Zomato Mumbai Data Analysis Project

Data Preprocessing & Exploratory Data Analysis

1. Import relevant Libraries

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sb
import plotly.express as px
import plotly.io as pio
pio.renderers.default = 'svg'
```

2. Data Collection

In [2]:
```
dataset_raw = pd.read_csv("Zomato_Mumbai_Dataset.csv", delimiter = '|')
```

In [83]:
```
dataset_raw.head()
```

Out[83]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYPE
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casual Dining	12noon to 130am	Excellent
1	Baba Falooda	400	Desserts,Ice Cream,Beverages	Mahim	Dessert Parlor	2pm to 1am	Very Good
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am	Very Good
3	Butterfly High	1000	Modern Indian	Bandra	Bar	12noon to 130am	Very Good
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra	Bar	1130am to 1am	Very Good

3. Basic Informations of Raw Dataset

In [4]:
```
dataset_raw.shape
```

Out[4]: (15081, 12)

In [5]:
```
dataset_raw.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15081 entries, 0 to 15080
Data columns (total 12 columns):
 #   Column           Non-Null Count  Dtype 
---  ------           --------------  ----- 
 0   NAME             15081 non-null  object
 1   PRICE            15080 non-null  object
 2   CUSINE_CATEGORY  15079 non-null  object
 3   CITY             15080 non-null  object
 4   REGION           15080 non-null  object
 5   URL              15080 non-null  object
 6   PAGE NO          15080 non-null  object
 7   CUSINE TYPE      15080 non-null  object
 8   TIMING           15015 non-null  object
 9   RATING_TYPE      14070 non-null  object
 10  RATING           15080 non-null  object
 11  VOTES            15080 non-null  object
dtypes: object(12)
memory usage: 1.4+ MB
```

In [6]:
```
dataset_raw.isnull().sum()
```

Out[6]:
```
NAME                0
PRICE               1
CUSINE_CATEGORY     2
CITY                1
REGION              1
URL                 1
PAGE NO             1
CUSINE TYPE         1
TIMING             66
RATING_TYPE      1011
RATING              1
VOTES               1
dtype: int64
```

In [7]:
```
dataset_raw.dtypes
```

Out[7]:
```
NAME             object
PRICE            object
CUSINE_CATEGORY  object
CITY             object
REGION           object
URL              object
PAGE NO          object
CUSINE TYPE      object
TIMING           object
RATING_TYPE      object
RATING           object
VOTES            object
dtype: object
```

In [8]:
```
dataset_raw.describe()
```

Out[8]:

	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	T
count	15081	15080	15079	15080	15080	15080	15080	15080	
unique	12720	67	3183	2	241	13823	944	23	
top	NAME	400	CUSINE_CATEGORY	Mumbai	REGION	URL	PAGE NO	Quick Bites	1 11pn
freq	942	2042	942	14138	942	942	942	5262	

Steps To be Followed before creating the Model

(i) Data Cleaning

Purpose:

To correct or remove inaccurate, corrupted, or incomplete data. It's a subset of data wrangling and preprocessing.

Task

- Handling missing values (imputation or removal)
- Removing duplicates
- Correcting data entry errors (e.g., typos, incorrect formatting)
- Handling outliers or inconsistent data
- Standardizing data (ensuring uniformity in text formats, units, etc.)

(ii) Data Wrangling

Purpose:

To transform raw data into a structured and usable format. It encompasses data cleaning and goes beyond it.

Task

- Data Cleaning (as part of wrangling)
- Merging or joining datasets
- Reshaping data (e.g., pivoting, unpivoting)
- Feature extraction (e.g., creating new variables from existing ones)
- Handling missing or incorrect data (e.g., imputation)
- Converting data types
- Filtering and sorting

(iii) Data Preprocessing

Purpose:

Preparing data for machine learning or statistical analysis. It typically happens after wrangling and focuses on making data ready for modeling.

Task

- Data Cleaning and Wrangling (as foundational steps)
- Normalization or standardization (scaling features)
- Encoding categorical variables (e.g., one-hot encoding, label encoding)
- Splitting datasets into training, validation, and test sets
- Handling imbalanced datasets (e.g., oversampling, undersampling)
- Feature selection or dimensionality reduction (e.g., PCA)

(iv) Exploratory Data Analysis

Purpose:

To summarize the main characteristics of the dataset and uncover patterns, relationships, and insights. This is an analysis phase where you understand the data.

Task

- Descriptive statistics (mean, median, mode, standard deviation)
- Visualization (e.g., histograms, box plots, scatter plots, bar charts)
- Identifying correlations between variables (e.g., using heatmaps)
- Checking for outliers or anomalies
- Distribution of variables
- Assessing relationships and interactions between variables

Short Summary

- Data Cleaning: Fixing incorrect or inc omplete data.
- Data Wrangling: Structuring and transforming raw data into a usable form (includes cleaning).
- Data Preprocessing: Preparing data for machine learning or statistical analysis (includes cleaning, scaling, encoding, etc.).
- Exploratory Data Analysis (EDA): Analyzing the data to discover patterns and insights through statistical summaries and visualizations.

Data Preproceing

4. Data Cleaning

4.1 Removal of redundant(unwanted) rows

In [9]:
```
wrong_data = dataset_raw['PAGE NO'] == 'PAGE NO'
dataset_raw[wrong_data]
```

Out[9]:

	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	F
15	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
31	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
47	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
63	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
79	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
...	...	...	...	...	...	...	...	...	...	
15000	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
15016	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
15032	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
15048	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	
15064	NAME	PRICE	CUSINE_CATEGORY	CITY	REGION	URL	PAGE NO	CUSINE TYPE	TIMING	

942 rows × 12 columns

In [10]:
```
# Performing Negation of the wrong dataset and then storing the correct data back i
# This permamnently remove the wrong data from the original dataframe
# Automatically it resets the index

dataset_raw = (dataset_raw[~wrong_data])
```

In [11]:
```
dataset_raw.shape       # (15081 rows - 942 rows)
```

Out[11]:
```
(14139, 12)
```

In [12]:
```
# Dropping columns which are not required for further analysis
dataset_raw.drop(['URL','PAGE NO','CITY'], axis = 1, inplace = True)
```

```
dataset_raw.head()
```

```
C:\Users\priya\AppData\Local\Temp\ipykernel_4260\1606638257.py:2: SettingWithCopyWar
ning:


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/u
ser_guide/indexing.html#returning-a-view-versus-a-copy
```

Out[12]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	First International Financial Centre--Bandra ...	Casual Dining	12noon to 130am(Mon-Sun)	Ex
1	Baba Falooda	400	Desserts,Ice Cream,Beverages	Mahim	Dessert Parlor	2pm to 1am(Mon-Sun)	Very
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am(Mon-Sun)	Very
3	Butterfly High	1000	Modern Indian	Bandra Kurla Complex	Bar	12noon to 130am(Mon-Sun)	Very
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra Kurla Complex	Bar	1130am to 1am(Mon-Sun)	Veŕmi

4.2 Removal of NULL records

In [13]:
```
# Checking for the NULL values

dataset_raw.isnull().sum()
```

Out[13]:
```
NAME                0
PRICE               1
CUSINE_CATEGORY     2
REGION              1
CUSINE TYPE         1
TIMING             66
RATING_TYPE      1011
RATING              1
VOTES               1
dtype: int64
```

In [14]:
```
dataset_raw[dataset_raw['PRICE'].isnull()]
```

Out[14]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYPE	RATII
15080	□	NaN	NaN	NaN	NaN	NaN	NaN	N

In [15]:
```
dataset_raw = dataset_raw.drop(labels=15080, axis = 0)
```

In [16]:
```
# Replacing the other NAN records with NA

dataset_raw.fillna('NA', inplace=True)
```

In [17]:
```
dataset_raw.isnull().sum()
```

Out[17]:
```
NAME              0
PRICE             0
CUSINE_CATEGORY   0
REGION            0
CUSINE TYPE       0
TIMING            0
RATING_TYPE       0
RATING            0
VOTES             0
dtype: int64
```

4.3 Converting the datatypes of Numaerical variables to Numeric datatypes

In [18]:
```
dataset_raw.dtypes

# Shows object datatype for numerical variables
# So we need to convert it from (object -> int/float)
```

Out[18]:
```
NAME              object
PRICE             object
CUSINE_CATEGORY   object
REGION            object
CUSINE TYPE       object
TIMING            object
RATING_TYPE       object
RATING            object
VOTES             object
dtype: object
```

In [19]:
```
# Checking for text values in the column before converting it to numeric datatype

dataset_raw['RATING'].value_counts()
```

Out[19]:
```
RATING
-          2360
3.5        1094
3.4        1036
3.6         960
NEW         953
3.3         926
3.7         917
3.2         801
3.8         782
3.1         734
3.0         622
3.9         596
2.9         409
4.0         408
2.8         309
4.1         298
4.2         199
2.7         170
4.3         148
4.4          99
2.6          77
Opening      57
4.5          46
2.5          39
4.6          32
2.4          26
4.7          13
2.3          10
2.1           5
2.2           4
4.8           4
4.9           2
1.8           1
2.0           1
Name: count, dtype: int64
```

In [20]:
```
# Replacing the text values with '0'

dataset_raw['RATING'].replace(to_replace=['-','NEW','Opening'], value = '0', inplac
```

```
C:\Users\priya\AppData\Local\Temp\ipykernel_4260\758529825.py:3: FutureWarning:

A value is trying to be set on a copy of a DataFrame or Series through chained assig
nment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because
the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method
({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform
the operation inplace on the original object.
```

In [21]:
```
dataset_raw['VOTES'].value_counts()
```

Out[21]:
```
VOTES
-       2360
NEW      953
4        364
5        320
6        288
        ...
1029       1
7350       1
964        1
585        1
1249       1
Name: count, Length: 1123, dtype: int64
```

In [22]:
```
dataset_raw['VOTES'].replace(to_replace=['-','NEW','Opening'], value = '0', inplace
```

```
C:\Users\priya\AppData\Local\Temp\ipykernel_4260\1830807789.py:1: FutureWarning:

A value is trying to be set on a copy of a DataFrame or Series through chained assig
nment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because
the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method
({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform
the operation inplace on the original object.
```

In [23]:
```
dataset_raw.dtypes
```

Out[23]:
```
NAME              object
PRICE             object
CUSINE_CATEGORY   object
REGION            object
CUSINE TYPE       object
TIMING            object
RATING_TYPE       object
RATING            object
VOTES             object
dtype: object
```

In [24]:
```
# Changing the datatype for Numerical columns

dataset_raw['PRICE'] = dataset_raw['PRICE'].astype('int64')
dataset_raw['RATING'] = dataset_raw['RATING'].astype('float64')
dataset_raw['VOTES'] = dataset_raw['VOTES'].astype('int64')
```

In [25]:
```
dataset_raw.dtypes
```

Out[25]:
```
NAME                object
PRICE                int64
CUSINE_CATEGORY     object
REGION              object
CUSINE TYPE         object
TIMING              object
RATING_TYPE         object
RATING             float64
VOTES                int64
dtype: object
```

In [26]:
```
dataset_raw.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 14138 entries, 0 to 15079
Data columns (total 9 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   NAME             14138 non-null  object 
 1   PRICE            14138 non-null  int64  
 2   CUSINE_CATEGORY  14138 non-null  object 
 3   REGION           14138 non-null  object 
 4   CUSINE TYPE      14138 non-null  object 
 5   TIMING           14138 non-null  object 
 6   RATING_TYPE      14138 non-null  object 
 7   RATING           14138 non-null  float64
 8   VOTES            14138 non-null  int64  
dtypes: float64(1), int64(2), object(6)
memory usage: 1.1+ MB
```

4.4 Working with 'TIMIMG' column

In [27]:
```
dataset_raw.head()
```

Out[27]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	First International Financial Centre--Bandra ...	Casual Dining	12noon to 130am(Mon-Sun)	Ex
1	Baba Falooda	400	Desserts,Ice Cream,Beverages	Mahim	Dessert Parlor	2pm to 1am(Mon-Sun)	Very
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am(Mon-Sun)	Very
3	Butterfly High	1000	Modern Indian	Bandra Kurla Complex	Bar	12noon to 130am(Mon-Sun)	Very
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra Kurla Complex	Bar	1130am to 1am(Mon-Sun)	Veŕmi

In [28]:
```
dataset_raw['TIMING'].value_counts()
```

Out[28]:
```
TIMING
11am to 11pm(Mon-Sun)                                1192
11am to 12midnight(Mon-Sun)                           632
12noon to 12midnight(Mon-Sun)                         467
11am to 1130pm(Mon-Sun)                               309
10am to 10pm(Mon-Sun)                                 267
                                                     ...
1130am to 4pm,630pm to 1230AM...                        1
12midnight to 5am,12noon to 12midnight(Mon-Sun)         1
12midnight to 1230AM,12noon to 4pm,7pm to ...           1
12noon to 330pm,630pm to 12midnight...                  1
8am to 11pm,12midnight to 115am(Mon-Sun)                1
Name: count, Length: 2551, dtype: int64
```

In [29]:
```
# Splitting the column and storing it in temp_df dataframe
# SYNTAX -> string.split(separator, maxsplit)
# Expand the split strings into separate columns.

temp_df = dataset_raw['TIMING'].str.split('(', n = 1, expand = True)
```

In [30]:
```
temp_df
```

Out[30]:

	0	1
0	12noon to 130am	Mon-Sun)
1	2pm to 1am	Mon-Sun)
2	12noon to 1am	Mon-Sun)
3	12noon to 130am	Mon-Sun)
4	1130am to 1am	Mon-Sun)
...	...	...
15075	8am to 11pm,12midnight to 115am	Mon-Sun)
15076	11am to 230am	Mon-Sun)
15077	11am to 11pm	Mon,Tue,Wed,Thu,Sun),11am to ...
15078	9am to 1230AM	Mon-Sun)
15079	12noon to 330pm,7pm to 1am	Mon-Sun)

14138 rows × 2 columns

In [31]:
```
# Assigning the columns back to the dataset_raw dataframe

dataset_raw['TIMING'] = temp_df[0]
dataset_raw['DAYS_OPEN'] = temp_df[1]
dataset_raw.head(5)
```

Out[31]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYP
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	First International Financial Centre--Bandra ...	Casual Dining	12noon to 130am	Excelle
1	Baba Falooda	400	Desserts,Ice Cream,Beverages	Mahim	Dessert Parlor	2pm to 1am	Very Goc
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am	Very Goc
3	Butterfly High	1000	Modern Indian	Bandra Kurla Complex	Bar	12noon to 130am	Very Goc
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra Kurla Complex	Bar	1130am to 1am	Veľmi dob

In [32]:
```
# Removing the bracket character from Days column
# regex = Determines if the passed-in pattern is a regular expression

dataset_raw['DAYS_OPEN'] = dataset_raw['DAYS_OPEN'].str.replace(")",'')
dataset_raw.head(5)
```

Out[32]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYP
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	First International Financial Centre--Bandra ...	Casual Dining	12noon to 130am	Excelle
1	Baba Falooda	400	Desserts,Ice Cream,Beverages	Mahim	Dessert Parlor	2pm to 1am	Very Goo
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am	Very Goo
3	Butterfly High	1000	Modern Indian	Bandra Kurla Complex	Bar	12noon to 130am	Very Goo
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra Kurla Complex	Bar	1130am to 1am	Veŕmi dob

In [33]:
```
dataset_raw.isnull().sum()
```

Out[33]:
```
NAME                0
PRICE               0
CUSINE_CATEGORY     0
REGION              0
CUSINE TYPE         0
TIMING              0
RATING_TYPE         0
RATING              0
VOTES               0
DAYS_OPEN         160
dtype: int64
```

In [34]:
```
dataset_raw['DAYS_OPEN'].value_counts()
```

Out[34]:
```
DAYS_OPEN
Mon-Sun                                12533
Mon-Sat,Closed(Sun                       170
Mon,11am to 11pm(Tue-Sun                  30
Mon,Wed,Thu,Fri,Sat,Sun...                26
Mon,Tue,Wed...                            25
                                         ...
Mon-Sat,130pm to 1045pm(Sun                1
Mon-Sat,1pm to ...                         1
Mon,11am to 4pm,7pm to ...                 1
Mon-Tue,1130am to 4pm,7pm to ...           1
Mon,1230pm...                              1
Name: count, Length: 720, dtype: int64
```

In [35]:
```
dataset_raw.fillna('NA',inplace=True)
```

In [36]:
```
dataset_raw.isnull().sum()
```

Out[36]:
```
NAME               0
PRICE              0
CUSINE_CATEGORY    0
REGION             0
CUSINE TYPE        0
TIMING             0
RATING_TYPE        0
RATING             0
VOTES              0
DAYS_OPEN          0
dtype: int64
```

In [37]:
```
dataset_raw.dtypes
```

Out[37]:
```
NAME               object
PRICE               int64
CUSINE_CATEGORY    object
REGION             object
CUSINE TYPE        object
TIMING             object
RATING_TYPE        object
RATING            float64
VOTES               int64
DAYS_OPEN          object
dtype: object
```

4.5 Removing the Restaurnt records whose Rating or Votes is 0

In [38]:
```
# Finding those restaurant whose has 0 Rating or Votes

unwanted_data = (dataset_raw['RATING'] == 0.0) | (dataset_raw['VOTES'] == 0)
dataset_raw[unwanted_data]
```

Out[38]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING
32	Hotel Annapoorna Refreshments	400	Maharashtrian,Mughlai,Chinese	Ghansoli	Quick Bites	1030am to 1230AM
34	Biryani 9	600	Biryani,North Indian	Near Andheri East Station	none	11am to 3am
36	D Fusion Flavours	350	Chinese	Goregaon East	none	12noon to 330pm,7pm to 3am
39	Nation Tadka	400	North Indian,South Indian,Chinese,Fast Food	Worli	none	12noon to 1230AM
83	Link Way Restaurant	500	North Indian,Chinese	Jogeshwari	Quick Bites	12noon to 4pm,8pm to 1am
...	...	...	...	...	...	...
14998	Foodies House	0	Chinese	Goregaon East	none	12noon to 4am
14999	Khansama	0	Biryani	Lower Parel	none	12noon to 3am
15010	Earth Cafe @ Waterfield	800	Cafe,Healthy Food,Italian,Pizza,Beverages	Linking Road--Bandra West	Café	10am to 10pm
15023	How About Some Cream	200	Beverages	Mumbai Central	Beverage Shop	12noon to 3am
15046	Food And Taste Theory	800	Continental,Italian	Phoenix Marketcity--Kurla	Casual Dining	9am to 12midnigh

3371 rows × 10 columns

In [39]:
```
dataset_raw = dataset_raw[~unwanted_data]
```

In [40]:
```
dataset_raw.shape
```

Out[40]:
```
(10767, 10)
```

In [41]:
```
dataset_raw['RATING'] == 0
```

Out[41]:
```
0        False
1        False
2        False
3        False
4        False
         ...
15075    False
15076    False
15077    False
15078    False
15079    False
Name: RATING, Length: 10767, dtype: bool
```

4.6 Working on 'RATING_TYPE' column

In [42]:
```
dataset_raw['RATING_TYPE'].value_counts()
```

Out[42]:
```
RATING_TYPE
Average          5111
Good             4330
Very Good        1137
Excellent          95
Poor               47
Veľmi dobré         6
Skvělá volba        4
Dobrze              4
Bardzo dobrze       3
Ortalama            2
Bueno               2
İyi                 2
Buono               2
Dobré               2
Bom                 2
Priemer             2
Průměr              2
Muito Bom           2
Promedio            2
Muy Bueno           1
Sangat Baik         1
Média               1
Biasa               1
Skvělé              1
Baik                1
Çok iyi             1
Excelente           1
Velmi dobré         1
Media               1
Name: count, dtype: int64
```

In [43]:
```
# Translating the texts into proper English text

dataset_raw['RATING_TYPE'].replace(to_replace='Excelente', value='Excellent', inpla
dataset_raw['RATING_TYPE'].replace(to_replace=['Veľmi dobré','Bardzo dobrze','Muy B
dataset_raw['RATING_TYPE'].replace(to_replace=['Skvělá volba','Dobrze','Bueno','Buo
dataset_raw['RATING_TYPE'].replace(to_replace=['Priemer','Média','Çok iyi'] , value
```

```
dataset_raw['RATING_TYPE'].replace(to_replace=['Průměr','Promedio','Ortalama','Muit
dataset_raw['RATING_TYPE'].replace(to_replace=['Baik','Biasa','Media','Sangat Baik'
```

```
C:\Users\priya\AppData\Local\Temp\ipykernel_4260\418158687.py:3: FutureWarning:

A value is trying to be set on a copy of a DataFrame or Series through chained assig
nment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because
the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method
({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform
the operation inplace on the original object.



C:\Users\priya\AppData\Local\Temp\ipykernel_4260\418158687.py:4: FutureWarning:

A value is trying to be set on a copy of a DataFrame or Series through chained assig
nment using an inplace method.
The behavior will change in pandas 3.0. This inplace method will never work because
the intermediate object on which we are setting values always behaves as a copy.

For example, when doing 'df[col].method(value, inplace=True)', try using 'df.method
({col: value}, inplace=True)' or df[col] = df[col].method(value) instead, to perform
the operation inplace on the original object.
```

In [44]:
```
dataset_raw['RATING_TYPE'].value_counts()
```

Out[44]:
```
RATING_TYPE
Average      5115
Good         4347
Very Good    1148
Excellent      96
Poor           57
Very Poor       4
Name: count, dtype: int64
```

4.7 Working with "REGION" column

In [45]:
```
dataset_raw['REGION'].value_counts()
```

Out[45]:
```
REGION
Mira Road                              405
Malad West                             308
Chembur                                277
Kharghar                               268
Borivali West                          264
                                      ...
Hotel Emerald-- Juhu                     1
Trident-- Bandra Kurla Complex           1
Sea Princess-- Juhu                      1
Aureole Hotel-- Andheri East             1
Hotel Satkar Residency-- Majiwada        1
Name: count, Length: 237, dtype: int64
```

In [46]:
```
# Removing the irrelevant text from the Region column
# regex = Determines if the passed-in pattern is a regular expression

dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('[a-zA-Z].+-- ','', regex
```

In [47]:
```
dataset_raw['REGION'].value_counts()
```

Out[47]:
```
REGION
Thane West           712
Mira Road            412
Andheri West         407
Malad West           316
Bandra West          282
                    ...
Andheri East           2
CBD Belapur            1
Girgaon Chowpatty      1
Goregaon               1
Dadar                  1
Name: count, Length: 120, dtype: int64
```

In [48]:
```
# Removing the West & East from the Region column

dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('West|west|East|east','',
```

In [49]:
```
dataset_raw['REGION'].value_counts()
```

Out[49]:
```
REGION
Thane                726
Mira Road            412
Andheri              409
Malad                378
Kandivali            377
                    ...
Kalyan                 2
Girgaon Chowpatty      1
CBD Belapur            1
Goregaon               1
Dadar                  1
Name: count, Length: 104, dtype: int64
```

In [50]:
```
# Replacing Small regions with Known region name

dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('4 Bungalows|7 Andheri|Az
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Bandra Kurla Complex','B
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('CBD-Belapur','CBD Belapu
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Girgaon Chowpatty','Chow
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Dadar Shivaji Park','Dad
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Flea Bazaar Café|Kamala
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Runwal Green','Mulund',r
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Mumbai CST Area','Mumbai
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Kopar Khairane|Seawoods|
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('New Panvel|Old Panvel','
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Kamothe','Sion',regex=Tr
dataset_raw['REGION'] = dataset_raw['REGION'].str.replace('Ghodbunder Road|Majiwada
```

In [51]:
```
dataset_raw['REGION'].value_counts()
```

Out[51]:
```
REGION
Thane          726
Mira Road      412
Andheri        409
Malad          378
Kandivali      377
              ...
Mulund           7
Gorai            7
Peddar Road      4
Kalyan           2
Goregaon         1
Name: count, Length: 89, dtype: int64
```

4.8 Removing Duplicate records

In [52]:
```
# Finding all the duplicate rows

dataset_raw[dataset_raw.duplicated()]
```

Out[52]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING
4064	Sai Sannidhi Restaurant & Bar	1000	North Indian,Konkan	Dahisar	Casual Dining	11am to 12midnight
4068	Konkan Katta	400	Seafood,Maharashtrian,Malwani	Mahakali	Quick Bites	11am to 330pm,630pm to 1130pm
4082	Usmaniya Hotel	600	Mughlai	Fort	Casual Dining	1030am to 1130pm
4083	Gina's Cakes	450	Bakery	Dombivali	none	11am to 11pm
4084	Konkanastha Lunch Home	400	Seafood,Malwani	Chakala	Casual Dining	12noon to 3pm,730pm to 1030pm
...	...	...	...	...	...	..
14200	Mezbaan Family Restaurant	350	Chinese,Mughlai	Mumbra	Dhaba	12noon to 1230AM
14204	Jyoti Lunch Home	650	Chinese,North Indian,Seafood,Mughlai	Mulund	Casual Dining	11am to 1230AM
14253	On Toes	900	Italian,North Indian,Chinese	Malad	Casual Dining	12noon to 3pm,7pm to 1230AM
14761	Frosty Farm	400	Ice Cream,Desserts,Fast Food	Malad	Dessert Parlor	1pm to 1215AM
14928	Shree Manu Sagar	300	North Indian,Chinese,Indian	Ghansoli	Quick Bites	1130am to 415pm,7pm to 1215AM

220 rows × 10 columns

In [53]:
```
# Removing all duplicated rows

dataset_raw = dataset_raw.drop_duplicates()
```

In [54]:
```
# Cross check for the duplicates

dataset_raw[dataset_raw.duplicated()]
```

Out[54]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYPE	RATING	V

5. Copying Cleaned data to new dataframe

In [55]:
```
Zomato_Mumbai = dataset_raw.copy()
```

In [56]:
```
Zomato_Mumbai.head(5)
```

Out[56]:

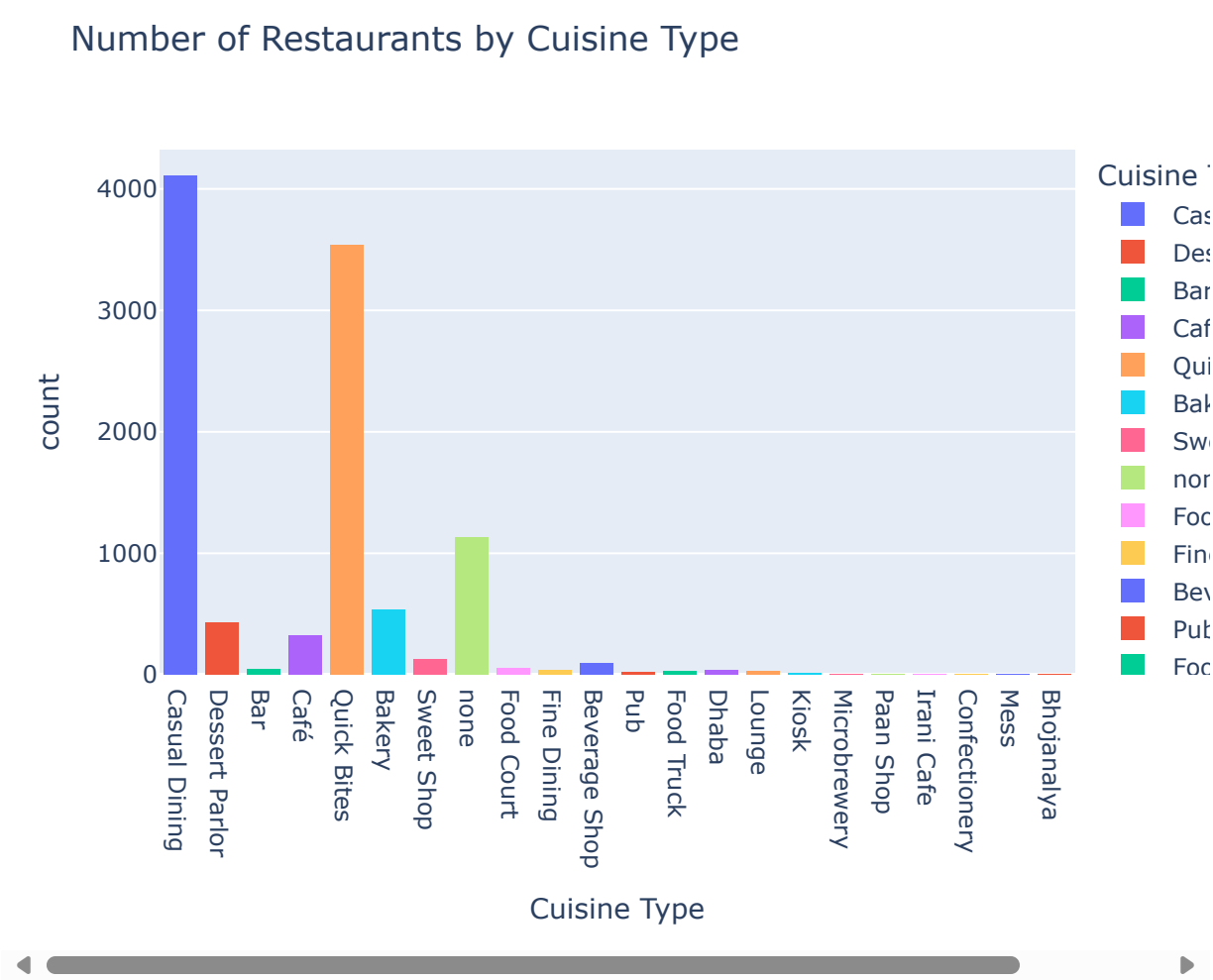
	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYPE
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casual Dining	12noon to 130am	Excellent
1	Baba Falooda	400	Desserts,Ice Cream,Beverages	Mahim	Dessert Parlor	2pm to 1am	Very Good
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am	Very Good
3	Butterfly High	1000	Modern Indian	Bandra	Bar	12noon to 130am	Very Good
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra	Bar	1130am to 1am	Very Good

6. Exploratory Data Analysis

Q1) How many restaurants are in Mumbai for each type of cuisine?

In [57]:
```
#!pip install plotly
#!pip install -U kaleido
```

In [58]:
```
fig = px.histogram(Zomato_Mumbai, x = 'CUSINE TYPE', color = 'CUSINE TYPE',
                   title = 'Number of Restaurants by Cuisine Type',
                   labels = {'CUSINE TYPE':'Cuisine Type'})
fig.show()
```



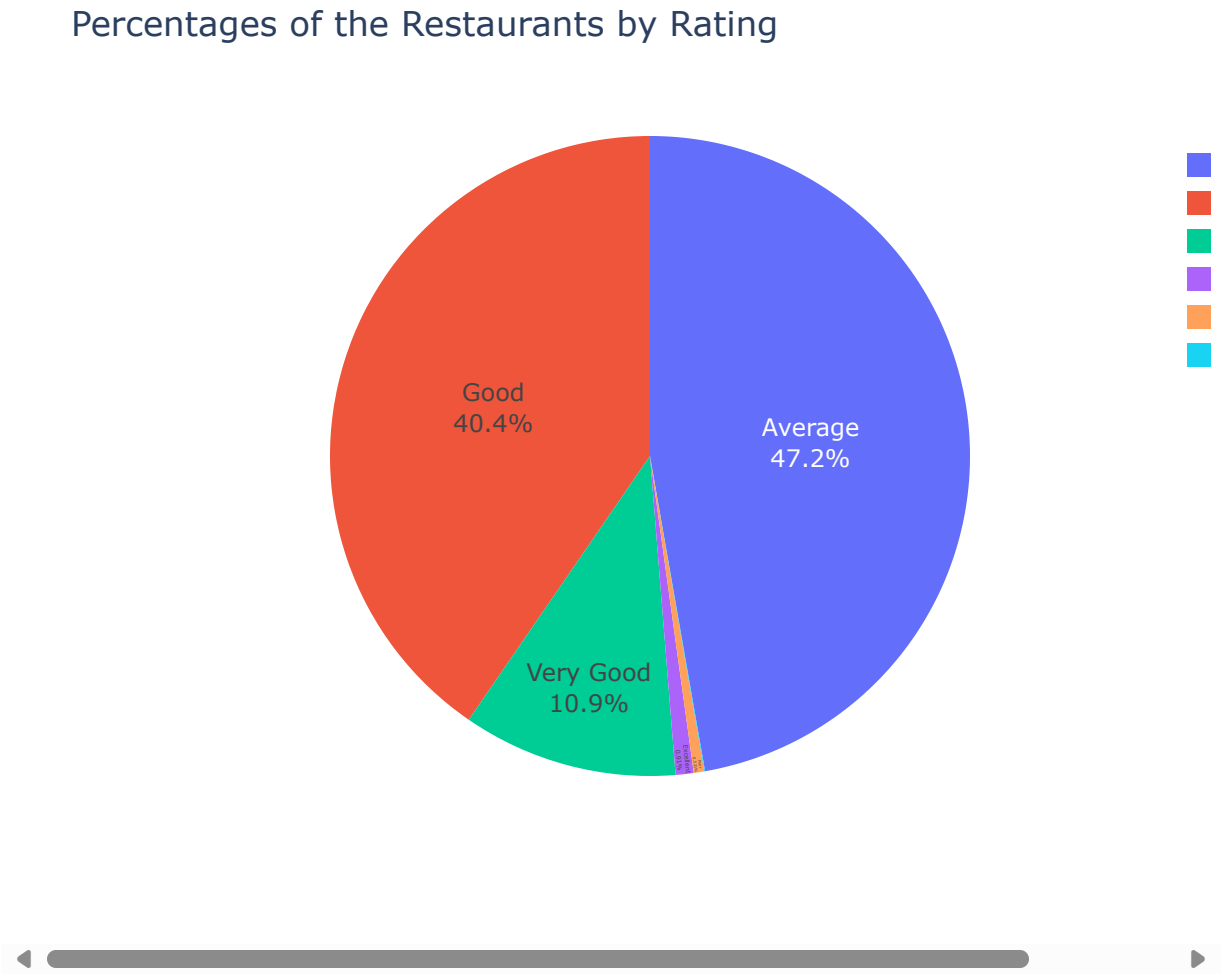
Q2) What are the percentage of restaurants by Rating Type in Mumbai?

In [59]:
```
rating_type_df = Zomato_Mumbai['RATING_TYPE'].value_counts().reset_index()
rating_type_df.rename(columns={'RATING_TYPE':'Rating_Types', 'count':'Count_of_Rest
rating_type_df
```

Out[59]:

	Rating_Types	Count_of_Restaurants
0	Average	4983
1	Good	4263
2	Very Good	1145
3	Excellent	96
4	Poor	56
5	Very Poor	4

In [60]:
```
fig = px.pie(rating_type_df, names='Rating_Types', values ='Count_of_Restaurants',
             title = 'Percentages of the Restaurants by Rating').update_traces(textp
fig.show()
```



Q3) Which are the Top 10 highest rated Seafood Restaurant in Mumbai?

In [61]:
```
seafood_df = Zomato_Mumbai[Zomato_Mumbai['CUSINE_CATEGORY'].str.contains('Seafood')
seafood_df.sort_values(by='RATING',ascending=False).head(10)
```

Out[61]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE
7104	Thangabali	1000	Seafood,South Indian,Mangalorean,Andhra,Kerala	Khar	Bar
76	Ceremonial Kitchen & Co	1000	Seafood,Maharashtrian,North Indian,Chinese	Thane	Casual Dining
13685	Maharashtra Lunch Home	600	Maharashtrian,Malwani,Konkan,Seafood	Kharghar	Casual Dining
12433	Quarter Canteen	1100	North Indian,Seafood,Chinese	Bandra	Casual Dining
902	The Harbour Bay - SeaFood Kitchen & Bar	2400	Seafood,Beverages	Bandra	Casual Dining
884	Rajmanya-Seafood family restaurant	800	Maharashtrian,Konkan,Seafood	Vashi	Casual Dining
3380	Peco Peco	700	Chinese,Seafood,Asian	Powai	none
9954	Pi Bar and Kitchen	1600	Continental,European,Italian,Seafood,Pizza,Des...	Andheri	Bar
903	Ferry Wharf	1500	Seafood,Mangalorean	Bandra	Casual Dining
915	Monis Bar and Restaurant	1000	North Indian,Chinese,Continental,Seafood,Bever...	Thane	Casual Dining

Q4) Which is the best Food Truck in Mumbai?

In [62]:
```
foodTruck_df = Zomato_Mumbai[Zomato_Mumbai['CUSINE TYPE'] == 'Food Truck']
foodTruck_df.sort_values(by='RATING', ascending=False).head(2)
```

Out[62]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYPE	RA
262	Dumpling Delights	200	Momos	Matunga	Food Truck	430pm to 930pm	Very Good	
1017	Street Food Co.	250	Fast Food,Chinese	Virar	Food Truck	6pm to 3am	Very Good	

Q5) Which places have the highest rated restaurant for each Cuisine Type in Mumbai?

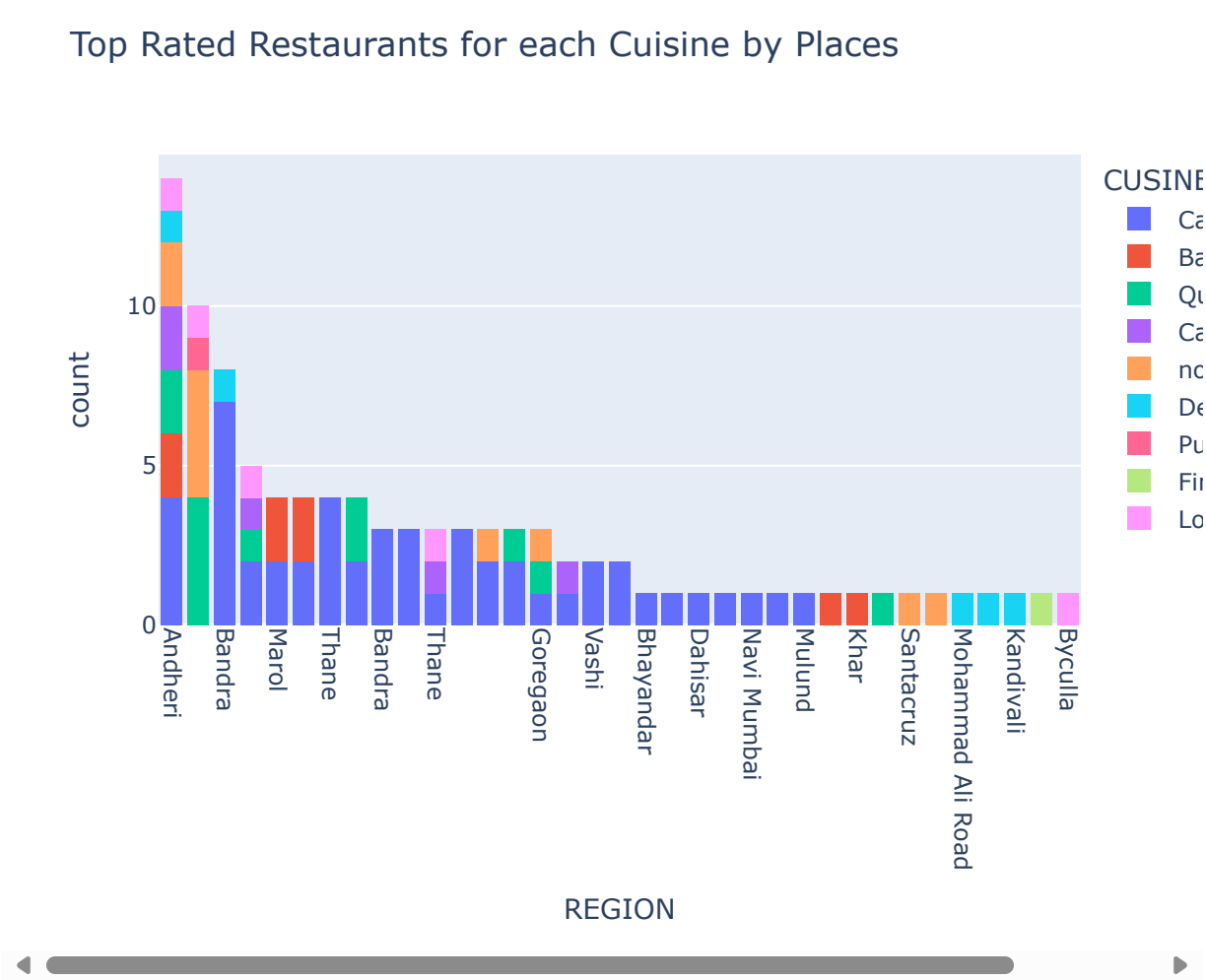
In [63]:
```
highest_rated_df = Zomato_Mumbai[Zomato_Mumbai['RATING'] >= 4.5]
highest_rated_df
```

Out[63]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMI
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casual Dining	12noor 130
6	Persian Darbar	1300	Biryani,North Indian,Chinese,Mughlai	Marol	Casual Dining	10am 3
7	Tanatan	1500	Modern Indian	Juhu	Casual Dining	12noor 130
9	Plum by Bent Chair	1800	Asian	Lower Parel	Casual Dining	12noor 1
10	Angrezi Dhaba	1500	North Indian,Chinese,Thai,European	Dadar	Bar	12noor 1
...	...	...	...	...	...	
14228	Zaika Crave - Club Aquaria	1300	North Indian,Continental,Chinese,Desserts	Borivali	Casual Dining	11am 330pm,7 to 1130
14234	Cone Culture	250	European	Kharghar	Casual Dining	Clo
15007	Dessertino	300	Desserts,Ice Cream	Kandivali	Dessert Parlor	11am 12midni
15051	Tick-eat	800	North Indian,Italian,Chinese,Mexican,Lebanese	Mulund	Casual Dining	1130am 330pm,7 to 1130
15056	Daftar Goregaon	750	Pizza,Chinese,North Indian,Beverages	Goregaon	Casual Dining	12noor 1130

97 rows × 10 columns

In [64]:
```
fig = px.histogram(highest_rated_df, x = 'REGION', color = 'CUSINE TYPE',
                   title = 'Top Rated Restaurants for each Cuisine by Places').upda
fig.show()
```



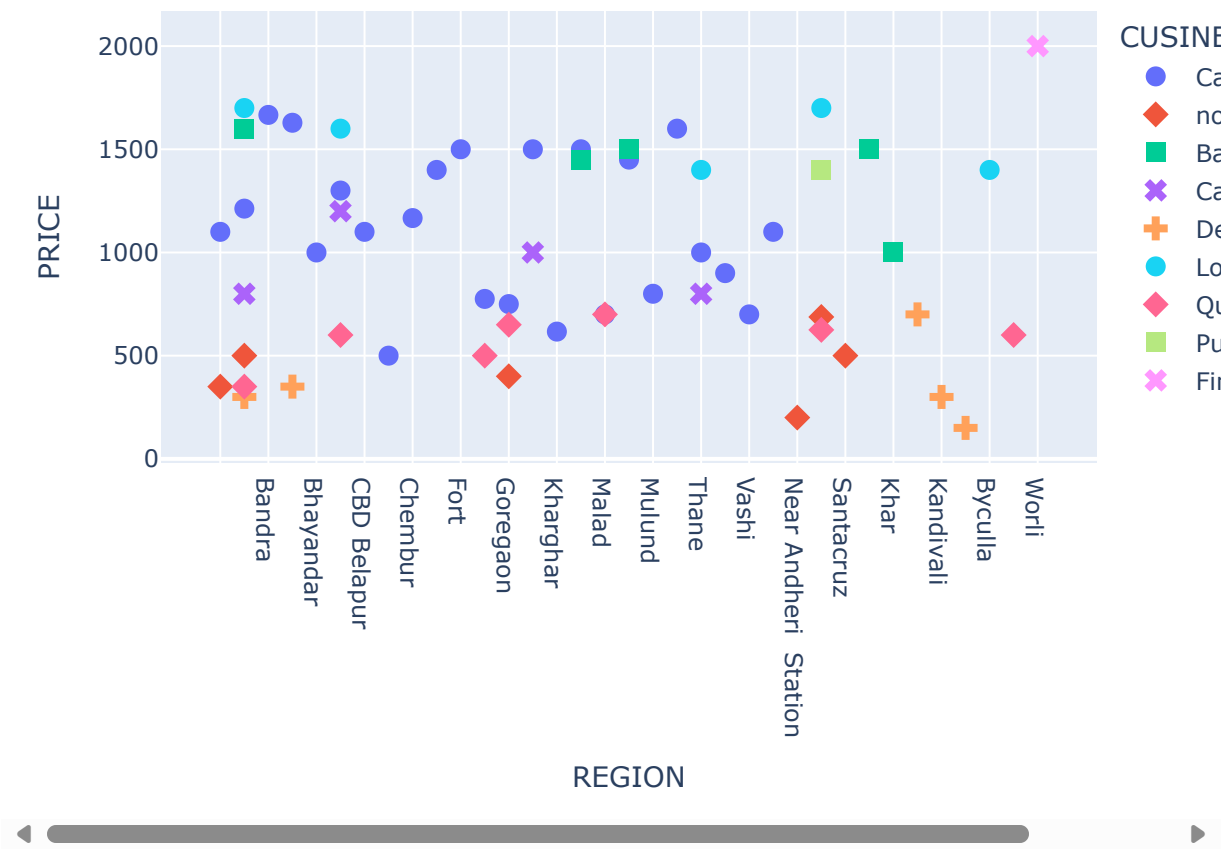
Q6) What is the Avg Price Distibution of highest rated restaurant for each Cuisine Type in Mumbai?

In [65]:
```
ave_price_df = highest_rated_df.groupby(by=['REGION','CUSINE TYPE'])['PRICE'].mean(
ave_price_df.head()
```

Out[65]:

	REGION	CUSINE TYPE	PRICE
0		Casual Dining	1100.0
1		none	350.0
2	Andheri	Bar	1600.0
3	Andheri	Café	800.0
4	Andheri	Casual Dining	1212.5

In [66]:
```
fig = px.scatter(ave_price_df, x = 'REGION', y = 'PRICE', color = 'CUSINE TYPE', sy
                 title = 'Average Price of Highest Restuarants by Cuisine Type').up
fig.show()
```



Q7) Which areas have a large number of Chinese Restaurant Market?

In [67]:
```
chinese_df = Zomato_Mumbai[Zomato_Mumbai['CUSINE_CATEGORY'].str.contains('Chinese')
chinese_df
```

Out[67]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	F
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casual Dining	12noon to 130am	
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am	
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra	Bar	1130am to 1am	
5	Flea Bazaar Café	800	American,Asian,Street Food,North Indian,Luckno...	Lower Parel	Café	12noon to 1am	
6	Persian Darbar	1300	Biryani,North Indian,Chinese,Mughlai	Marol	Casual Dining	10am to 3am	
...	...	...	...	...	...	...	
15071	Lucknow Zaika	500	North Indian,Chinese	Kurla	Quick Bites	12noon to 2am	
15072	Zuha's Kitchen	400	Chinese,North Indian,Mughlai	Mumbai Central	Quick Bites	12noon to 4pm,730pm to 430am	
15075	Tirupati Balaji	500	Chinese,Fast Food,North Indian	Andheri	Casual Dining	8am to 11pm,12midnight to 115am	
15076	Hari Om Snack Bar	350	Fast Food,South Indian,Chinese	Kandivali	Quick Bites	11am to 230am	
15079	Mandarin Panda	400	Desserts,Chinese,Thai	Malad	none	12noon to 330pm,7pm to 1am	

5119 rows × 10 columns

In [68]:
```
chinese_rest_df = chinese_df.groupby(by=['REGION']).agg({'NAME':'count', 'PRICE':'m
chinese_rest_df = chinese_rest_df.sort_values(by=['COUNT OF RESTAURANTS'],ascending
chinese_rest_df.head()
```

Out[68]:

	REGION	COUNT OF RESTAURANTS	AVERAGE PRICE
0	Thane	348	588.376437
1	Mira Road	224	553.348214
2	Malad	186	604.032258
3	Goregaon	162	545.987654
4	Dombivali	159	540.899371

In [69]:
```
fig = px.bar(chinese_rest_df, x='REGION', y='COUNT OF RESTAURANTS', color='AVERAGE
           title= 'Number of Chinese Restaurant by PLaces')
fig.show()
```

Q8) Is there a relation between Price and Rating by each Cuisine Type?

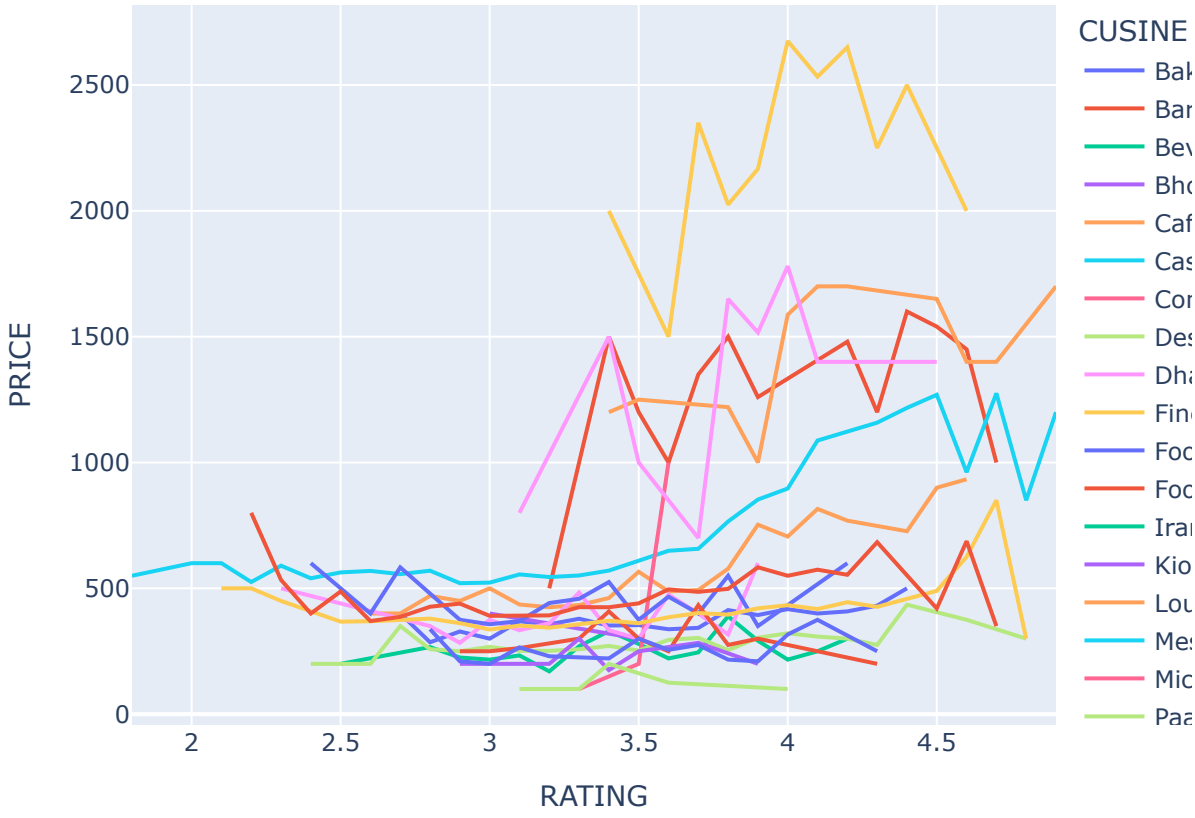
In [70]:
```
price_rating_df = Zomato_Mumbai.groupby(['CUSINE TYPE','RATING'])['PRICE'].mean().r
price_rating_df
```

Out[70]:

	CUSINE TYPE	RATING	PRICE
0	Bakery	2.7	400.000000
1	Bakery	2.8	285.714286
2	Bakery	2.9	328.571429
3	Bakery	3.0	300.000000
4	Bakery	3.1	369.117647
...	...	...	...
278	none	4.3	683.333333
279	none	4.4	555.000000
280	none	4.5	420.000000
281	none	4.6	687.500000
282	none	4.7	350.000000

283 rows × 3 columns

In [71]:
```
fig = px.line(price_rating_df, x = 'RATING', y = 'PRICE', color = 'CUSINE TYPE')
fig.show()
```



Q9) Is there a relation between Region and Price?

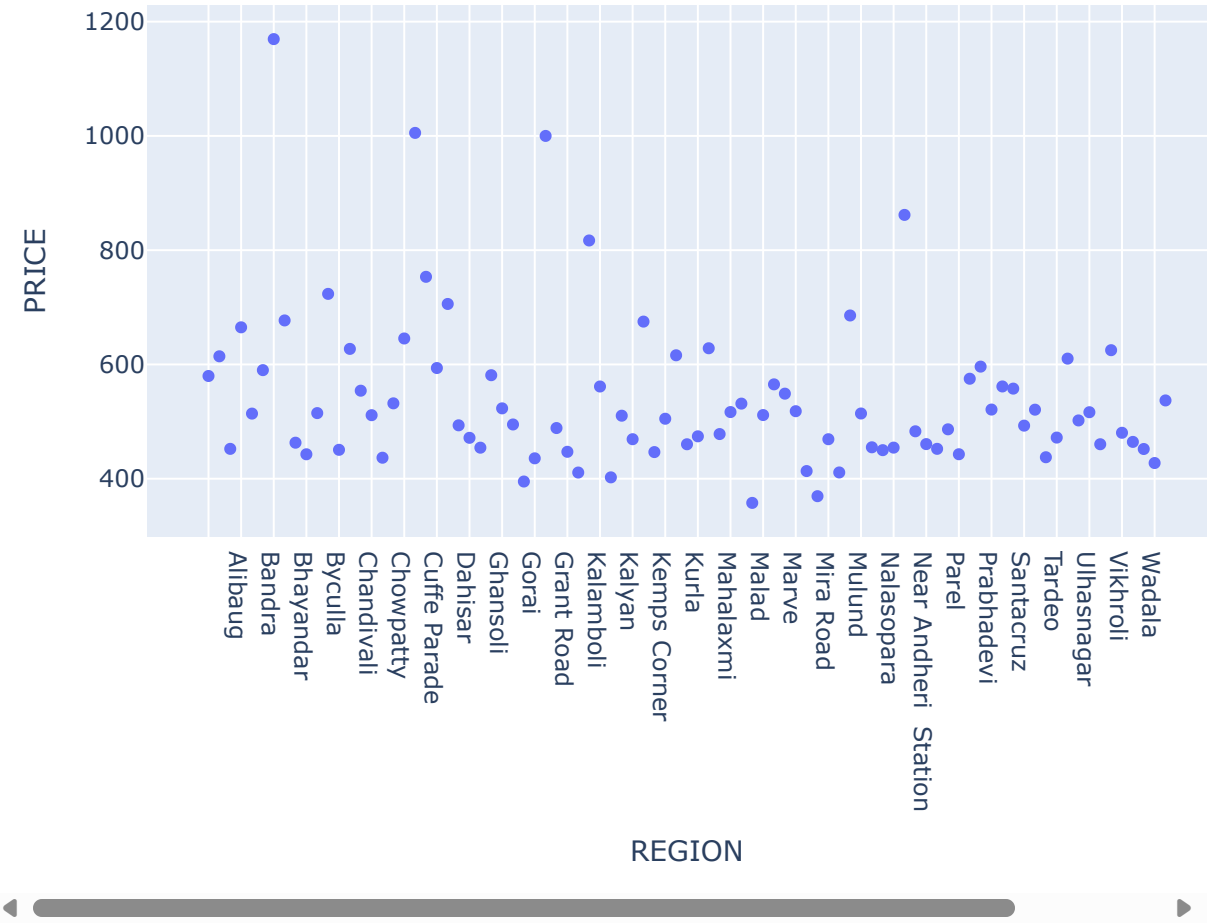
In [72]:
```
region_price_df = Zomato_Mumbai.groupby(['REGION'])['PRICE'].mean().reset_index()
region_price_df
```

Out[72]:

	REGION	PRICE
0		579.779412
1		614.285714
2	Airoli	452.287582
3	Alibaug	665.000000
4	Ambernath	514.000000
...	...	...
84	Vikhroli	480.434783
85	Vile Parle	464.457831
86	Virar	452.027027
87	Wadala	427.500000
88	Worli	537.012987

89 rows × 2 columns

In [73]:
```
fig = px.scatter(region_price_df, x = 'REGION', y = 'PRICE')
fig.show()
```



Q10) Find the list of Affordable Restaurants?

In [74]:
```
Zomato_Mumbai.head()
```

Out[74]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	TIMING	RATING_TYPE
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casual Dining	12noon to 130am	Excellent
1	Baba Falooda	400	Desserts,Ice Cream,Beverages	Mahim	Dessert Parlor	2pm to 1am	Very Good
2	Chin Chin Chu	1800	Asian,Chinese	Juhu	Casual Dining	12noon to 1am	Very Good
3	Butterfly High	1000	Modern Indian	Bandra	Bar	12noon to 130am	Very Good
4	BKC DIVE	1200	North Indian,Chinese,Continental	Bandra	Bar	1130am to 1am	Very Good

The criteria for Affordable Restaurants would be:-

1. Low Price
2. High Rated

- First step will find the restaurants with average cost 1/4th the average cost of most expensive restaurant in our dataframe.
- Let me explain:- The most expensive restaurant has an average meal cost= 6000.
- We'll try to stay economical and only pick the restaurants that are 1/4th of 6000.

In [75]:
```
max_price = Zomato_Mumbai['PRICE'].max()
max_price
```

Out[75]:
```
5000
```

In [76]:
```
oneFourth_price = max_price/4
oneFourth_price
```

Out[76]:
```
1250.0
```

In [77]:
```
low_price_df =  Zomato_Mumbai[['NAME', 'PRICE', 'CUSINE_CATEGORY', 'REGION', 'CUSIN
low_price_df = low_price_df[low_price_df['PRICE'] < 1250]
low_price_df.sort_values(by=['PRICE'],inplace = True)
low_price_df
```

Out[77]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSINE TYPE	RATING	VO
6137	Sanjog Wine N Dine	5	North Indian,Chinese	Thane	Casual Dining	3.5	
2925	Jab We Eat	50	South Indian,North Indian,Maharashtrian,Fast Food	Girgaum	none	3.3	
9598	Ho5 Store	50	Fast Food	Matunga	none	3.2	
9669	Himson Dryfruit & Sweets	100	Fast Food,Mithai	Vile Parle	Quick Bites	2.9	
3127	Tandoor Chai	100	Fast Food,Beverages,Tea	Kalyan	Quick Bites	3.4	
...	...	...	...	...	...	...	
1837	Chi Na Chi Ni	1200	Asian	Kharghar	Casual Dining	4.3	
14215	Reise All Day Bar & Kitchen	1200	Burger,American,Italian,North Indian,European,...	Chakala	Casual Dining	3.9	
14214	Wild Dining Restaurant	1200	North Indian,Continental,Mexican,Chinese	Andheri	Casual Dining	4.5	1
7105	Bayview Cafe	1200	North Indian,American,Chinese	Colaba	Casual Dining	3.9	1
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casual Dining	4.9	3

10187 rows × 7 columns

In [78]:
```
high_rated_df = Zomato_Mumbai[['NAME', 'PRICE', 'CUSINE_CATEGORY', 'REGION', 'CUSIN
high_rated_df = high_rated_df[high_rated_df['RATING'] > 4.5]
high_rated_df.sort_values(by='RATING',inplace=True)
high_rated_df
```

Out[78]:

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSIN TYI
1781	Yazu - Pan Asian Supper Club	1700	Thai,Korean,Japanese,Chinese	Andheri	Casu Dinir
1502	Cake Centre-The Dessert Maker	150	Desserts	Mohammad Ali Road	Desse Parl
1533	Fruitilicious	700	Desserts	Kalbadevi	Desse Parl
1786	Global Fusion	2000	Chinese,Japanese,Asian,North Indian	Worli	Fi Dinir
1796	TBG- The Biryani Guys	450	North Indian,Biryani	Powai	nor
1847	Regano's	600	Continental,Fast Food,Italian,Desserts	Malad	Casu Dinir
1968	Curry Culture	800	North Indian,Biryani,Chinese,Kebab,Mughlai,Asian	Powai	nor
2321	Lion Heart	1400	North Indian,Chinese,Italian,Finger Food,Asian...	Byculla	Loun
2573	Sam's Bohri Zaika	600	Bohri,North Indian,Mughlai,Kebab	Chandivali	Qui Bit
1251	Joey's Pizza	800	Pizza	Malad	Qui Bit
3026	Makhan Singh	800	North Indian,Chinese,Biryani	Powai	nor
3924	Smiley Pops	300	Desserts,Ice Cream,Beverages,Sandwich	Andheri	Desse Parl
8893	Coppetto Artisan Gelato	350	Ice Cream,Desserts	Bandra	Desse Parl
12094	Sandy's Den	1000	Fast Food,Bar Food	Chembur	Casu Dinir
12440	The Stables - Peninsula Redpine	1500	American,Italian,Mexican,Continental	Marol	B
12636	Khow Chow	1500	Asian	Bandra	Casu Dinir
13685	Maharashtra Lunch Home	600	Maharashtrian,Malwani,Konkan,Seafood	Kharghar	Casu Dinir

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSIN TYI
13859	Family Tree	800	Italian,Mexican,North Indian,Chinese,Salad	Thane	Casu Dinir
14234	Cone Culture	250	European	Kharghar	Casu Dinir
3757	B For Biryani	500	Biryani,North Indian,Kebab	Powai	Qui Bit
1177	Jazz & Blues	500	Cafe,Pizza,Italian	Andheri	Ca
15056	Daftar Goregaon	750	Pizza,Chinese,North Indian,Beverages	Goregaon	Casu Dinir
757	Cookstory	700	North Indian,Chinese,Mughlai	Andheri	nor
724	Maezo	1000	Modern Indian	Thane	Casu Dinir
12	Todi Mill Social	1400	American,North Indian,Chinese,Fast Food,Contin...	Lower Parel	B
588	Pepper Fry	800	Chinese,Italian,South Indian,North Indian	Thane	Casu Dinir
459	Royale Masterchef Finedine and Bar	1400	North Indian,Asian,Continental,Lebanese,Salad	Dahisar	Casu Dinir
369	Aquafire Restaurant	1100	North Indian,Continental,Chinese,Italian	Vile Parle	Casu Dinir
50	Spice Republic	1200	Cafe,Continental,Mediterranean,Mexican,Italian...	Borivali	Ca
59	Little West Pizza	600	Pizza	Borivali	Qui Bit
76	Ceremonial Kitchen & Co	1000	Seafood,Maharashtrian,North Indian,Chinese	Thane	Casu Dinir
1080	The Poshpit	1100	Cafe,Continental,Chinese,Mexican,Pizza,Salad,B...	Andheri	Ca
901	Big Bang Cuurry	350	North Indian,Biryani,Rolls		nor
7	Tanatan	1500	Modern Indian	Juhu	Casu Dinir
9	Plum by Bent Chair	1800	Asian	Lower Parel	Casu Dinir
8185	The Fusion Kitchen	1600	Chinese,Continental,European,North Indian,Ital...	Marol	Casu Dinir

	NAME	PRICE	CUSINE_CATEGORY	REGION	CUSIN TYI
7104	Thangabali	1000	Seafood,South Indian,Mangalorean,Andhra,Kerala	Khar	B
4099	Butter Chickenwala	1000	North Indian,Chinese,Biryani	Powai	Qui Bit
125	Too Much Drama	600	Fast Food,Roast Chicken,BBQ	Vashi	Casu Dini
3554	Smoke House Deli	1400	European,Italian,Salad,American,Burger,Juices,...	Bandra	Casu Dini
196	Culinary Tales	1200	Chinese,European,Continental,Salad,Italian,Pizza		Casu Dini
202	Dum & Curry	700	Mughlai,North Indian,Chinese	Powai	Qui Bit
626	Hotel Sagar	500	North Indian,Chinese,Beverages	Chakala	Casu Dini
824	Blend N Brew	1600	North Indian,Chinese,American	Navi Mumbai	Casu Dini
5156	Paps Premium Lounge	1400	North Indian,Mexican,Continental	Thane	Loun
149	The Northern Vibe	300	Momos,Rolls,Fast Food	Powai	Qui Bit
9778	Rajdhani	950	Gujarati,Rajasthani,North Indian	Ghatkopar	Casu Dini
66	Downtown China	750	Chinese,Thai	Andheri	Casu Dini
15007	Dessertino	300	Desserts,Ice Cream	Kandivali	Desse Parl
10669	Trumpet Sky Lounge	1700	North Indian,Chinese	Andheri	Loun
0	Hitchki	1200	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casu Dini

In [79]:
```
afford_rest_df = pd.merge(low_price_df, high_rated_df, how = 'inner', on=['NAME','R
afford_rest_df = afford_rest_df[['NAME', 'PRICE_x', 'RATING_x', 'CUSINE_CATEGORY_x'
afford_rest_df.rename(columns={'NAME':"NAME",'PRICE_x':'PRICE','RATING_x':'RATING',
                               'REGION':'REGION','CUSINE TYPE_x':'CUSINE TYPE','VOTE
```

Out[79]:

	NAME	PRICE	RATING	CUSINE_CATEGORY	REGION
0	Cake Centre-The Dessert Maker	150	4.6	Desserts	Mohammad Ali Road
1	Cone Culture	250	4.6	European	Kharghar
2	Smiley Pops	300	4.6	Desserts,Ice Cream,Beverages,Sandwich	Andheri
3	The Northern Vibe	300	4.8	Momos,Rolls,Fast Food	Powai
4	Dessertino	300	4.8	Desserts,Ice Cream	Kandivali
5	Big Bang Cuurry	350	4.7	North Indian,Biryani,Rolls	
6	Coppetto Artisan Gelato	350	4.6	Ice Cream,Desserts	Bandra
7	TBG- The Biryani Guys	450	4.6	North Indian,Biryani	Powai
8	Hotel Sagar	500	4.7	North Indian,Chinese,Beverages	Chakala
9	B For Biryani	500	4.6	Biryani,North Indian,Kebab	Powai
10	Jazz & Blues	500	4.6	Cafe,Pizza,Italian	Andheri
11	Too Much Drama	600	4.7	Fast Food,Roast Chicken,BBQ	Vashi
12	Little West Pizza	600	4.6	Pizza	Borivali
13	Regano's	600	4.6	Continental,Fast Food,Italian,Desserts	Malad
14	Maharashtra Lunch Home	600	4.6	Maharashtrian,Malwani,Konkan,Seafood	Kharghar
15	Sam's Bohri Zaika	600	4.6	Bohri,North Indian,Mughlai,Kebab	Chandivali
16	Dum & Curry	700	4.7	Mughlai,North Indian,Chinese	Powai
17	Cookstory	700	4.6	North Indian,Chinese,Mughlai	Andheri

	NAME	PRICE	RATING	CUSINE_CATEGORY	REGION
18	Fruitilicious	700	4.6	Desserts	Kalbadevi
19	Downtown China	750	4.8	Chinese,Thai	Andheri
20	Daftar Goregaon	750	4.6	Pizza,Chinese,North Indian,Beverages	Goregaon
21	Pepper Fry	800	4.6	Chinese,Italian,South Indian,North Indian	Thane
22	Family Tree	800	4.6	Italian,Mexican,North Indian,Chinese,Salad	Thane
23	Makhan Singh	800	4.6	North Indian,Chinese,Biryani	Powai
24	Curry Culture	800	4.6	North Indian,Biryani,Chinese,Kebab,Mughlai,Asian	Powai
25	Joey's Pizza	800	4.6	Pizza	Malad
26	Rajdhani	950	4.8	Gujarati,Rajasthani,North Indian	Ghatkopar
27	Maezo	1000	4.6	Modern Indian	Thane
28	Thangabali	1000	4.7	Seafood,South Indian,Mangalorean,Andhra,Kerala	Khar
29	Sandy's Den	1000	4.6	Fast Food,Bar Food	Chembur
30	Ceremonial Kitchen & Co	1000	4.6	Seafood,Maharashtrian,North Indian,Chinese	Thane
31	Butter Chickenwala	1000	4.7	North Indian,Chinese,Biryani	Powai
32	Aquafire Restaurant	1100	4.6	North Indian,Continental,Chinese,Italian	Vile Parle
33	The Poshpit	1100	4.6	Cafe,Continental,Chinese,Mexican,Pizza,Salad,B...	Andheri
34	Spice Republic	1200	4.6	Cafe,Continental,Mediterranean,Mexican,Italian...	Borivali
35	Culinary Tales	1200	4.7	Chinese,European,Continental,Salad,Italian,Pizza	
36	Hitchki	1200	4.9	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra

Q11) Find the list of most Reliable Restaurants?

The criteria for most Reliable Restaurants would be:-

1. Low Price
2. High Rated
3. Large No. of Votes

- First step will find the restaurants with Votes greater than the Mean of Votes

In [80]:
```
mean_vote = Zomato_Mumbai['VOTES'].mean()
mean_vote
```

Out[80]:
```
177.2656679624538
```

In [81]:
```
# Finding list of restaurants that have Votes greater than and equal to Mean of Vot

greater_votes_df = Zomato_Mumbai[['NAME', 'CUSINE_CATEGORY', 'REGION', 'CUSINE TYPE
greater_votes_df = greater_votes_df[greater_votes_df['VOTES'] > mean_vote]
greater_votes_df.sort_values(by='VOTES',inplace=True)
greater_votes_df
```

Out[81]:

	NAME	CUSINE_CATEGORY	REGION	CUSINE TYPE	PRICE
4194	Sai Sagar Veg Treat	North Indian,South Indian,Chinese,Fast Food,Be...	Kalyan	Casual Dining	500
884	Rajmanya-Seafood family restaurant	Maharashtrian,Konkan,Seafood	Vashi	Casual Dining	800
3914	Ice Cafe	Fast Food,Ice Cream,Beverages,Pizza	Borivali	Quick Bites	500
7897	Konkan Lajjatdar	Seafood,Biryani,Beverages,Chinese,Malwani,Konkan	Andheri	Casual Dining	500
3828	Frozen Delight - The Dessert Cafe	Desserts,Ice Cream	Airoli	Dessert Parlor	250
...	...	...	...	...	...
8539	Leopold Cafe & Bar	American,Chinese,Mughlai,Italian	Colaba	Casual Dining	1600
1251	Joey's Pizza	Pizza	Malad	Quick Bites	800
5337	Chili's American Grill & Bar	American,Mexican,Burger,Tex-Mex	Powai	Casual Dining	1400
3751	Prithvi Cafe	Cafe,Fast Food	Juhu	Café	700
8897	Candies	Cafe,Italian,North Indian,Desserts	Bandra	Café	700

2345 rows × 7 columns

These are the most reliable, highest rated and affordable restaurants:-

- We obtain this dataframe by simply taking the intersection of afford_rest_df & greater_votes_df
- This dataframe obtained below shows the restaurants whose:
- Cost is below **1250**
- Rating is above **4.5**
- Votes are above **177**

In [82]:
```
reliable_rest_df = pd.merge(afford_rest_df,greater_votes_df, how = 'inner', on = ['
reliable_rest_df = reliable_rest_df[['NAME','CUSINE_CATEGORY_x', 'REGION', 'CUSINE
reliable_rest_df.rename(columns={'NAME':"NAME",'CUSINE_CATEGORY_x':'CUSINE_CATEGORY
                                 'CUSINE TYPE_x':'CUSINE TYPE','PRICE_x':'PRICE','RATI
reliable_rest_df
```

Out[82]:

	NAME	CUSINE_CATEGORY	REGION	CUSINE TYPE	PRICE	R
0	Cone Culture	European	Kharghar	Casual Dining	250	
1	Dessertino	Desserts,Ice Cream	Kandivali	Dessert Parlor	300	
2	Big Bang Cuurry	North Indian,Biryani,Rolls		none	350	
3	Coppetto Artisan Gelato	Ice Cream,Desserts	Bandra	Dessert Parlor	350	
4	Little West Pizza	Pizza	Borivali	Quick Bites	600	
5	Regano's	Continental,Fast Food,Italian,Desserts	Malad	Casual Dining	600	
6	Maharashtra Lunch Home	Maharashtrian,Malwani,Konkan,Seafood	Kharghar	Casual Dining	600	
7	Dum & Curry	Mughlai,North Indian,Chinese	Powai	Quick Bites	700	
8	Daftar Goregaon	Pizza,Chinese,North Indian,Beverages	Goregaon	Casual Dining	750	
9	Family Tree	Italian,Mexican,North Indian,Chinese,Salad	Thane	Casual Dining	800	
10	Makhan Singh	North Indian,Chinese,Biryani	Powai	none	800	
11	Curry Culture	North Indian,Biryani,Chinese,Kebab,Mughlai,Asian	Powai	none	800	
12	Joey's Pizza	Pizza	Malad	Quick Bites	800	
13	Rajdhani	Gujarati,Rajasthani,North Indian	Ghatkopar	Casual Dining	950	
14	Maezo	Modern Indian	Thane	Casual Dining	1000	
15	Thangabali	Seafood,South Indian,Mangalorean,Andhra,Kerala	Khar	Bar	1000	
16	Sandy's Den	Fast Food,Bar Food	Chembur	Casual Dining	1000	
17	Ceremonial Kitchen & Co	Seafood,Maharashtrian,North Indian,Chinese	Thane	Casual Dining	1000	

	NAME	CUSINE_CATEGORY	REGION	CUSINE TYPE	PRICE	R
18	Aquafire Restaurant	North Indian,Continental,Chinese,Italian	Vile Parle	Casual Dining	1100	
19	Spice Republic	Cafe,Continental,Mediterranean,Mexican,Italian...	Borivali	Café	1200	
20	Culinary Tales	Chinese,European,Continental,Salad,Italian,Pizza		Casual Dining	1200	
21	Hitchki	Modern Indian,North Indian,Chinese,Momos,Birya...	Bandra	Casual Dining	1200	

In [ ]: