A Mini Project Report

On

Mood Based Restaurant Recommendation System

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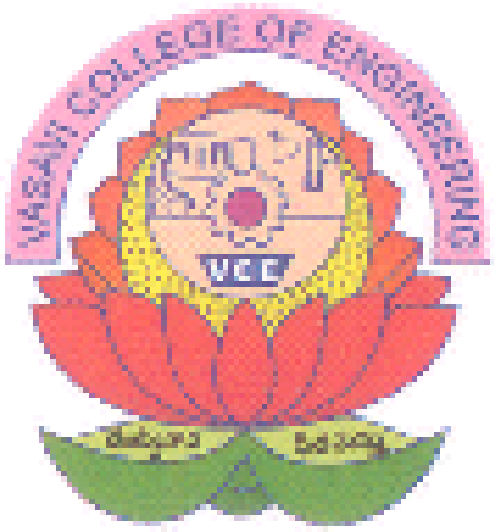
1602-17-733-119



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We are thankful to Dr. T. Adilakshmi Mam, Head of Department (CSE), Vasavi College of Engineering for her help during our course work.

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ABSTRACT

Technology has created an exceptional platform for growth of every kind of businesses. The emerging use of technology urges the need of use of IT is all possible aspects of business. Today hotel and restaurant business are one of the most growing business and has been helping a lot in the economy of the country.

The project analyzes the data of rating and location of a restaurant in the chosen dataset and also the mood of the user and use the data to recommend foods and restaurants to the users. The recommendation is based on the mood of the user and the comfort food corresponding to that particular mood. The recommendation is done on the basis of k-means clustering algorithm.

1 INTRODUCTION

People from different world like to visit different eateries. The restaurant recommendation system is the most needful recommender system as per now in the modern world where all the families try different eateries to have a peaceful amount of time in their relationships. The restaurant recommendation plays a vital role for a family, a single person, a couple to decide which place to go according to their convenience.

1.1 PROBLEM STATEMENT

User has to tell us his/her mood, we'll recommend him/her a restaurant according to the mood. The moods are stress, laziness, happy, depression, sick, cold weather, hunger, etc. The model works well for age range 15-30 due to the dataset.

2 SOFTWARE REQUIREMENTS SPECIFICATIONS

Any of the following browsers are supported- Chrome 70+, Safari 10+, Firefox 60+, Opera 60+, IE 9+

Google Colab

Modules used:

- **pandas**
- **numpy**
- **seaborn**
- **nltk**
- **wordcloud**
- **matplotlib.pyplot**
- **Collections**

3 SYSTEM ARCHITECTURE (DESIGN)

3.1 DATASET

Dataset Used: Zomato Restaurants data

3.1.1 Context

I really get fascinated by good quality food being served in the restaurants and would like to help community find the best cuisines around their area

3.1.2 Content

Zomato API Analysis is one of the most useful analysis for foodies who want to taste the best cuisines of every part of the world which lies in their budget. This analysis is also for those who want to find the value for money restaurants in various parts of the country for the cuisines. Additionally, this analysis caters the needs of people who are striving to get the best cuisine of the country and which locality of that country serves that cuisines with maximum number of restaurants.

Data Collection:
Data collected can be seen as a raw .json file here

Data Storage:
The collected data has been stored in the Comma Separated Value file Zomato.csv. Each restaurant in the dataset is uniquely identified by its Restaurant Id. Every Restaurant contains the following variables:

• Restaurant Id: Unique id of every restaurant across various cities of the world
• Restaurant Name: Name of the restaurant
• Country Code: Country in which restaurant is located
• City: City in which restaurant is located
• Address: Address of the restaurant
• Locality: Location in the city
• Locality Verbose: Detailed description of the locality
• Longitude: Longitude coordinate of the restaurant's location
• Latitude: Latitude coordinate of the restaurant's location
• Cuisines: Cuisines offered by the restaurant
• Average Cost for two: Cost for two people in different currencies
• Currency: Currency of the country
• Has Table booking: yes/no
• Has Online delivery: yes/ no
• Is delivering: yes/ no
• Switch to order menu: yes/no
• Price range: range of price of food
• Aggregate Rating: Average rating out of 5

• Rating color: depending upon the average rating color
• Rating text: text on the basis of rating of rating
• Votes: Number of ratings casted by

Dataset Used: Food Choices

This dataset includes information on food choices, nutrition, preferences, childhood favorites, and other information from college students. There are 126 responses from students. Data is raw and uncleaned. Cleaning is in the process and as soon as that is done, additional versions of the data will be posted.

Inspiration

How important is nutrition information for today's college kids? Is their taste in food defined by their food preferences when they were children? Are kids of parents who cook more likely to make better food choices than others? Are these kids likely to have a different taste compared to others? There a number of open-ended questions included in this dataset such as: What is your favorite comfort food? What is your favorite cuisine? that could work well for natural language processing.

4 IMPLEMENTATION & OUTPUT

Recommending Restaurants based on User Moods

User has to enter his/her mood.

According to the mood entered, restaurants having the comfort food in the chosen city are
displayed. The moods are stress, laziness, happy, depression, sick, cold w eather, hunger, etc. The model works well for age range 15-
30 due to the dataset.

About the Dataset

We are using two datasets. First is Zomato Restaurants Dataset and Seco nd is Food Choices of College Students Dataset.

```
import nltk
nltk.download('stopwords')
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from wordcloud import WordCloud, STOPWORDS
stopwords = set(STOPWORDS)
import seaborn as sns
from plotly.offline import init_notebook_mode, iplot
init_notebook_mode()
from collections import Counter
from nltk.corpus import stopwords
stop = set(stopwords.words('english'))
stop.update(['.', ',', "", "'", '?', '!', ':', ';', '(', ')', '[', ']', '{', '}',"])
from nltk.stem import WordNetLemmatizer
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
```

Zomato Restaurants Dataset Analysis (in New Delhi)

```
res_data = pd.read_csv('/content/zomato.csv', encoding='latin-1')
countryCode_toName = {
   1: "India",
   14: "Australia",
   30: "Brazil",
   37: "Canada",
   94: "Indonesia",
   148: "New Zealand",
   162: "Phillipines",
   166: "Qatar",
   184: "Singapore",
   189: "South Africa",
   191: "Sri Lanka",
   208: "Turkey",
   214: "UAE",
   215: "United Kingdom",
   216: "United States",
}
res_data['Country'] = res_data['Country Code'].apply(lambda x: countryC
ode_toName[x])


res_data = res_data.loc[(res_data['Country Code'] == 1) & (res_data['City
'] == 'New Delhi'), :]
res_data = res_data.loc[res_data['Longitude'] != 0, :]
res_data = res_data.loc[res_data['Latitude'] != 0, :]
res_data = res_data.loc[res_data['Latitude'] < 29] # clearing out invalid o
utlier
res_data = res_data.loc[res_data['Rating text'] != 'Not rated']
res_data['Cuisines'] = res_data['Cuisines'].astype(str)
res_data['fusion_num'] = res_data['Cuisines'].apply(lambda x: len(x.split('
,')))
res_data.info()
```

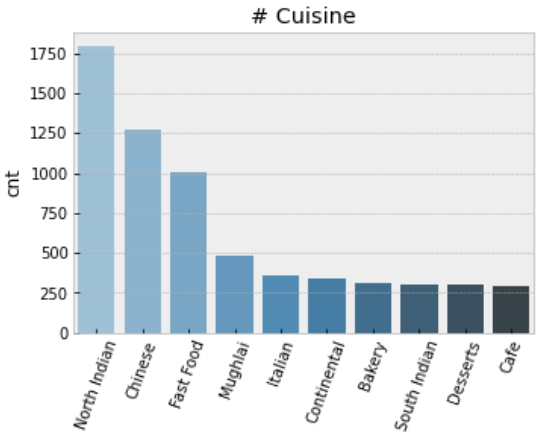
```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 3975 entries, 2561 to 8009
Data columns (total 23 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   Restaurant ID         3975 non-null   int64  
 1   Restaurant Name       3975 non-null   object 
 2   Country Code          3975 non-null   int64  
 3   City                  3975 non-null   object 
 4   Address               3975 non-null   object 
 5   Locality              3975 non-null   object 
 6   Locality Verbose      3975 non-null   object 
 7   Longitude             3975 non-null   float64
 8   Latitude              3975 non-null   float64
 9   Cuisines              3975 non-null   object 
 10  Average Cost for two  3975 non-null   int64  
 11  Currency              3975 non-null   object 
 12  Has Table booking     3975 non-null   object 
 13  Has Online delivery   3975 non-null   object 
 14  Is delivering now     3975 non-null   object 
 15  Switch to order menu  3975 non-null   object 
 16  Price range           3975 non-null   int64  
 17  Aggregate rating      3975 non-null   float64
 18  Rating color          3975 non-null   object 
 19  Rating text           3975 non-null   object 
 20  Votes                 3975 non-null   int64  
 21  Country               3975 non-null   object 
 22  fusion_num            3975 non-null   int64  
dtypes: float64(3), int64(6), object(14)
memory usage: 745.3+ KB
```

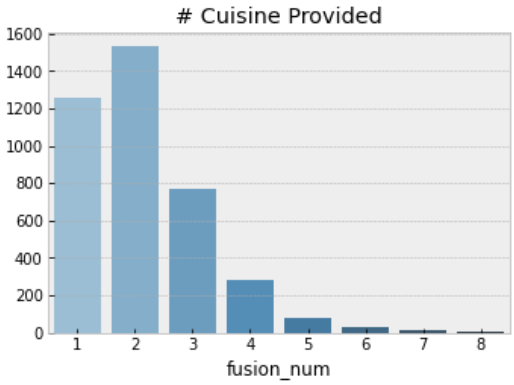
What are the most famous cuisines in CHOOSEN CITY?

```
lst_cuisine = set()
Cnt_cuisine = Counter()
for cu_lst in res_data['Cuisines']:
    cu_lst = cu_lst.split(',')
    lst_cuisine.update([cu.strip() for cu in cu_lst])
    for cu in cu_lst:
        Cnt_cuisine[cu.strip()] += 1

cnt = pd.DataFrame.from_dict(Cnt_cuisine, orient = 'index')
cnt.sort_values(0, ascending = False, inplace = True)
```

```
tmp_cnt = cnt.head(10)
tmp_cnt.rename(columns = {0:'cnt'}, inplace = True)
with plt.style.context('bmh'):
    f = plt.figure(figsize = (12, 8))
    ax = plt.subplot2grid((2,2), (0,0))
    sns.barplot(x = tmp_cnt.index, y = 'cnt', data = tmp_cnt, ax = ax, palett
e = sns.color_palette('Blues_d', 10))
    ax.set_title('# Cuisine')
    ax.tick_params(axis='x', rotation=70)
    ax = plt.subplot2grid((2,2), (0,1))
    sns.countplot(res_data['fusion_num'], ax=ax, palette = sns.color_palett
e('Blues_d', res_data.fusion_num.nunique()))
    ax.set_title('# Cuisine Provided')
    ax.set_ylabel('')
    plt.show()
print('# Unique Cuisine: ', len(lst_cuisine))
```

```
/usr/local/lib/python3.6/dist-packages/pandas/core/frame.py:4308:
SettingWithCopyWarning:


A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation:
https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

/usr/local/lib/python3.6/dist-packages/seaborn/_decorators.py:43:
FutureWarning:

Pass the following variable as a keyword arg: x. From version 0.12,
the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
```






```
# Unique Cuisine:  78
```

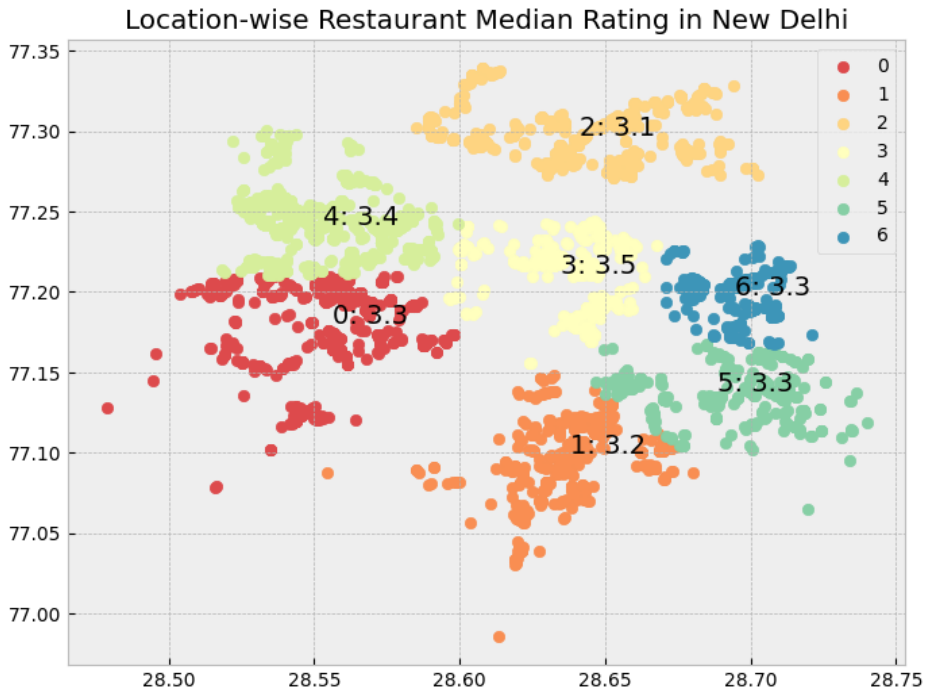
K-Means Clustering - Where are high rated restaurants located?

```
res_data['Rating category'] = res_data['Rating text'].map({'Not rated': -
1, 'Poor':0, 'Average':2, 'Good':3, 'Very Good':4, 'Excellent':5})
tmp = res_data['Aggregate rating'].map(np.round)
a = np.full(tmp.shape[0], False, dtype = bool)
((tmp - res_data['Rating category']).map(np.round)).value_counts()
sys_check = res_data[['Aggregate rating', 'Rating category', 'Votes']].copy
()
sys_check['distorted'] = (res_data['Aggregate rating'] - res_data['Rating c
ategory']).map(np.round)
sys_check['diff'] = sys_check['Aggregate rating'] - sys_check['Rating cate
gory']
res_data = res_data.loc[sys_check['distorted'] != 2, :]
res_data['Rating category'] = res_data['Aggregate rating'].round(0).astype
(int)
```

```
from sklearn.cluster import KMeans
kmeans = KMeans(n_clusters=7, random_state=0).fit(res_data[['Longitud
e', 'Latitude']])
res_data['pos'] = kmeans.labels_
```

```
pop_local = res_data.groupby('pos')['Longitude', 'Latitude', 'Aggregate rat
ing'].agg({'Longitude':np.mean, 'Latitude':np.mean, 'Aggregate rating':np.
median}).reset_index()

with plt.style.context('bmh', after_reset=True):
    pal = sns.color_palette('Spectral', 7)
    plt.figure(figsize = (8,6))
    for i in range(7):
        ix = res_data.pos == i
        plt.scatter(res_data.loc[ix, 'Latitude'], res_data.loc[ix, 'Longitude'], c
olor = pal[i], label = str(i))
        plt.text(pop_local.loc[i, 'Latitude'], pop_local.loc[i, 'Longitude'], str(
i) + ': '+str(pop_local.loc[i, 'Aggregate rating'].round(2)), fontsize = 14, c
olor = 'black')
    plt.title('Location-wise Restaurant Median Rating in New Delhi')
    plt.legend()
    plt.show()
```

```
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:4:
FutureWarning:

Indexing with multiple keys (implicitly converted to a tuple of
keys) will be deprecated, use a list instead.
```



Food Choices Dataset Analysis

food_data = pd.read_csv('/content/food_choices.csv')
food_data.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 125 entries, 0 to 124
Data columns (total 61 columns):
 #   Column                          Non-Null Count  Dtype  
---  ------                          --------------  -----  
 0   GPA                             123 non-null    object 
 1   Gender                          125 non-null    int64  
 2   breakfast                       125 non-null    int64  
 3   calories_chicken                125 non-null    int64  
 4   calories_day                    106 non-null    float64
 5   calories_scone                  124 non-null    float64
 6   coffee                          125 non-null    int64  
 7   comfort_food                    124 non-null    object 
 8   comfort_food_reasons            124 non-null    object 
 9   comfort_food_reasons_coded      106 non-null    float64
 10  cook                            122 non-null    float64
 11  comfort_food_reasons_coded.1    125 non-null    int64  
 12  cuisine                         108 non-null    float64
 13  diet_current                    124 non-null    object 
 14  diet_current_coded              125 non-null    int64  
 15  drink                           123 non-null    float64
 16  eating_changes                  122 non-null    object 
 17  eating_changes_coded            125 non-null    int64  
 18  eating_changes_coded1           125 non-null    int64  
 19  eating_out                      125 non-null    int64  
 20  employment                      116 non-null    float64
 21  ethnic_food                     125 non-null    int64  
 22  exercise                        112 non-null    float64
 23  father_education                124 non-null    float64
 24  father_profession               122 non-null    object 
 25  fav_cuisine                     123 non-null    object 
 26  fav_cuisine_coded               125 non-null    int64  
 27  fav_food                        123 non-null    float64
 28  food_childhood                  124 non-null    object 
 29  fries                           125 non-null    int64  
 30  fruit_day                       125 non-null    int64  
 31  grade_level                     125 non-null    int64  
 32  greek_food                      125 non-null    int64  
 33  healthy_feeling                 125 non-null    int64  
 34  healthy_meal                    124 non-null    object 
 35  ideal_diet                      124 non-null    object 
 36  ideal_diet_coded                125 non-null    int64  
 37  income                          124 non-null    float64
 38  indian_food                     125 non-null    int64  
 39  italian_food                    125 non-null    int64  
 40  life_rewarding                  124 non-null    float64
```

```
 41  marital_status                124 non-null    float64
 42  meals_dinner_friend           122 non-null    object
 43  mother_education              122 non-null    float64
 44  mother_profession             123 non-null    object
 45  nutritional_check             125 non-null    int64
 46  on_off_campus                 124 non-null    float64
 47  parents_cook                  125 non-null    int64
 48  pay_meal_out                  125 non-null    int64
 49  persian_food                  124 non-null    float64
 50  self_perception_weight        124 non-null    float64
 51  soup                          124 non-null    float64
 52  sports                        123 non-null    float64
 53  thai_food                     125 non-null    int64
 54  tortilla_calories             124 non-null    float64
 55  turkey_calories               125 non-null    int64
 56  type_sports                   104 non-null    object
 57  veggies_day                   125 non-null    int64
 58  vitamins                      125 non-null    int64
 59  waffle_calories               125 non-null    int64
 60  weight                        123 non-null    object
dtypes: float64(20), int64(27), object(14)
memory usage: 59.7+ KB
```

What are some comfort foods in various situations such as stress, boredom, hunger, happiness?

food_data[['comfort_food_reasons', 'comfort_food']]

	comfort_food_reasons	comfort_food
0	we dont have comfort	none
1	Stress, bored, anger	chocolate, chips, ice cream
2	stress, sadness	frozen yogurt, pizza, fast food
3	Boredom	Pizza, Mac and cheese, ice cream
4	Stress, boredom, cravings	Ice cream, chocolate, chips
...	...	...
120	boredom and sadness	wine. mac and cheese, pizza, ice cream

	comfort_food_reasons	comfort_food
121	Loneliness / Homesick / Sadness	Pizza / Wings / Cheesecake
122	sadness	rice, potato, seaweed soup
123	happiness, they are some of my favorite foods	Mac n Cheese, Lasagna, Pizza
124	hormones, Premenstrual syndrome.	Chocolates, pizza, and Ritz.

125 rows × 2 columns

```
def search_comfort(mood):
    lemmatizer = WordNetLemmatizer()
    foodcount = {}
    for i in range(124):
        temp = [temps.strip().replace('.','').replace(',','').lower() for temps in s
tr(food_data["comfort_food_reasons"][i]).split(' ') if temps.strip() not in s
top ]
        if mood in temp:
            foodtemp = [lemmatizer.lemmatize(temps.strip().replace('.','').repl
ace(',','').lower()) for temps in str(food_data["comfort_food"][i]).split(',') i
f temps.strip() not in stop ]
            for a in foodtemp:
                if a not in foodcount.keys():
                    foodcount[a] = 1
                else:
                    foodcount[a] += 1
    sorted_food = []
    sorted_food = sorted(foodcount, key=foodcount.get, reverse=True)
    return sorted_food


def find_my_comfort_food(mood):
    topn = []
    topn = search_comfort(mood) #function create dictionary only for parti
cular mood
    print("5 Popular Comfort Foods in %s are:"%(mood))
```

```
    for i in range(5):
      print(topn[i])
```

```
import nltk

nltk.download('wordnet')
find_my_comfort_food('happy')
```

```
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data]   Package wordnet is already up-to-date!
3 Popular Comfort Foods in happy are:
pizza
ice cream
chicken wings
pretzel
fruit snacks
```

###Suggesting Restaurants based on User Moods
Under Following Moods

* stress
* boredom
* depression/sadness
* hunger
* laziness
* cold weather
* happiness
* watching tv

Finding Restaurants based on cuisines

```
res_data[res_data.Cuisines.str.contains('pizza', case=False)].sort_values(by='Aggregate rating', ascending=False).head(5)
```

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	Latitude	Cuisines	Average Cost for two	Currency	Has Table booking	Has Online delivery	Is delivering now	Switch to order menu	Price range	Ag
3658	18400736	Owl is Well	1	New Delhi	Greater Kailash (GK) 1, New Delhi	Greater Kailash (GK) 1	Greater Kailash (GK) 1, New Delhi	77.240703	28.541636	Burger, American, Fast Food, Italian, Pizza	1000	Indian Rupees(Rs.)	No	Yes	No	No	3	
4665	18419910	Civil House	1	New Delhi	26, Khan Market, New Delhi	Khan Market	Khan Market, New Delhi	77.227358	28.600257	European, Continental, Pizza	1700	Indian Rupees(Rs.)	Yes	No	No	No	3	
6850	313269	Tossin Pizza	1	New Delhi	B-6/2, Safdarjung Enclave, Opposite Deer Park,...	Safdarjung	Safdarjung, New Delhi	77.195728	28.559335	Pizza, Italian	900	Indian Rupees(Rs.)	Yes	Yes	No	No	2	
3696	310776	Gastronomica Kitchen & Bar	1	New Delhi	2nd Floor, M-55, M Block Market, Greater Kaila...	Greater Kailash (GK) 1	Greater Kailash (GK) 1, New Delhi	77.235082	28.550351	European, Asian, North Indian, Italian, Contin...	1400	Indian Rupees(Rs.)	Yes	Yes	No	No	3	
3111	18294269	Smoke On Water	1	New Delhi	D-26, Connaught Place, New Delhi	Connaught Place	Connaught Place, New Delhi	77.221544	28.633643	Continental, Mexican, Burger, American, Pizza,...	1300	Indian Rupees(Rs.)	Yes	No	No	No	3	

5 RESULTS AND ANALYSIS

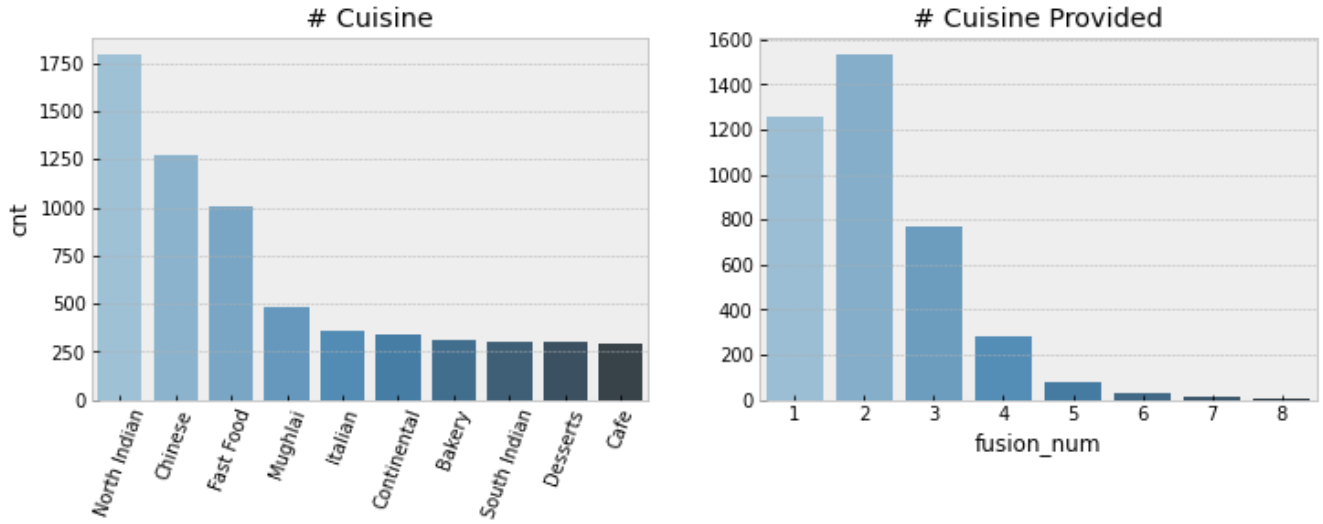


Figure 1: Famous Cuisines in New Delhi

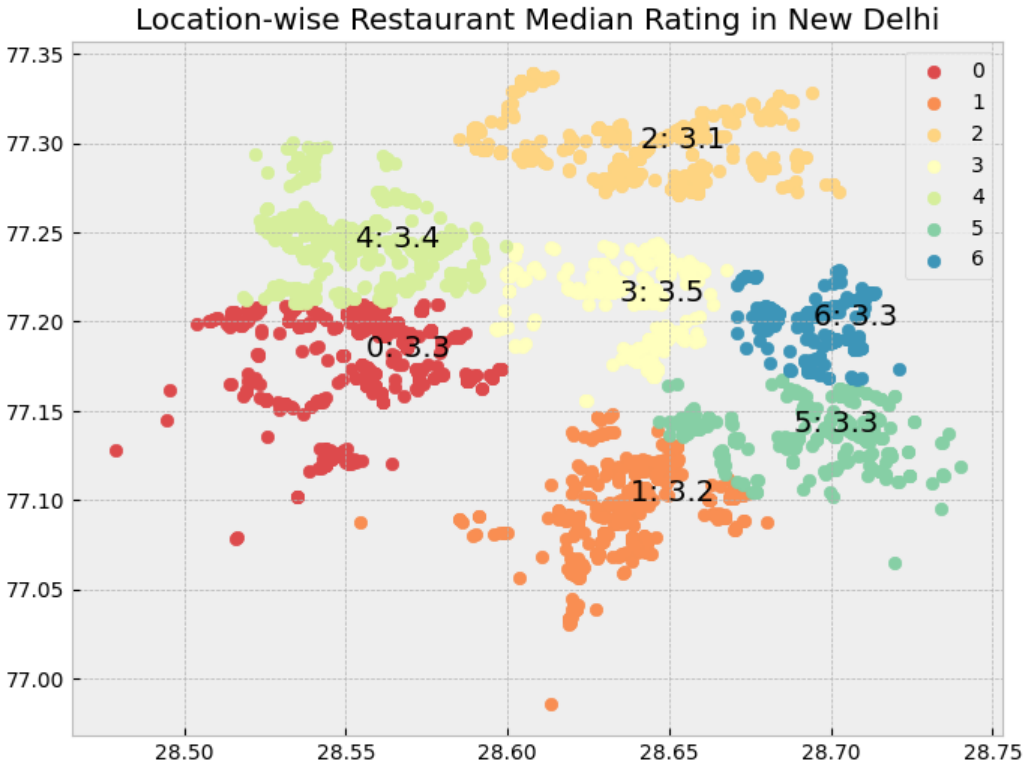


Figure 2: Location wise Restaurant Median Rating in New Delhi

	comfort_food_reasons	comfort_food
0	we dont have comfort	none
1	Stress, bored, anger	chocolate, chips, ice cream
2	stress, sadness	frozen yogurt, pizza, fast food
3	Boredom	Pizza, Mac and cheese, ice cream
4	Stress, boredom, cravings	Ice cream, chocolate, chips
...	...	...
120	boredom and sadness	wine. mac and cheese, pizza, ice cream
121	Loneliness / Homesick / Sadness	Pizza / Wings / Cheesecake
122	sadness	rice, potato, seaweed soup
123	happiness, they are some of my favorite foods	Mac n Cheese, Lasagna, Pizza
124	hormones, Premenstrual syndrome.	Chocolates, pizza, and Ritz.

125 rows × 2 columns

Figure 3: Comfort food and Comfort Food Reasons

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	Latitude	Cuisines	Average Cost for two	Currency	Has Table booking	Has Online delivery	Is delivering now
3658	18400736	Owl is Well	1	New Delhi	Greater Kailash (GK) 1, New Delhi	Greater Kailash (GK) 1	Greater Kailash (GK) 1, New Delhi	77.240703	28.541636	Burger, American, Fast Food, Italian, Pizza	1000	Indian Rupees(Rs.)	No	Yes	No
4665	18419910	Civil House	1	New Delhi	26, Khan Market, New Delhi	Khan Market	Khan Market, New Delhi	77.227358	28.600257	European, Continental, Pizza	1700	Indian Rupees(Rs.)	Yes	No	No
6850	313269	Tossin Pizza	1	New Delhi	B-6/2, Safdarjung Enclave, Opposite Deer Park,...	Safdarjung	Safdarjung, New Delhi	77.195728	28.559335	Pizza, Italian	900	Indian Rupees(Rs.)	Yes	Yes	No
3696	310776	Gastronomica Kitchen & Bar	1	New Delhi	2nd Floor, M-55, M Block Market, Greater Kaila...	Greater Kailash (GK) 1	Greater Kailash (GK) 1, New Delhi	77.235082	28.550351	European, Asian, North Indian, Italian, Contin...	1400	Indian Rupees(Rs.)	Yes	Yes	No
3111	18294269	Smoke On Water	1	New Delhi	D-26, Connaught Place, New Delhi	Connaught Place	Connaught Place, New Delhi	77.221544	28.633643	Continental, Mexican, Burger, American, Pizza,...	1300	Indian Rupees(Rs.)	Yes	No	No

Figure 4(A): Restaurants List

ıde	Latitude	Cuisines	Average Cost for two	Currency	Has Table booking	Has Online delivery	Is delivering now	Switch to order menu	Price range	Aggregate rating	Rating color	Rating text	Votes	Country	fusion_num	Rating category	pos
'03	28.541636	Burger, American, Fast Food, Italian, Pizza	1000	Indian Rupees(Rs.)	No	Yes	No	No	3	4.5	Dark Green	Excellent	162	India	5	4	4
58	28.600257	European, Continental, Pizza	1700	Indian Rupees(Rs.)	Yes	No	No	No	3	4.2	Green	Very Good	113	India	3	4	3
'28	28.559335	Pizza, Italian	900	Indian Rupees(Rs.)	Yes	Yes	No	No	2	4.1	Green	Very Good	647	India	2	4	0
82	28.550351	European, Asian, North Indian, Italian, Contin...	1400	Indian Rupees(Rs.)	Yes	Yes	No	No	3	4.1	Green	Very Good	826	India	6	4	4
44	28.633643	Continental, Mexican, Burger, American, Pizza,...	1300	Indian Rupees(Rs.)	Yes	No	No	No	3	4.1	Green	Very Good	467	India	6	4	3

Figure 4(B): Restaurants List

6 CONCLUSION AND FUTURE WORK

This project can be made into a fully functional website.

We can implement the following functionalities:

- Automatically detecting user location
- GUI input for user mood
- City/location input from user
- Enabling restaurant owners to add their restaurant to the list.

7 REFERENCES

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