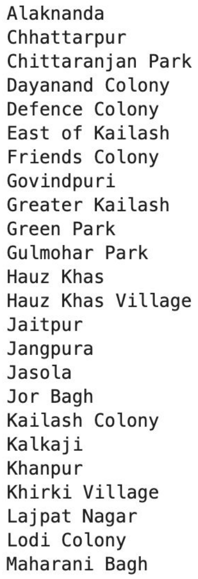
- Client ID (Foursquare Developers Panel)
- Client Secret (Foursquare Developers Panel)
- Latitude
- Longitude
- Radius (=500m in this case)
- Limit (=100 in this case)
- Search Query (=Restaurant in this case)

The result obtained from the API was in the form of JSON, which had to be normalized into a dataframe.

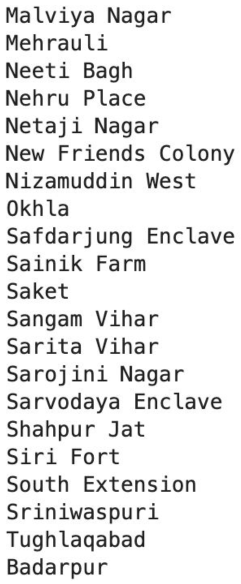
The information crucial about venues from the neighborhoods was;

1. Venue ID
2. Name of Venue
3. Longitude and Latitude values

There were a total of 45 neighborhoods in South Delhi.

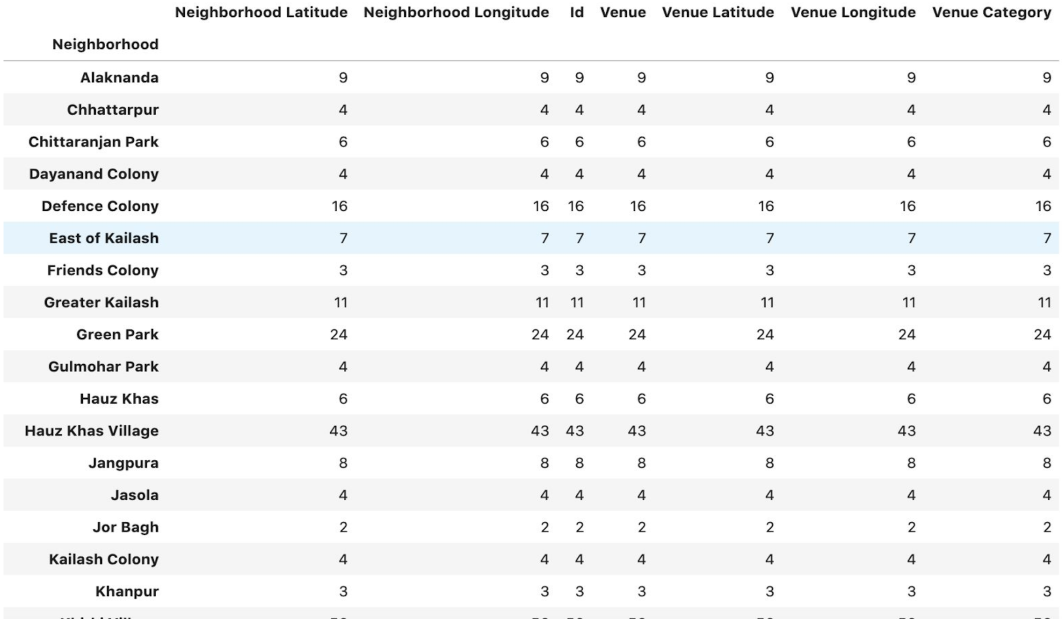


```
Alaknanda
Chhattarpur
Chittaranjan Park
Dayanand Colony
Defence Colony
East of Kailash
Friends Colony
Govindpuri
Greater Kailash
Green Park
Gulmohar Park
Hauz Khas
Hauz Khas Village
Jaitpur
Jangpura
Jasola
Jor Bagh
Kailash Colony
Kalkaji
Khanpur
Khirki Village
Lajpat Nagar
Lodi Colony
Maharani Bagh
```



```
Malviya Nagar
Mehrauli
Neeti Bagh
Nehru Place
Netaji Nagar
New Friends Colony
Nizamuddin West
Okhla
Safdarjung Enclave
Sainik Farm
Saket
Sangam Vihar
Sarita Vihar
Sarojini Nagar
Sarvodaya Enclave
Shahpur Jat
Siri Fort
South Extension
Sriniwaspuri
Tughlaqabad
Badarpur
```

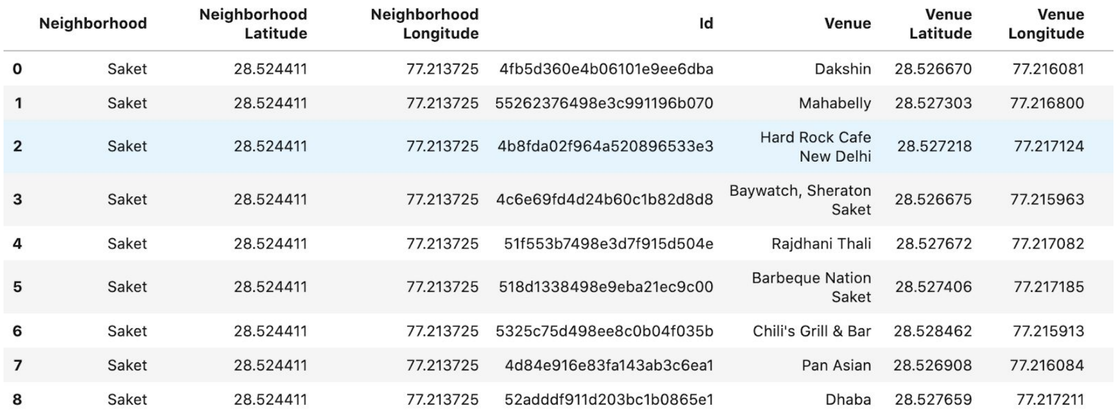
After the data for each venue was collected it was organised in a dataframe for an improved readability. The data was grouped on the basis of the number of venues in a particular neighborhood.



	Neighborhood Latitude	Neighborhood Longitude	Id	Venue	Venue Latitude	Venue Longitude	Venue Category
Neighborhood							
Alaknanda	9	9	9	9	9	9	9
Chhattarpur	4	4	4	4	4	4	4
Chittaranjan Park	6	6	6	6	6	6	6
Dayanand Colony	4	4	4	4	4	4	4
Defence Colony	16	16	16	16	16	16	16
East of Kailash	7	7	7	7	7	7	7
Friends Colony	3	3	3	3	3	3	3
Greater Kailash	11	11	11	11	11	11	11
Green Park	24	24	24	24	24	24	24
Gulmohar Park	4	4	4	4	4	4	4
Hauz Khas	6	6	6	6	6	6	6
Hauz Khas Village	43	43	43	43	43	43	43
Jangpura	8	8	8	8	8	8	8
Jasola	4	4	4	4	4	4	4
Jor Bagh	2	2	2	2	2	2	2
Kailash Colony	4	4	4	4	4	4	4
Khanpur	3	3	3	3	3	3	3

This data would help the user to know about the most popular neighborhoods

For this project we analyse venues in the neighborhood: **“Saket”**



	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Id	Venue	Venue Latitude	Venue Longitude
0	Saket	28.524411	77.213725	4fb5d360e4b06101e9ee6dba	Dakshin	28.526670	77.216081
1	Saket	28.524411	77.213725	55262376498e3c991196b070	Mahabelly	28.527303	77.216800
2	Saket	28.524411	77.213725	4b8fda02f964a520896533e3	Hard Rock Cafe New Delhi	28.527218	77.217124
3	Saket	28.524411	77.213725	4c6e69fd4d24b60c1b82d8d8	Baywatch, Sheraton Saket	28.526675	77.215963
4	Saket	28.524411	77.213725	51f553b7498e3d7f915d504e	Rajdhani Thali	28.527672	77.217082
5	Saket	28.524411	77.213725	518d1338498e9eba21ec9c00	Barbeque Nation Saket	28.527406	77.217185
6	Saket	28.524411	77.213725	5325c75d498ee8c0b04f035b	Chili's Grill & Bar	28.528462	77.215913
7	Saket	28.524411	77.213725	4d84e916e83fa143ab3c6ea1	Pan Asian	28.526908	77.216084
8	Saket	28.524411	77.213725	52adddf911d203bc1b0865e1	Dhaba	28.527659	77.217211

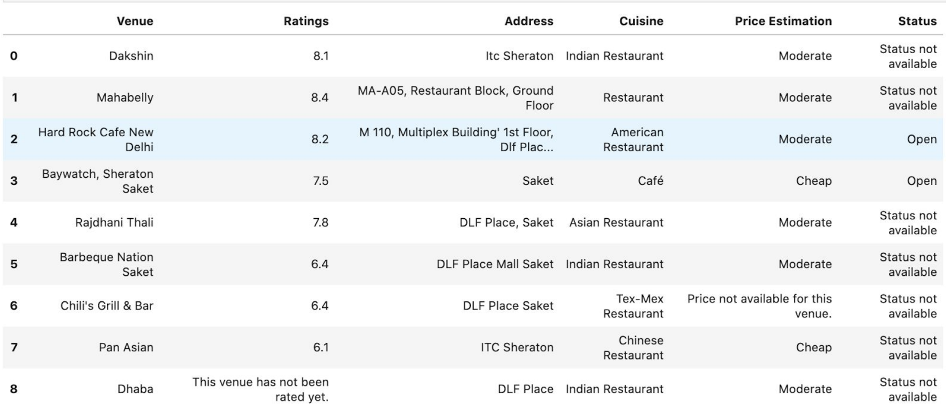
The resulting data frame has 9 entries. The column "Venue" mentions the name of the venues. Further we will be working on the above 9 venues and retrieve information about these venues.

3.2 Retrieving Venue Data

The above data frame is the data that we will be working upon in this section. The Foursquare API is called to obtain information about each venue. The features used while making ther API call are:

- Venue ID
- Client ID
- Client Secret

The results are in json format and are normalized to a dataframe. The resulting data frame has a record of all the important information the user needs to know about the venue, before choosing it.



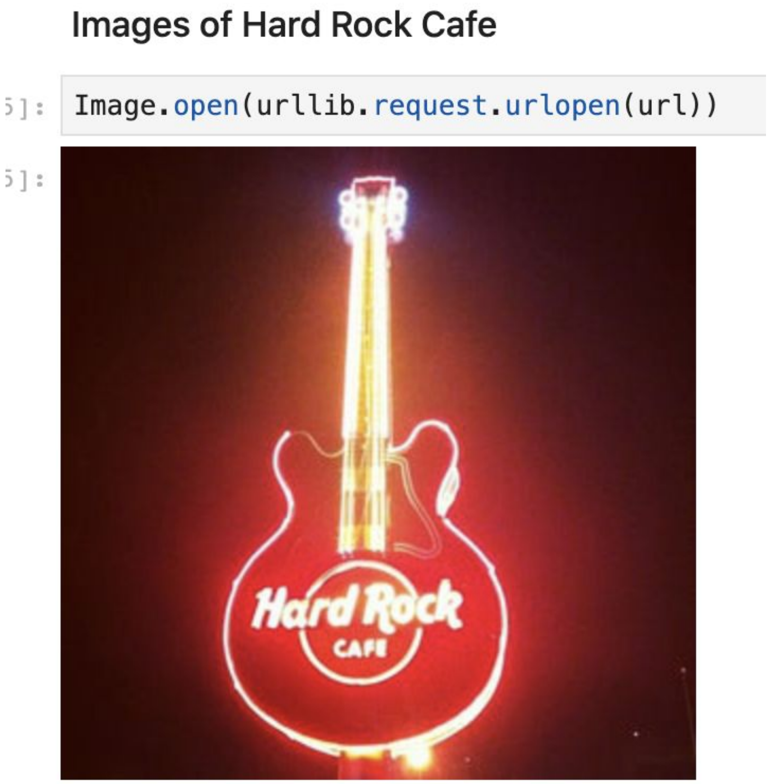
	Venue	Ratings	Address	Cuisine	Price Estimation	Status
0	Dakshin	8.1	Itc Sheraton	Indian Restaurant	Moderate	Status not available
1	Mahabelly	8.4	MA-A05, Restaurant Block, Ground Floor	Restaurant	Moderate	Status not available
2	Hard Rock Cafe New Delhi	8.2	M 110, Multiplex Building' 1st Floor, Dlf Plac...	American Restaurant	Moderate	Open
3	Baywatch, Sheraton Saket	7.5	Saket	Café	Cheap	Open
4	Rajdhani Thali	7.8	DLF Place, Saket	Asian Restaurant	Moderate	Status not available
5	Barbeque Nation Saket	6.4	DLF Place Mall Saket	Indian Restaurant	Moderate	Status not available
6	Chili's Grill & Bar	6.4	DLF Place Saket	Tex-Mex Restaurant	Price not available for this venue.	Status not available
7	Pan Asian	6.1	ITC Sheraton	Chinese Restaurant	Cheap	Status not available
8	Dhaba	This venue has not been rated yet.	DLF Place	Indian Restaurant	Moderate	Status not available

The above table contains Venue Name, Ratings, Address, Cuisine, Price Estimation and Present Status of the different venues.

For people who prioritise ratings over all the other factors, will choose **“Mahabelly”** from all the above options.
Users who do not wish to spend a lot might choose **“Baywatch”** or **“Pan Asian”.**
Users who wish to go as soon as possible might choose the venue on the basis of Status, so their choice may contain **“Hard Rock Cafe”** or **“Baywatch”.**

Now**,** let's suppose the user chooses to visit **The Hard Rock Cafe** on the basis of above data. But needs more information like, photos, opening hours, popular hours, contact info etc
This model allows the user to retrieve the required information by using the unique Venue ID while calling the API.
The json results are normalised into a more readable form and helps the user to view the following information about a specific venue:

3.2.1 Images of the Venue

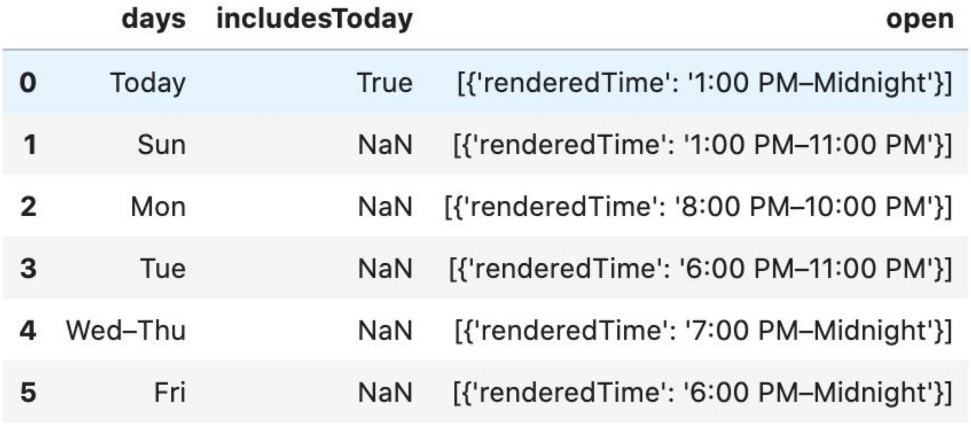


Images of Hard Rock Cafe

```
5]: Image.open(urllib.request.urlopen(url))
```

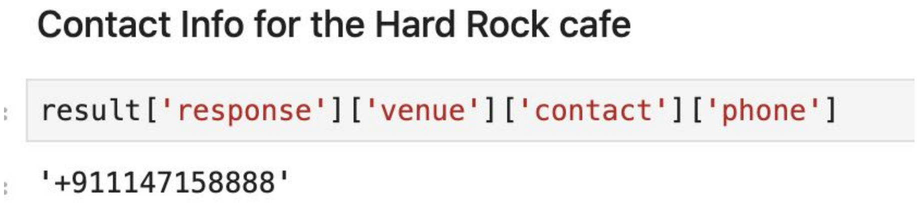
5]:

3.2.2 Popular hours at the Venue



	days	includesToday	open
0	Today	True	[{'renderedTime': '1:00 PM–Midnight'}]
1	Sun	NaN	[{'renderedTime': '1:00 PM–11:00 PM'}]
2	Mon	NaN	[{'renderedTime': '8:00 PM–10:00 PM'}]
3	Tue	NaN	[{'renderedTime': '6:00 PM–11:00 PM'}]
4	Wed–Thu	NaN	[{'renderedTime': '7:00 PM–Midnight'}]
5	Fri	NaN	[{'renderedTime': '6:00 PM–Midnight'}]

3.2.3 Contact Information of the Venue

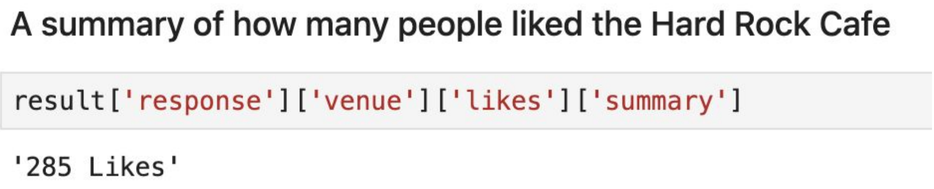


Contact Info for the Hard Rock cafe

```
result['response']['venue']['contact']['phone']
```

```
'+911147158888'
```

3.2.4 Number of people liked the Venue



A summary of how many people liked the Hard Rock Cafe

```
result['response']['venue']['likes']['summary']
```

```
'285 Likes'
```

3.2.5 Trending Venues

The user can check for trending venues near their location. The trending venues are generated and can also be visualised using folium maps. In this project the list of Trending Venues is null since there may not be any trending venue due to the lockdown in action for Pandemic.

4. Results

4.1 For users

The model generates all the crucial information required by a user to make an informed decision before choosing a venue. The model helps the user to view different attributes like

- Ratings of a Venue
- Photos of the Venue
- Location of the Venue
- Contact Information of the Venue
- Status of the Venue
- Popular Hours of the Venue
- Number of likes
- Cuisine offered by the Venue
- Price Estimation

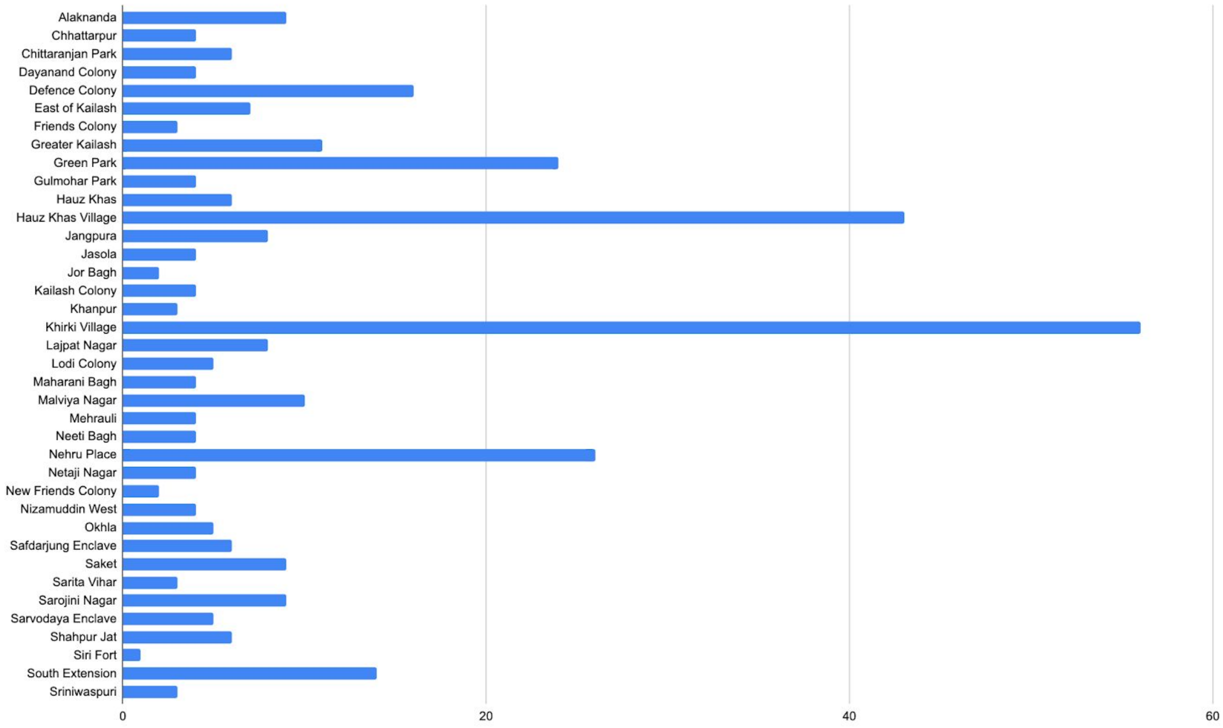
In most cases, the above attributes are enough for a user to make a decision on which venue to choose. Different users prioritise different attributes.

Some Users wish to search venues on the basis of Cuisine. Lets say, a user wishes to search for an Indian restaurant in Saket, South Delhi. The model helps the user to shortlist their options to two options -**Dakshin and Dhaba.**

Further if the user chooses the venue with higher ratings, the user may choose to visit **Dakshin.**

4.2 For Businessmen

The business implementation of this model is that it helps the person to choose the popular areas where a new venue could be opened. People are usually drawn towards opening a venue in the area which has many venues of a similar category, for example, If a neighborhood has many restaurants, a businessman would usually prefer to open a new restaurant in the same neighborhood so that he doesn't have to fight for footfall in a new neighborhood.



From the data it can be inferred that neighborhoods like *Defense Colony, Greater Kailash, Green Park, Hauz Khas Village, Khirki Village, Lajpat Nagar, Malviya Nagar and Nehru Place* are amongst the most popular neighborhoods since they have a maximum number of venues.

Therefore if a person is looking to open a new venue in South Delhi, they can choose one of the above mentioned locations to open a new Venue.

A businessman would try to include maximum possible changes in the location like cuisine type, venue layout, decor etc. Due to which the person needs to be informed about the types of cuisines present in the neighborhood. For example Saket has cuisines like Indian, Mexican, Asian, American, Cafe, Chinese.

So a person may come up with a new cuisine like *Lebanese or Turkish* in order to attract people.

To fight and survive, the owner may want to keep cheaper prices compared to other venues present in the neighborhood. This project helps the user to analyse the price of venues in the neighborhood and come up with an appropriate pricing.

5. Discussion

This project is a decision model which helps the user to decide the best possible option according to their preference. The model allows the user to decide on the basis on many attributes as mentioned earlier.
The project's working is similar to that of Zomato's and Swiggy's "Go out" feature where the user is able to view information about different venues such as cuisine, price, ratings, menu etc. in the chosen neighborhood.

For Future Work, the model could be deployed as a mobile application detecting the location of the user and rendering information on the basis of the user's preferences.

6. Conclusion

We conclude that the project is a decision model that helps users make decisions about venues they could possibly visit. The model can largely benefit users as they can view a brief summary of all the venues just by sitting at home.