RESTAURANT ANALYSIS

In [1]:
```python
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:
```python
df = pd.read_csv(r'D:\NAYAN_DS\DATA_SCIENCE\INTERNSHIP\Cognifyz\Dataset.csv')
```

Data Understanding (EDA) + Data Preprocessing (Data Cleaning)

In [4]:
```python
df.head(2)
```

Out[4]:

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	Latitude	Cuisines	...
0	6317637	Le Petit Souffle	162	Makati City	Third Floor, Century City Mall, Kalayaan Avenu...	Century City Mall, Poblacion, Makati City	Century City Mall, Poblacion, Makati City, Mak...	121.027535	14.565443	French, Japanese, Desserts	...
1	6304287	Izakaya Kikufuji	162	Makati City	Little Tokyo, 2277 Chino Roces Avenue, Legaspi...	Little Tokyo, Legaspi Village, Makati City	Little Tokyo, Legaspi Village, Makati City, Ma...	121.014101	14.553708	Japanese	...

2 rows × 21 columns

In [5]:
```python
df.tail(2)
```

Out[5]:

	Restaurant ID	Restaurant Name	Country Code	City	Address	Locality	Locality Verbose	Longitude	
9549	5916112	A���k Kahve	208	��stanbul	Kuru�_e��me Mahallesi, Muallim Naci Caddesi, N...	Kuru�_e��me	Kuru�_e��me, ��stanbul	29.036019	4
9550	5927402	Walter's Coffee Roastery	208	��stanbul	Cafea��a Mahallesi, Bademalt\ Sokak, No 21/B, ...	Moda	Moda, ��stanbul	29.026016	4

2 rows × 21 columns

In [6]:
```
df.columns
```

Out[6]:
```
Index(['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', 'Aggregate rating', 'Rating color', 'Rating text',
       'Votes'],
      dtype='object')
```

In [7]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9551 entries, 0 to 9550
Data columns (total 21 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   Restaurant ID         9551 non-null   int64  
 1   Restaurant Name       9551 non-null   object 
 2   Country Code          9551 non-null   int64  
 3   City                  9551 non-null   object 
 4   Address               9551 non-null   object 
 5   Locality              9551 non-null   object 
 6   Locality Verbose      9551 non-null   object 
 7   Longitude             9551 non-null   float64
 8   Latitude              9551 non-null   float64
 9   Cuisines              9542 non-null   object 
 10  Average Cost for two  9551 non-null   int64  
 11  Currency              9551 non-null   object 
 12  Has Table booking     9551 non-null   object 
 13  Has Online delivery   9551 non-null   object 
 14  Is delivering now     9551 non-null   object 
 15  Switch to order menu  9551 non-null   object 
 16  Price range           9551 non-null   int64  
 17  Aggregate rating      9551 non-null   float64
 18  Rating color          9551 non-null   object 
 19  Rating text           9551 non-null   object 
 20  Votes                 9551 non-null   int64  
dtypes: float64(3), int64(5), object(13)
memory usage: 1.5+ MB
```

In [8]:
```
df.shape
```

Out[8]:
```
(9551, 21)
```

In [9]:
```
continuous = ['Restaurant ID', 'Country Code', 'Longitude', 'Latitude',
              'Average Cost for two', 'Aggregate rating', 'Votes']

discrete_categorical = ['Restaurant Name', 'City', 'Address', 'Locality',
                        'Locality Verbose', 'Cuisines', 'Currency',
                        'Has Table booking', 'Has Online delivery',
                        'Is delivering now', 'Switch to order menu',
                        'Rating color', 'Rating text']

discrete_count = ['Price range']
```

In [10]:
```
df['Price range'].unique()
```

Out[10]:
```
array([3, 4, 2, 1], dtype=int64)
```

In [11]:
```
df.duplicated().sum()
```

Out[11]:
```
0
```

In [12]:
```
df['Restaurant Name'].unique()
```

Out[12]:
```
array(['Le Petit Souffle', 'Izakaya Kikufuji', 'Heat - Edsa Shangri-La',
       ..., 'Huqqa', 'A����k Kahve', "Walter's Coffee Roastery"],
      dtype=object)
```

In [13]:
```
df['Restaurant Name'] = df['Restaurant Name'].str.replace('�', '')
df['Restaurant Name']
```

```
Out[13]: 0                Le Petit Souffle
         1                Izakaya Kikufuji
         2          Heat - Edsa Shangri-La
         3                            Ooma
         4                     Sambo Kojin
                           ...
         9546                  Namlʾ Gurme
         9547                   Ceviz Aacʾ
         9548                        Huqqa
         9549                     Ak Kahve
         9550    Walter's Coffee Roastery
         Name: Restaurant Name, Length: 9551, dtype: object
```

```
In [14]: df['Restaurant Name'].unique()
```

```
Out[14]: array(['Le Petit Souffle', 'Izakaya Kikufuji', 'Heat - Edsa Shangri-La',
                ..., 'Huqqa', 'Ak Kahve', "Walter's Coffee Roastery"], dtype=object)
```

```
In [15]: df['City'].unique()
```

```
Out[15]: array(['Makati City', 'Mandaluyong City', 'Pasay City', 'Pasig City',
                'Quezon City', 'San Juan City', 'Santa Rosa', 'Tagaytay City',
                'Taguig City', 'Bras�_lia', 'Rio de Janeiro', 'S��o Paulo',
                'Albany', 'Armidale', 'Athens', 'Augusta', 'Balingup',
                'Beechworth', 'Boise', 'Cedar Rapids/Iowa City', 'Chatham-Kent',
                'Clatskanie', 'Cochrane', 'Columbus', 'Consort', 'Dalton',
                'Davenport', 'Des Moines', 'Dicky Beach', 'Dubuque',
                'East Ballina', 'Fernley', 'Flaxton', 'Forrest', 'Gainesville',
                'Hepburn Springs', 'Huskisson', 'Inverloch', 'Lakes Entrance',
                'Lakeview', 'Lincoln', 'Lorn', 'Macedon', 'Macon', 'Mayfield',
                'Mc Millan', 'Middleton Beach', 'Miller', 'Monroe', 'Montville',
                'Ojo Caliente', 'Orlando', 'Palm Cove', 'Paynesville', 'Penola',
                'Pensacola', 'Phillip Island', 'Pocatello', 'Potrero', 'Princeton',
                'Rest of Hawaii', 'Savannah', 'Singapore', 'Sioux City',
                'Tampa Bay', 'Tanunda', 'Trentham East', 'Valdosta', 'Vernonia',
                'Victor Harbor', 'Vineland Station', 'Waterloo', 'Weirton',
                'Winchester Bay', 'Yorkton', 'Abu Dhabi', 'Dubai', 'Sharjah',
                'Agra', 'Ahmedabad', 'Allahabad', 'Amritsar', 'Aurangabad',
                'Bangalore', 'Bhopal', 'Bhubaneshwar', 'Chandigarh', 'Chennai',
                'Coimbatore', 'Dehradun', 'Faridabad', 'Ghaziabad', 'Goa',
                'Gurgaon', 'Guwahati', 'Hyderabad', 'Indore', 'Jaipur', 'Kanpur',
                'Kochi', 'Kolkata', 'Lucknow', 'Ludhiana', 'Mangalore', 'Mohali',
                'Mumbai', 'Mysore', 'Nagpur', 'Nashik', 'New Delhi', 'Noida',
                'Panchkula', 'Patna', 'Puducherry', 'Pune', 'Ranchi',
                'Secunderabad', 'Surat', 'Vadodara', 'Varanasi', 'Vizag',
                'Bandung', 'Bogor', 'Jakarta', 'Tangerang', 'Auckland',
                'Wellington City', 'Birmingham', 'Edinburgh', 'London',
                'Manchester', 'Doha', 'Cape Town', 'Inner City', 'Johannesburg',
                'Pretoria', 'Randburg', 'Sandton', 'Colombo', 'Ankara',
                '��stanbul'], dtype=object)
```

```
In [16]: df['City'] = df['City'].str.replace('�', '')
         df['City']
```

```
Out[16]: 0            Makati City
         1            Makati City
         2       Mandaluyong City
         3       Mandaluyong City
         4       Mandaluyong City
                       ...
         9546            stanbul
         9547            stanbul
         9548            stanbul
         9549            stanbul
         9550            stanbul
         Name: City, Length: 9551, dtype: object
```

```
In [17]: df['City'].unique()
```

```
Out[17]: array(['Makati City', 'Mandaluyong City', 'Pasay City', 'Pasig City',
                'Quezon City', 'San Juan City', 'Santa Rosa', 'Tagaytay City',
                'Taguig City', 'Bras_lia', 'Rio de Janeiro', 'So Paulo', 'Albany',
                'Armidale', 'Athens', 'Augusta', 'Balingup', 'Beechworth', 'Boise',
                'Cedar Rapids/Iowa City', 'Chatham-Kent', 'Clatskanie', 'Cochrane',
                'Columbus', 'Consort', 'Dalton', 'Davenport', 'Des Moines',
                'Dicky Beach', 'Dubuque', 'East Ballina', 'Fernley', 'Flaxton',
                'Forrest', 'Gainesville', 'Hepburn Springs', 'Huskisson',
                'Inverloch', 'Lakes Entrance', 'Lakeview', 'Lincoln', 'Lorn',
                'Macedon', 'Macon', 'Mayfield', 'Mc Millan', 'Middleton Beach',
                'Miller', 'Monroe', 'Montville', 'Ojo Caliente', 'Orlando',
                'Palm Cove', 'Paynesville', 'Penola', 'Pensacola',
                'Phillip Island', 'Pocatello', 'Potrero', 'Princeton',
                'Rest of Hawaii', 'Savannah', 'Singapore', 'Sioux City',
                'Tampa Bay', 'Tanunda', 'Trentham East', 'Valdosta', 'Vernonia',
                'Victor Harbor', 'Vineland Station', 'Waterloo', 'Weirton',
                'Winchester Bay', 'Yorkton', 'Abu Dhabi', 'Dubai', 'Sharjah',
                'Agra', 'Ahmedabad', 'Allahabad', 'Amritsar', 'Aurangabad',
                'Bangalore', 'Bhopal', 'Bhubaneshwar', 'Chandigarh', 'Chennai',
                'Coimbatore', 'Dehradun', 'Faridabad', 'Ghaziabad', 'Goa',
                'Gurgaon', 'Guwahati', 'Hyderabad', 'Indore', 'Jaipur', 'Kanpur',
                'Kochi', 'Kolkata', 'Lucknow', 'Ludhiana', 'Mangalore', 'Mohali',
                'Mumbai', 'Mysore', 'Nagpur', 'Nashik', 'New Delhi', 'Noida',
                'Panchkula', 'Patna', 'Puducherry', 'Pune', 'Ranchi',
                'Secunderabad', 'Surat', 'Vadodara', 'Varanasi', 'Vizag',
                'Bandung', 'Bogor', 'Jakarta', 'Tangerang', 'Auckland',
                'Wellington City', 'Birmingham', 'Edinburgh', 'London',
                'Manchester', 'Doha', 'Cape Town', 'Inner City', 'Johannesburg',
                'Pretoria', 'Randburg', 'Sandton', 'Colombo', 'Ankara', 'stanbul'],
               dtype=object)
```

```
In [18]: df['Address'].unique()
```

```
Out[18]: array(['Third Floor, Century City Mall, Kalayaan Avenue, Poblacion, Makati City',
                'Little Tokyo, 2277 Chino Roces Avenue, Legaspi Village, Makati City',
                'Edsa Shangri-La, 1 Garden Way, Ortigas, Mandaluyong City', ...,
                'Kuru�_e��me Mahallesi, Muallim Naci Caddesi, No 56, Be��ikta��, ��stanbul',
                'Kuru�_e��me Mahallesi, Muallim Naci Caddesi, No 64/B, Be��ikta��, ��stanbul',
                'Cafea��a Mahallesi, Bademalt˞ Sokak, No 21/B, Kad˞k�_y, ��stanbul'],
               dtype=object)
```

```
In [19]: df['Address'] = df['Address'].str.replace('�', '')
         df['Address']
```

```
Out[19]: 0       Third Floor, Century City Mall, Kalayaan Avenu...
         1       Little Tokyo, 2277 Chino Roces Avenue, Legaspi...
         2       Edsa Shangri-La, 1 Garden Way, Ortigas, Mandal...
         3       Third Floor, Mega Fashion Hall, SM Megamall, O...
         4       Third Floor, Mega Atrium, SM Megamall, Ortigas...
                                       ...
         9546    Kemanke Karamustafa Paa Mahallesi, R˞ht˞m Cadd...
         9547    Kouyolu Mahallesi, Muhittin st_nda Caddesi, No...
         9548    Kuru_eme Mahallesi, Muallim Naci Caddesi, No 5...
         9549    Kuru_eme Mahallesi, Muallim Naci Caddesi, No 6...
         9550    Cafeaa Mahallesi, Bademalt˞ Sokak, No 21/B, Ka...
         Name: Address, Length: 9551, dtype: object
```

```
In [20]: df['Address'].unique()
```

```
Out[20]: array(['Third Floor, Century City Mall, Kalayaan Avenue, Poblacion, Makati City',
                'Little Tokyo, 2277 Chino Roces Avenue, Legaspi Village, Makati City',
                'Edsa Shangri-La, 1 Garden Way, Ortigas, Mandaluyong City', ...,
                'Kuru_eme Mahallesi, Muallim Naci Caddesi, No 56, Beikta, stanbul',
                'Kuru_eme Mahallesi, Muallim Naci Caddesi, No 64/B, Beikta, stanbul',
                'Cafeaa Mahallesi, Bademalt˞ Sokak, No 21/B, Kad˞k_y, stanbul'],
               dtype=object)
```

```
In [21]: df['Locality'].unique()
```

```
Out[21]: array(['Century City Mall, Poblacion, Makati City',
                'Little Tokyo, Legaspi Village, Makati City',
                'Edsa Shangri-La, Ortigas, Mandaluyong City', ..., 'Ko��uyolu',
                'Kuru�_e��me', 'Moda'], dtype=object)
```

```
In [22]: df['Locality'] = df['Locality'].str.replace('�', '')
         df['Locality']
```

```
Out[22]: 0        Century City Mall, Poblacion, Makati City
         1       Little Tokyo, Legaspi Village, Makati City
         2       Edsa Shangri-La, Ortigas, Mandaluyong City
         3           SM Megamall, Ortigas, Mandaluyong City
         4           SM Megamall, Ortigas, Mandaluyong City
                                    ...
         9546                                      Karak_y
         9547                                      Kouyolu
         9548                                     Kuru_eme
         9549                                     Kuru_eme
         9550                                         Moda
         Name: Locality, Length: 9551, dtype: object
```

```
In [23]: df['Locality'].unique()
```

```
Out[23]: array(['Century City Mall, Poblacion, Makati City',
                'Little Tokyo, Legaspi Village, Makati City',
                'Edsa Shangri-La, Ortigas, Mandaluyong City', ..., 'Kouyolu',
                'Kuru_eme', 'Moda'], dtype=object)
```

```
In [24]: df['Locality Verbose'].unique()
```

```
Out[24]: array(['Century City Mall, Poblacion, Makati City, Makati City',
                'Little Tokyo, Legaspi Village, Makati City, Makati City',
                'Edsa Shangri-La, Ortigas, Mandaluyong City, Mandaluyong City',
                ..., 'Ko��uyolu, ��stanbul', 'Kuru�_e��me, ��stanbul',
                'Moda, ��stanbul'], dtype=object)
```

```
In [25]: df['Locality Verbose'] = df['Locality Verbose'].str.replace('�', '')
         df['Locality Verbose']
```

```
Out[25]: 0       Century City Mall, Poblacion, Makati City, Mak...
         1       Little Tokyo, Legaspi Village, Makati City, Ma...
         2       Edsa Shangri-La, Ortigas, Mandaluyong City, Ma...
         3       SM Megamall, Ortigas, Mandaluyong City, Mandal...
         4       SM Megamall, Ortigas, Mandaluyong City, Mandal...
                                       ...
         9546                                   Karak_y, stanbul
         9547                                   Kouyolu, stanbul
         9548                                  Kuru_eme, stanbul
         9549                                  Kuru_eme, stanbul
         9550                                      Moda, stanbul
         Name: Locality Verbose, Length: 9551, dtype: object
```

```
In [26]: df['Locality Verbose'].unique()
```

```
Out[26]: array(['Century City Mall, Poblacion, Makati City, Makati City',
                'Little Tokyo, Legaspi Village, Makati City, Makati City',
                'Edsa Shangri-La, Ortigas, Mandaluyong City, Mandaluyong City',
                ..., 'Kouyolu, stanbul', 'Kuru_eme, stanbul', 'Moda, stanbul'],
               dtype=object)
```

```
In [27]: df['Cuisines'].unique()
```

```
Out[27]: array(['French, Japanese, Desserts', 'Japanese',
                'Seafood, Asian, Filipino, Indian', ..., 'Burger, Izgara',
                'World Cuisine, Patisserie, Cafe', 'Italian, World Cuisine'],
               dtype=object)
```

```
In [28]: df['Cuisines'] = df['Cuisines'].str.replace('�', '')
         df['Cuisines']
```

```
Out[28]: 0              French, Japanese, Desserts
         1                                Japanese
         2        Seafood, Asian, Filipino, Indian
         3                         Japanese, Sushi
         4                        Japanese, Korean
                                ...
         9546                              Turkish
         9547      World Cuisine, Patisserie, Cafe
         9548                Italian, World Cuisine
         9549                       Restaurant Cafe
         9550                                 Cafe
         Name: Cuisines, Length: 9551, dtype: object
```

```
In [29]: df['Cuisines'].unique()
```

```
Out[29]: array(['French, Japanese, Desserts', 'Japanese',
                'Seafood, Asian, Filipino, Indian', ..., 'Burger, Izgara',
                'World Cuisine, Patisserie, Cafe', 'Italian, World Cuisine'],
               dtype=object)
```

Drop unimportant columns

```
In [30]: df.drop(['Country Code', 'Address', 'Address', 'Locality',
                'Locality Verbose', 'Currency', 'Is delivering now', 'Average Cost for two', 'Switch to order men
```

```
In [31]: df.head(2)
```

Out[31]:

	Restaurant ID	Restaurant Name	City	Longitude	Latitude	Cuisines	Has Table booking	Has Online delivery	Price range	Aggregate rating	Ratin tex
0	6317637	Le Petit Souffle	Makati City	121.027535	14.565443	French, Japanese, Desserts	Yes	No	3	4.8	Exceller
1	6304287	Izakaya Kikufuji	Makati City	121.014101	14.553708	Japanese	Yes	No	3	4.5	Exceller

Replace columns name

```
In [32]: df.rename(columns = {'Has Online delivery': 'Online_delivery', 'Has Table booking':'Table_booking'}, inp
```

After making changes, again understand the data

```
In [33]: df.head(2)
```

Out[33]:

	Restaurant ID	Restaurant Name	City	Longitude	Latitude	Cuisines	Table_booking	Online_delivery	Price range	Aggre ra
0	6317637	Le Petit Souffle	Makati City	121.027535	14.565443	French, Japanese, Desserts	Yes	No	3	
1	6304287	Izakaya Kikufuji	Makati City	121.014101	14.553708	Japanese	Yes	No	3	

```
In [34]: df.tail(2)
```

Out[34]:

	Restaurant ID	Restaurant Name	City	Longitude	Latitude	Cuisines	Table_booking	Online_delivery	Price range	A
9549	5916112	Ak Kahve	stanbul	29.036019	41.057979	Restaurant Cafe	No	No	4	
9550	5927402	Walter's Coffee Roastery	stanbul	29.026016	40.984776	Cafe	No	No	2	

In [35]:
```
df.columns
```

Out[35]:
```
Index(['Restaurant ID', 'Restaurant Name', 'City', 'Longitude', 'Latitude',
       'Cuisines', 'Table_booking', 'Online_delivery', 'Price range',
       'Aggregate rating', 'Rating text', 'Votes'],
      dtype='object')
```

In [36]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9551 entries, 0 to 9550
Data columns (total 12 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   Restaurant ID     9551 non-null   int64  
 1   Restaurant Name   9551 non-null   object 
 2   City              9551 non-null   object 
 3   Longitude         9551 non-null   float64
 4   Latitude          9551 non-null   float64
 5   Cuisines          9542 non-null   object 
 6   Table_booking     9551 non-null   object 
 7   Online_delivery   9551 non-null   object 
 8   Price range       9551 non-null   int64  
 9   Aggregate rating  9551 non-null   float64
 10  Rating text       9551 non-null   object 
 11  Votes             9551 non-null   int64  
dtypes: float64(3), int64(3), object(6)
memory usage: 895.5+ KB
```

In [37]:
```
df.shape
```

Out[37]:
```
(9551, 12)
```

In [38]:
```
continuous = ['Restaurant ID', 'Longitude', 'Latitude', 'Aggregate rating', 'Votes']

discrete_categorical = ['Restaurant Name', 'City', 'Cuisines',
                        'Table_booking', 'Online_delivery',
                         'Rating text']

discrete_count = ['Price range']
```

In [39]:
```
df[continuous].describe()
```

Out[39]:

	Restaurant ID	Longitude	Latitude	Aggregate rating	Votes
count	9.551000e+03	9551.000000	9551.000000	9551.000000	9551.000000
mean	9.051128e+06	64.126574	25.854381	2.666370	156.909748
std	8.791521e+06	41.467058	11.007935	1.516378	430.169145
min	5.300000e+01	-157.948486	-41.330428	0.000000	0.000000
25%	3.019625e+05	77.081343	28.478713	2.500000	5.000000
50%	6.004089e+06	77.191964	28.570469	3.200000	31.000000
75%	1.835229e+07	77.282006	28.642758	3.700000	131.000000
max	1.850065e+07	174.832089	55.976980	4.900000	10934.000000

In [40]:
```
df[discrete_categorical].describe()
```

Out[40]:

	Restaurant Name	City	Cuisines	Table_booking	Online_delivery	Rating text
count	9551	9551	9542	9551	9551	9551
unique	7446	141	1825	2	2	6
top	Cafe Coffee Day	New Delhi	North Indian	No	No	Average
freq	83	5473	936	8393	7100	3737

In [41]:
```
from skimpy import skim
skim(df)
```

```
╭──────────────────────────────────────────────── skimpy summary ──────────────
│          Data Summary                Data Types
│ ┏━━━━━━━━━━━━━━━━━━━┳━━━━━━━━┓ ┏━━━━━━━━━━━━━┳━━━━━━━┓
│ ┃ dataframe         ┃ Values ┃ ┃ Column Type ┃ Count ┃
│ ┡━━━━━━━━━━━━━━━━━━━╇━━━━━━━━┩ ┡━━━━━━━━━━━━━╇━━━━━━━┩
│ │ Number of rows    │ 9551   │ │ string      │ 6     │
│ │ Number of columns │ 12     │ │ int32       │ 3     │
│ └───────────────────┴────────┘ │ float64     │ 3     │
│                                └─────────────┴───────┘
│                                                     number
│ ┏━━━━━━━━━━━━━━━━━━┳━━━━┳━━━━━━┳━━━━━━━━━┳━━━━━━━━━┳━━━━━━┳━━━━━━━━┳━━━━━━━━━┳━━━━━━━━━━┳━━━━━━━
│ ┃ column_name      ┃ NA ┃ NA % ┃ mean    ┃ sd      ┃ p0   ┃ p25    ┃ p50     ┃ p75      ┃ p100
│ ┡━━━━━━━━━━━━━━━━━━╇━━━━╇━━━━━━╇━━━━━━━━━╇━━━━━━━━━╇━━━━━━╇━━━━━━━━╇━━━━━━━━━╇━━━━━━━━━━╇━━━━━━━
│ │ Restaurant ID    │  0 │    0 │ 9100000 │ 8800000 │   53 │ 300000 │ 6000000 │ 18000000 │ 190000
│ │ Longitude        │  0 │    0 │      64 │      41 │ -160 │     77 │      77 │       77 │      1
│ │ Latitude         │  0 │    0 │      26 │      11 │  -41 │     28 │      29 │       29 │
│ │ Price range      │  0 │    0 │     1.8 │    0.91 │    1 │      1 │       2 │        2 │
│ │ Aggregate rating │  0 │    0 │     2.7 │     1.5 │    0 │    2.5 │     3.2 │      3.7 │      4
│ │ Votes            │  0 │    0 │     160 │     430 │    0 │      5 │      31 │      130 │    110
│ └──────────────────┴────┴──────┴─────────┴─────────┴──────┴────────┴─────────┴──────────┴───────
│                                                     string
│ ┏━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━┳━━━━━━━━━━━━┳━━━━━━━━━━━━━━━━━━━━━━━━━━━┳━━━━━━━━━━
│ ┃ column_name                      ┃ NA     ┃ NA %       ┃ words per row             ┃ total word
│ ┡━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━╇━━━━━━━━━━━━╇━━━━━━━━━━━━━━━━━━━━━━━━━━━╇━━━━━━━━━━
│ │ Restaurant Name                  │      0 │          0 │                       2.6 │
│ │ City                             │      0 │          0 │                       1.6 │
│ │ Cuisines                         │      9 │       0.09 │                       2.9 │
│ │ Table_booking                    │      0 │          0 │                         1 │
│ │ Online_delivery                  │      0 │          0 │                         1 │
│ │ Rating text                      │      0 │          0 │                       1.3 │
│ └──────────────────────────────────┴────────┴────────────┴───────────────────────────┴──────────
╰──────────────────────────────────────────────────────── End ─────────────────
```

Analysis for Business Problem Understanding

Level 1 = Task 1 Task: Top Cuisines

Determine the top three most common cuisines in the dataset.

In [42]:
```
df.head(1)
```

Out[42]:

	Restaurant ID	Restaurant Name	City	Longitude	Latitude	Cuisines	Table_booking	Online_delivery	Price range	Aggre ra
0	6317637	Le Petit Souffle	Makati City	121.027535	14.565443	French, Japanese, Desserts	Yes	No	3	

In [43]:
```
df['Cuisines'].head()
```

```
Out[43]: 0         French, Japanese, Desserts
         1                           Japanese
         2    Seafood, Asian, Filipino, Indian
         3                    Japanese, Sushi
         4                   Japanese, Korean
         Name: Cuisines, dtype: object
```

```
In [44]: df['Cuisines'].unique()
```

```
Out[44]: array(['French, Japanese, Desserts', 'Japanese',
                'Seafood, Asian, Filipino, Indian', ..., 'Burger, Izgara',
                'World Cuisine, Patisserie, Cafe', 'Italian, World Cuisine'],
               dtype=object)
```

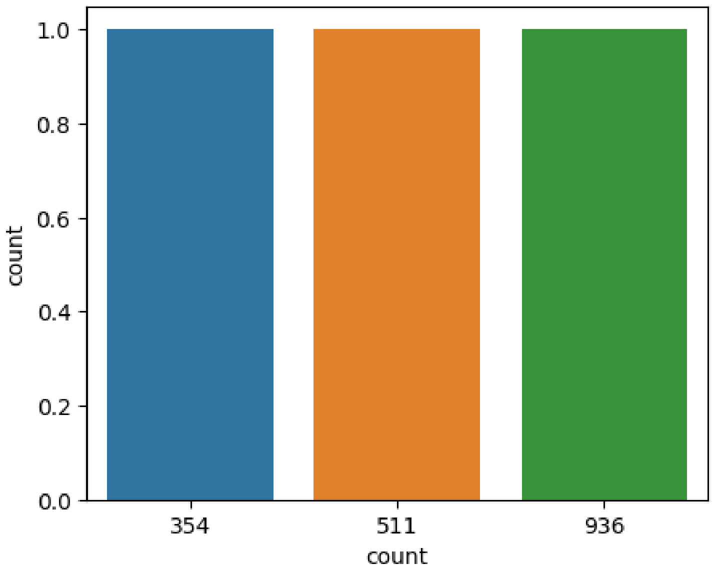
```
In [45]: Count_Cuisines = df['Cuisines'].value_counts()
         Count_Cuisines
```

```
Out[45]: Cuisines
         North Indian                                             936
         North Indian, Chinese                                    511
         Chinese                                                  354
         Fast Food                                                354
         North Indian, Mughlai                                    334
                                                                 ...
         Bengali, Fast Food                                         1
         North Indian, Rajasthani, Asian                            1
         Chinese, Thai, Malaysian, Indonesian                       1
         Bakery, Desserts, North Indian, Bengali, South Indian      1
         Italian, World Cuisine                                     1
         Name: count, Length: 1825, dtype: int64
```

```
In [46]: top_three_cuisines = Count_Cuisines.head(3)
         print('"The most three Cuisines are:"\n\n' ,top_three_cuisines)
```

```
"The most three Cuisines are:"

 Cuisines
North Indian             936
North Indian, Chinese    511
Chinese                  354
Name: count, dtype: int64
```

```
In [47]: plt.figure(figsize=(5, 4))
         sns.countplot(x=top_three_cuisines)
         plt.show()
```



As we can see based on our value_counts the most common three cuisines are **North Indian, Chinese**, and **Chinese**

Calculate the percentage of restaurants that serve each of the top cuisines.

```
In [48]: df['Restaurant ID'].nunique()
```

```
Out[48]: 9551
```

```
In [49]: number_of_Restaurant = len(df['Restaurant ID'])
         number_of_Restaurant
```

```
Out[49]: 9551
```

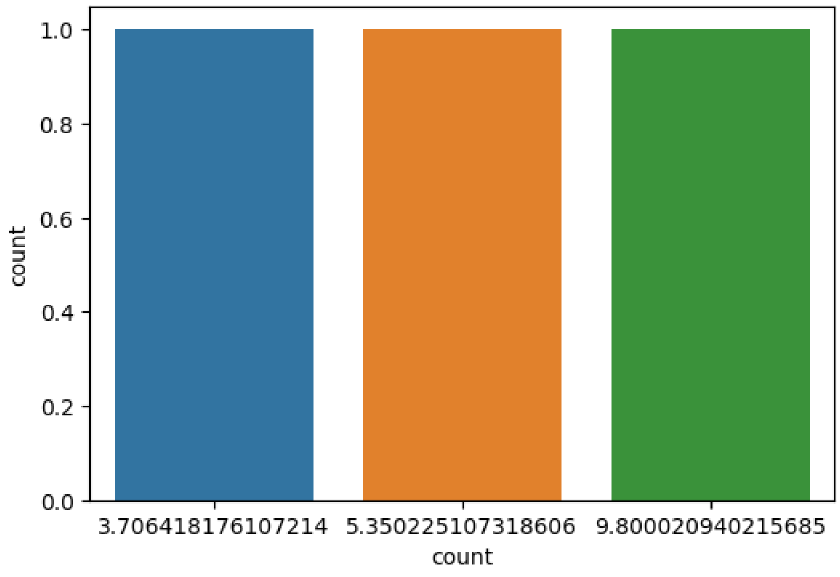
```
In [50]: percentage_Restaurant = (top_three_cuisines/number_of_Restaurant) * 100
         print('"The percentage of the Restaurant is:"\n\n' ,percentage_Restaurant)
```

```
"The percentage of the Restaurant is:"

 Cuisines
North Indian              9.800021
North Indian, Chinese     5.350225
Chinese                   3.706418
Name: count, dtype: float64
```

```
In [51]: percentage_Restaurant
```

```
Out[51]: Cuisines
         North Indian              9.800021
         North Indian, Chinese     5.350225
         Chinese                   3.706418
         Name: count, dtype: float64
```

```
In [52]: plt.figure(figsize=(6, 4))
         sns.countplot(x=percentage_Restaurant)
         plt.show()
```



Level 1 = Task 2 Task: City Analysis

Identify the city with the highest number of restaurants in the dataset.

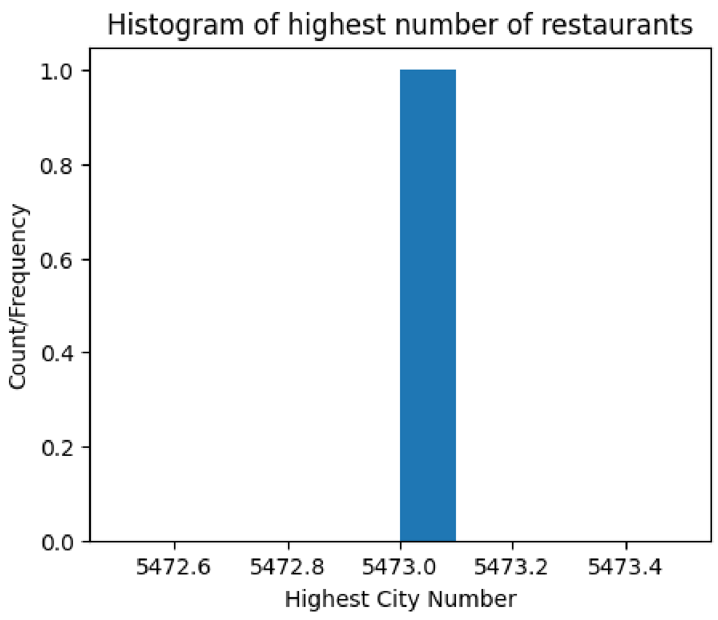
```
In [53]: count_city = df['City'].value_counts()
         count_city
```

```
Out[53]: City
         New Delhi            5473
         Gurgaon              1118
         Noida                1080
         Faridabad             251
         Ghaziabad              25
                              ...
         Panchkula               1
         Mc Millan               1
         Mayfield                1
         Macedon                 1
         Vineland Station        1
         Name: count, Length: 141, dtype: int64
```

```
In [54]: highest_Restaurant = count_city.head(1)
         print('"The city with highest number of Restaurant is:"\n\n' ,highest_Restaurant)
```

```
"The city with highest number of Restaurant is:"

 City
New Delhi    5473
Name: count, dtype: int64
```

```
In [55]: plt.figure(figsize=(5, 4))
         plt.hist(highest_Restaurant)
         plt.xlabel('Highest City Number')
         plt.ylabel('Count/Frequency')
         plt.title('Histogram of highest number of restaurants')
         plt.show()
```



Calculate the average rating for restaurants in each city.

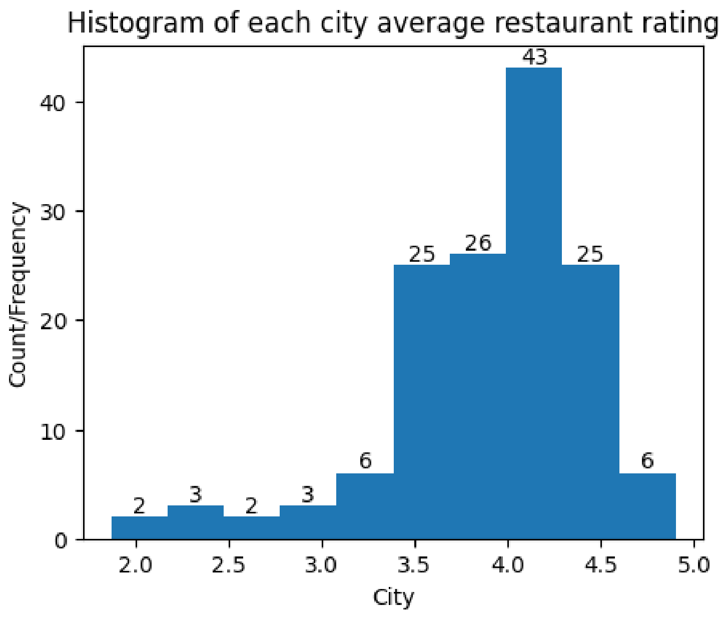
```
In [56]: df['City']
```

```
Out[56]: 0             Makati City
         1             Makati City
         2        Mandaluyong City
         3        Mandaluyong City
         4        Mandaluyong City
                        ...
         9546              stanbul
         9547              stanbul
         9548              stanbul
         9549              stanbul
         9550              stanbul
         Name: City, Length: 9551, dtype: object
```

```
In [57]: avg_rating_Restaurant = df.groupby('City')['Aggregate rating'].mean()
         print('"The average rating for each city Restaurant is:"\n\n' ,avg_rating_Restaurant)
```

```
"The average rating for each city Restaurant is:"

 City
Abu Dhabi          4.300000
Agra               3.965000
Ahmedabad          4.161905
Albany             3.555000
Allahabad          3.395000
                     ...
Weirton            3.900000
Wellington City    4.250000
Winchester Bay     3.200000
Yorkton            3.300000
stanbul            4.292857
Name: Aggregate rating, Length: 141, dtype: float64
```

In [58]:
```python
plt.figure(figsize=(5, 4))
n, bins, patches = plt.hist(avg_rating_Restaurant, bins=10)
plt.bar_label(patches)
plt.xlabel('City')
plt.ylabel('Count/Frequency')
plt.title('Histogram of each city average restaurant rating')
plt.show()
```



Determine the city with the highest average rating.

In [59]:
```python
highest_rating = avg_rating_Restaurant.max()
print('"The city with highest average rating is:"\n\n' ,highest_rating)
```

```
"The city with highest average rating is:"

 4.9
```

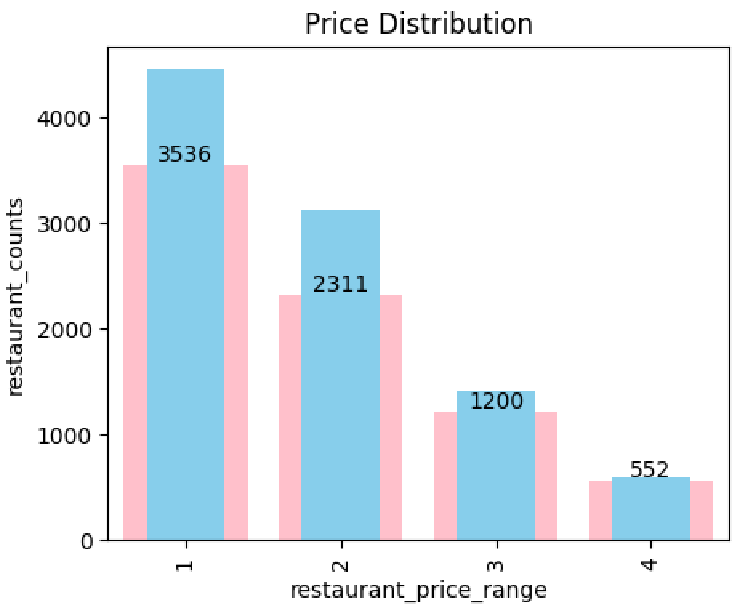
Level 1 = Task 3 Task: Price Range Distribution

Create a histogram or bar chart to visualize the distribution of price ranges among the restaurants.

In [60]:
```python
a = df[df['Price range']==1]['Restaurant Name'].nunique()
b = df[df['Price range']==2]['Restaurant Name'].nunique()
c = df[df['Price range']==3]['Restaurant Name'].nunique()
d = df[df['Price range']==4]['Restaurant Name'].nunique()
print(a, ",", b, ",", c, ",", d)

restaurant_prices = ['1', '2', '3', '4']
restaurant_counts = [3536, 2311, 1200, 552]
plt.figure(figsize=(5, 4))
plt.bar(restaurant_prices, restaurant_counts, color='pink')
```

```
ax = df['Price range'].value_counts().sort_index().plot(kind='bar',color='skyblue')
ax.bar_label(ax.containers[0])
plt.title('Price Distribution')
plt.xlabel('restaurant_price_range')
plt.ylabel('restaurant_counts')
plt.show()
```

```
3536 , 2311 , 1200 , 552
```



Calculate the percentage of restaurants in each price range category

In [61]:
```
price_range = df['Price range'].value_counts()
price_range
```

Out[61]:
```
Price range
1    4444
2    3113
3    1408
4     586
Name: count, dtype: int64
```

In [62]:
```
price_range = df['Price range'].value_counts(normalize=True) * 100
price_range
```

Out[62]:
```
Price range
1    46.529159
2    32.593446
3    14.741912
4     6.135483
Name: proportion, dtype: float64
```

In [63]:
```
number_of_Restaurant = len(df['Restaurant ID'])
number_of_Restaurant
```

Out[63]:
```
9551
```

In [64]:
```
percentage_of_Restaurant = (price_range/number_of_Restaurant) * 100
print('"The percetage of restaurant in each price range :"\n\n' ,percentage_Restaurant)
```

```
"The percetage of restaurant in each price range :"

 Cuisines
North Indian             9.800021
North Indian, Chinese    5.350225
Chinese                  3.706418
Name: count, dtype: float64
```

Level 1 = Task 4 Task: Online Delivery

Determine the percentage of restaurants that offer online delivery.

```
In [65]: online_delivery = df['Online_delivery'].value_counts()
         online_delivery
```

```
Out[65]: Online_delivery
         No     7100
         Yes    2451
         Name: count, dtype: int64
```

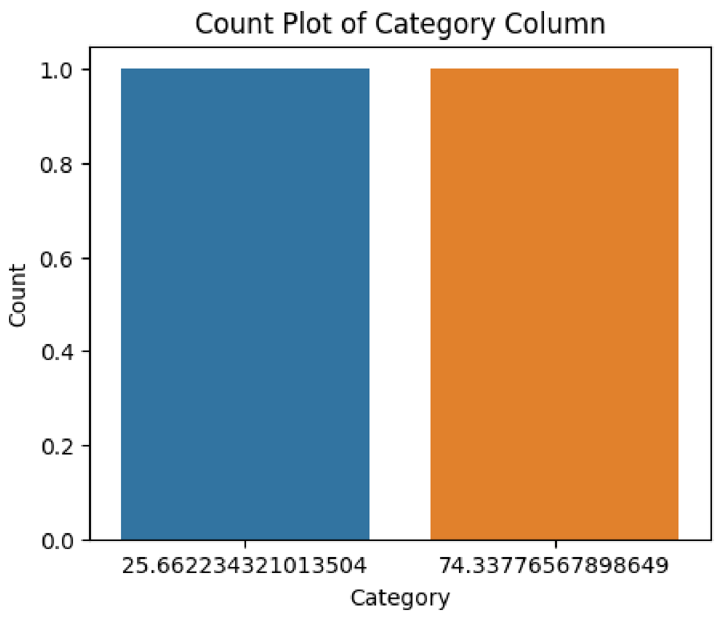
```
In [66]: number_of_Restaurant = len(df['Restaurant ID'])
         number_of_Restaurant
```

```
Out[66]: 9551
```

```
In [67]: percentage_Restaurant_online_deliver = (online_delivery/number_of_Restaurant) * 100
         print('"The percentage of restaurant that deliver food online or not:"\n\n' ,percentage_Restaurant_onlin
```

```
"The percentage of restaurant that deliver food online or not:"

 Online_delivery
No     74.337766
Yes    25.662234
Name: count, dtype: float64
```

```
In [68]: plt.figure(figsize=(5, 4))
         sns.countplot(data=df, x=percentage_Restaurant_online_deliver)
         plt.xlabel('Category')
         plt.ylabel('Count')
         plt.title('Count Plot of Category Column')
         plt.show()
```



Compare the average ratings of restaurants with and without online delivery.

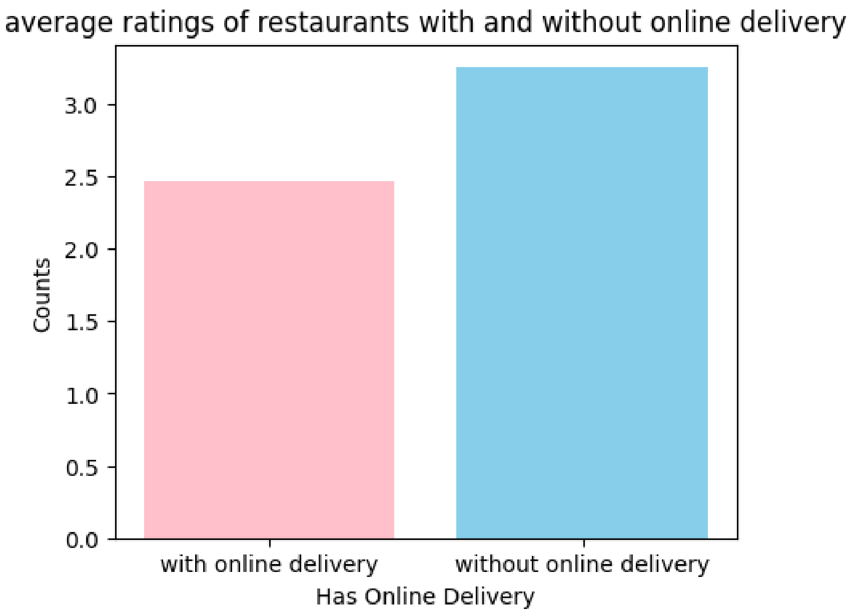
```
In [69]: df['Online_delivery'].value_counts()
```

```
Out[69]: Online_delivery
         No     7100
         Yes    2451
         Name: count, dtype: int64
```

```
In [70]: average_rating_of_restaurant = df.groupby('Online_delivery')['Aggregate rating'].mean()
         print('"The average rating for the restaurant is:"\n\n' ,average_rating_of_restaurant)
```

```
"The average rating for the restaurant is:"

 Online_delivery
No      2.465296
Yes     3.248837
Name: Aggregate rating, dtype: float64
```

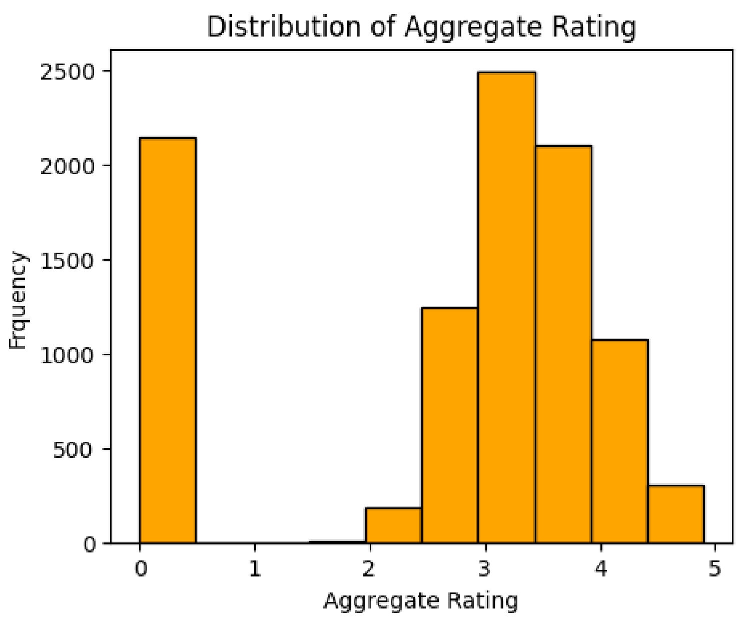
In [71]:
```python
x_axis = ['with online delivery', 'without online delivery']
plt.figure(figsize=(5, 4))
plt.bar(x_axis, average_rating_of_restaurant, color=['pink', 'skyblue'])
plt.xlabel('Has Online Delivery')
plt.ylabel('Counts')
plt.title('average ratings of restaurants with and without online delivery')
plt.show()
```



Level 2 = Task 1 Task: Restaurant Ratings

Analyze the distribution of aggregate ratings and determine the most common rating range.

In [72]:
```python
plt.figure(figsize=(5, 4))
plt.hist(df['Aggregate rating'], bins=10, color='orange', edgecolor='black')
plt.xlabel('Aggregate Rating')
plt.ylabel('Frquency')
plt.title('Distribution of Aggregate Rating')
plt.show()
```



The most common rating ranges between 3 and 4

Calculate the average number of votes received by restaurants.

In [73]:
```
average_Vote = df['Votes'].mean()
print('The average number of votes received by restaurant is:', average_Vote)
```

```
The average number of votes received by restaurant is: 156.909747670401
```

Level 2 = Task 2 Task: Cuisine Combination

Identify the most common combinations of cuisines in the dataset.

In [74]:
```
cuisine_counts = df['Cuisines'].str.split(', ', expand=True)
cuisine_counts
```

Out[74]:

	0	1	2	3	4	5	6	7
0	French	Japanese	Desserts	None	None	None	None	None
1	Japanese	None	None	None	None	None	None	None
2	Seafood	Asian	Filipino	Indian	None	None	None	None
3	Japanese	Sushi	None	None	None	None	None	None
4	Japanese	Korean	None	None	None	None	None	None
...	...	...	...	...	...	...	...	...
9546	Turkish	None	None	None	None	None	None	None
9547	World Cuisine	Patisserie	Cafe	None	None	None	None	None
9548	Italian	World Cuisine	None	None	None	None	None	None
9549	Restaurant Cafe	None	None	None	None	None	None	None
9550	Cafe	None	None	None	None	None	None	None

9551 rows × 8 columns

In [75]:
```
cuisine_counts = df['Cuisines'].str.split(', ', expand=True).stack().value_counts()
print('"The most common combination of cuisnines in the dataset is:"\n\n' ,cuisine_counts.head(1))
```

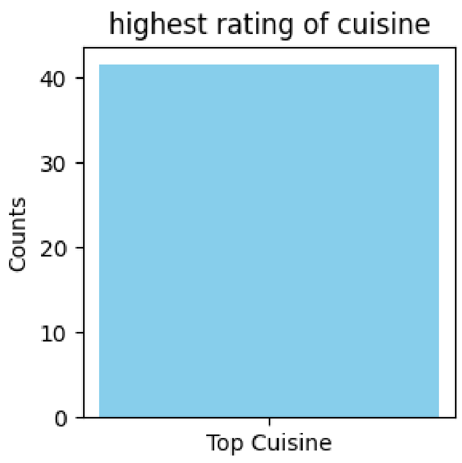
```
"The most common combination of cuisnines in the dataset is:"

 North Indian    3960
Name: count, dtype: int64
```

Determine if certain cuisine combinations tend to have higher ratings.

In [76]:
```
cuisnine_higher_ratings = cuisine_counts/len(df['Aggregate rating']) * 100
cuisnine_higher_ratings
print('"The higher ratings of the cuisine combinations are:"\n\n' ,cuisnine_higher_ratings.head())
```

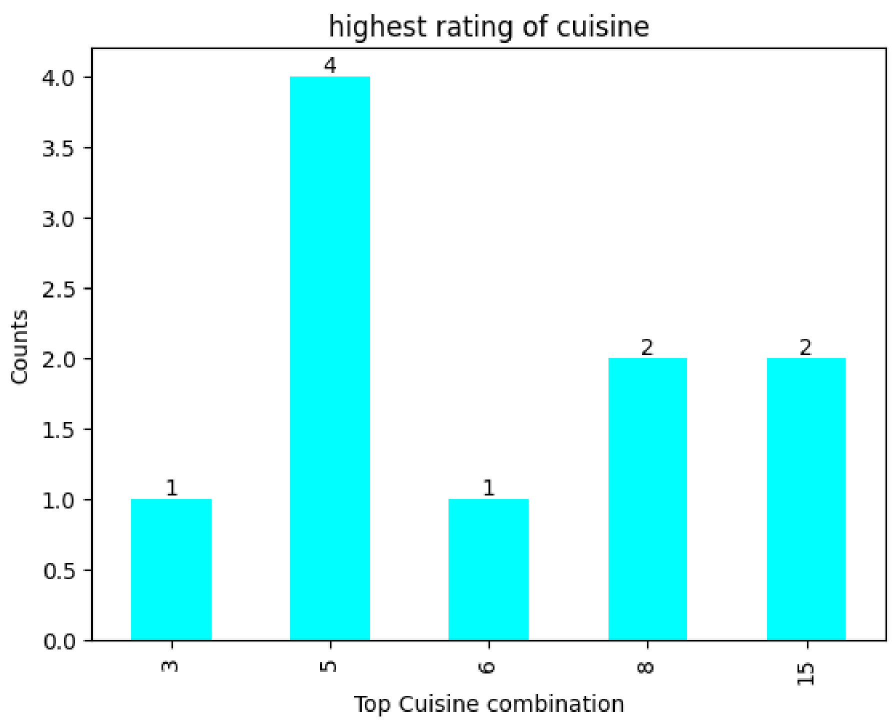
```
"The higher ratings of the cuisine combinations are:"

 North Indian    41.461627
Chinese         28.635745
Fast Food       20.793634
Mughlai         10.417757
Italian          7.999162
Name: count, dtype: float64
```

In [77]:
```
x_axis = ['Top Cuisine']
plt.figure(figsize=(3, 3))
plt.bar(x_axis, cuisnine_higher_ratings, color=['skyblue'])
plt.ylabel('Counts')
plt.title('highest rating of cuisine')
plt.show()
```



In [78]:
```
cuisine = cuisnine_higher_ratings.value_counts().head(10)
print(cuisine)
ax = cuisine.value_counts().sort_index().plot(kind='bar',color='aqua')
ax.bar_label(ax.containers[0])
plt.xlabel('Top Cuisine combination')
plt.ylabel('Counts')
plt.title('highest rating of cuisine')
plt.show()
```

```
count
0.010470    15
0.020940    15
0.041880     8
0.104701     8
0.031410     6
0.115171     5
0.062821     5
0.219872     5
0.083761     5
0.303633     3
Name: count, dtype: int64
```



Level 2 = Task 3 Task: Geographic Analysis

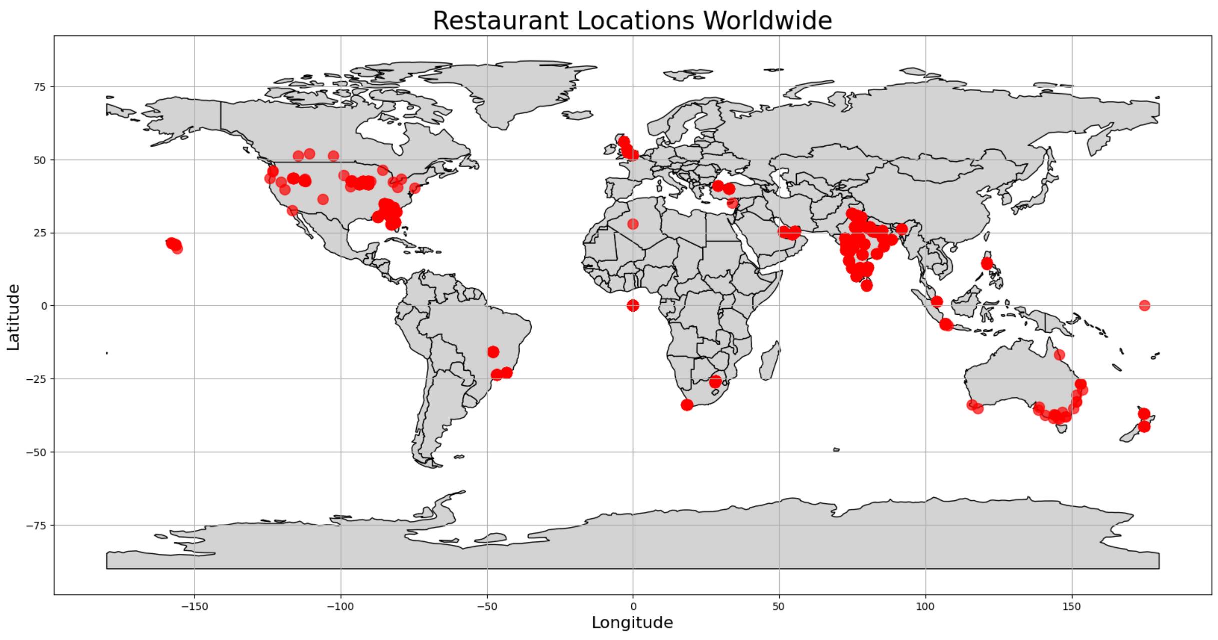
Plot the locations of restaurants on a map using longitude and latitude coordinates.

In [79]:
```
df.head(2)
```

Out[79]:

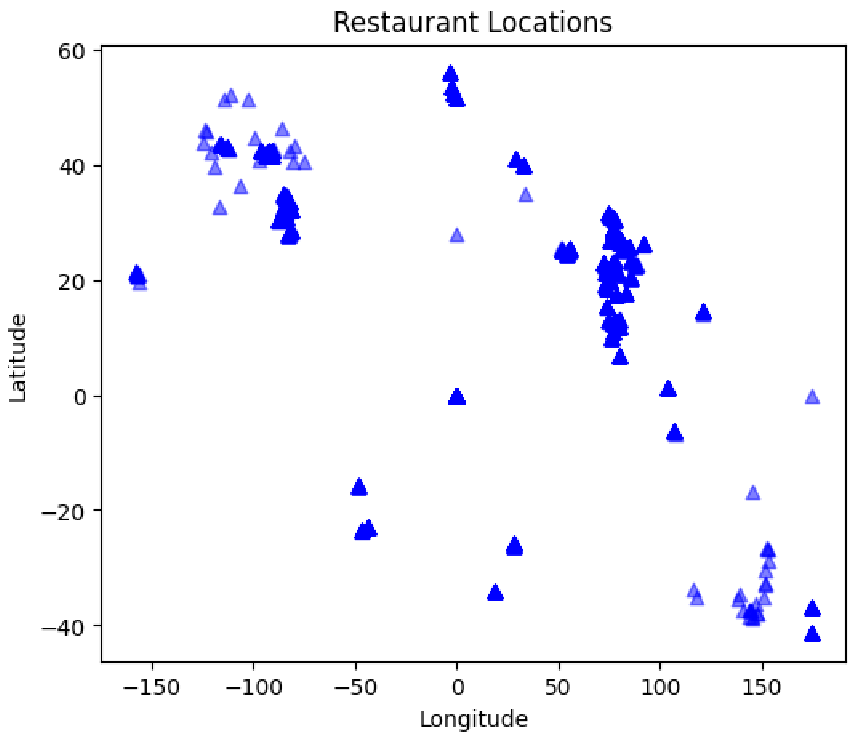
	Restaurant ID	Restaurant Name	City	Longitude	Latitude	Cuisines	Table_booking	Online_delivery	Price range	Aggre ra
0	6317637	Le Petit Souffle	Makati City	121.027535	14.565443	French, Japanese, Desserts	Yes	No	3	
1	6304287	Izakaya Kikufuji	Makati City	121.014101	14.553708	Japanese	Yes	No	3	

In [80]:
```
from shapely.geometry import Point
import geopandas as gpd
import matplotlib.pyplot as plt

# Create Point geometry from latitude and longitude using shapely
geometry = [Point(xy) for xy in zip(df['Longitude'], df['Latitude'])]
gdf = gpd.GeoDataFrame(df, geometry=geometry)

# Read world map data
world = gpd.read_file(gpd.datasets.get_path('naturalearth_lowres'))

# Plot the world map
ax = world.plot(figsize=(20, 12), color='lightgray', edgecolor='black')

# Plot the restaurants on top of the world map
gdf.plot(ax=ax, marker='o', color='red', markersize=100, alpha=0.7)

# Add additional features to the map (you can customize this based on your needs)
ax.set_title("Restaurant Locations Worldwide", fontsize=24)
ax.set_xlabel("Longitude", fontsize=16)
ax.set_ylabel("Latitude", fontsize=16)
plt.grid(True)

# Show the map
plt.show()
```



Identify any patterns or clusters of restaurants in specific areas.

In [81]:
```
plt.figure(figsize=(6, 5))
plt.scatter(df['Longitude'], df['Latitude'], marker='^', alpha=0.5, c='b', cmap='viridis')
plt.title('Restaurant Locations')
plt.xlabel('Longitude')
plt.ylabel('Latitude')
plt.show()
```



Level 2 = Task 4 Task: Restaurant Chains

Identify if there are any restaurant chains present in the dataset.

In [82]:
```
restaurant_chain = df['Restaurant Name'].value_counts()
print('The restaurant chain in the dataset', restaurant_chain[restaurant_chain > 1])
```

```
The restaurant chain in the dataset Restaurant Name
Cafe Coffee Day       83
Domino's Pizza        79
Subway                63
Green Chick Chop      51
McDonald's            48
                      ..
Town Hall              2
Halki Aanch            2
Snack Junction         2
Delhi Biryani Hut      2
Beliram Degchiwala     2
Name: count, Length: 734, dtype: int64
```

In [83]:
```
restaurant_chain.value_counts()
```

Out[83]:
```
count
1     6712
2      468
3      108
4       46
5       28
6       18
7       13
8        7
9        6
19       4
18       4
14       4
11       3
22       3
13       3
12       3
20       2
16       2
10       1
83       1
79       1
26       1
28       1
29       1
30       1
34       1
48       1
51       1
63       1
15       1
Name: count, dtype: int64
```

Analyze the ratings and popularity of different restaurant chains.

In [84]:
```
df= df.dropna(subset=['Aggregate rating', 'Votes'])
chain_stats = df.groupby('Restaurant Name').agg({'Aggregate rating':'mean', 'Votes':'sum'})

sorted_chain_stats_by_rating = chain_stats.sort_values(by='Aggregate rating', ascending=False)
sorted_chain_stats_by_votes = chain_stats.sort_values(by='Votes', ascending=False)
print(sorted_chain_stats_by_rating.head())
print(sorted_chain_stats_by_votes.head())
```

```
                         Aggregate rating  Votes
Restaurant Name
Ingleside Village Pizza               4.9    478
Ministry of Crab                      4.9    203
Oakwood Cafe                          4.9    249
Marukame Udon                         4.9    602
Flat Iron                             4.9    309
                           Aggregate rating  Votes
Restaurant Name
Barbeque Nation                    4.353846  28142
AB's - Absolute Barbecues          4.825000  13400
Toit                               4.800000  10934
Big Chill                          4.475000  10853
Farzi Cafe                         4.366667  10098
```

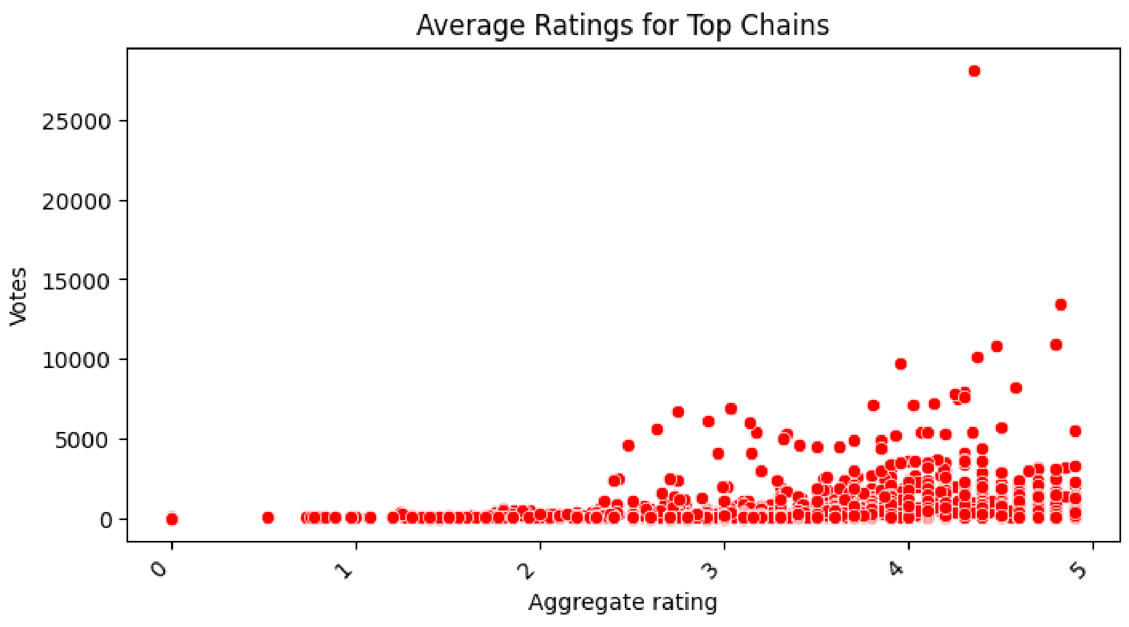
```
In [85]: chain_groups = df.groupby('Restaurant Name')
         average_ratings = chain_groups['Aggregate rating'].mean()
         total_votes = chain_groups['Votes'].sum()

         rank_by_ratings = average_ratings.sort_values(ascending=False)
         print(rank_by_ratings.head())
         print()
         rank_by_votes = total_votes.sort_values(ascending=False)
         print(rank_by_votes.head())
```

```
Restaurant Name
Ingleside Village Pizza    4.9
Ministry of Crab           4.9
Oakwood Cafe               4.9
Marukame Udon              4.9
Flat Iron                  4.9
Name: Aggregate rating, dtype: float64

Restaurant Name
Barbeque Nation               28142
AB's - Absolute Barbecues     13400
Toit                          10934
Big Chill                     10853
Farzi Cafe                    10098
Name: Votes, dtype: int64
```

```
In [86]: print(len(rank_by_ratings))
         print(len(rank_by_votes))
```

```
7446
7446
```

```
In [117…  plt.figure(figsize=(8, 4))
          sns.scatterplot(x=rank_by_ratings, y=rank_by_votes, color='r')
          plt.xticks(rotation=45, ha='right')
          plt.title('Average Ratings for Top Chains')
          plt.show()
```



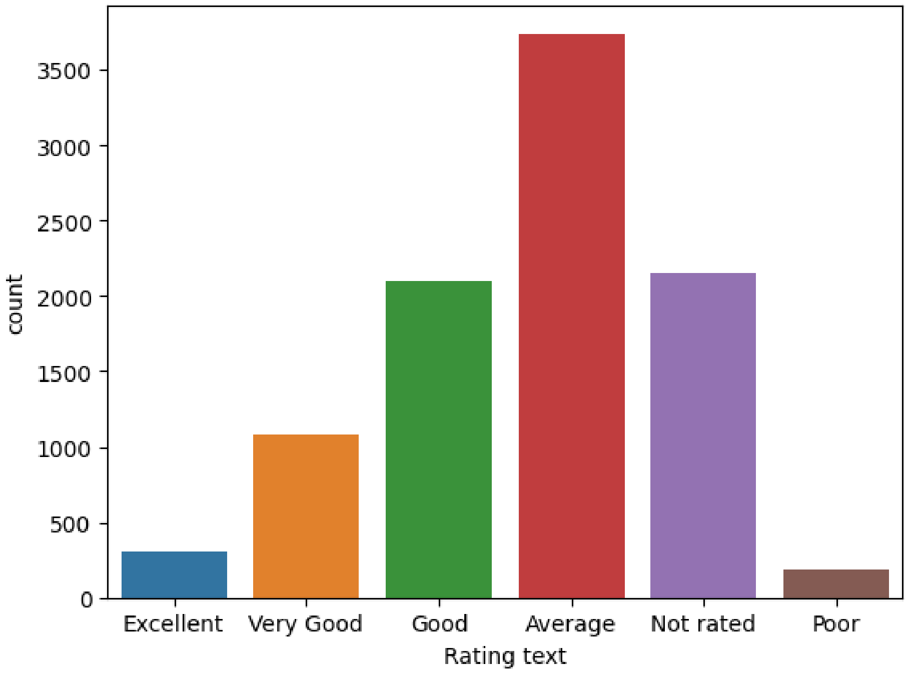
Level 3 = Task 1 Task: Restaurant Reviews

Analyze the text reviews to identify the most common positive and negative keywords.

```
In [88]: df['Rating text'].value_counts()
```

```
Out[88]: Rating text
         Average      3737
         Not rated    2148
         Good         2100
         Very Good    1079
         Excellent     301
         Poor          186
         Name: count, dtype: int64
```

```
In [89]: sns.countplot(x=df['Rating text'])
         plt.show()
```



Calculate the average length of reviews and explore if there is a relationship between review length and rating.

```
In [90]: a = df['Aggregate rating'].value_counts().mean()
         a
```

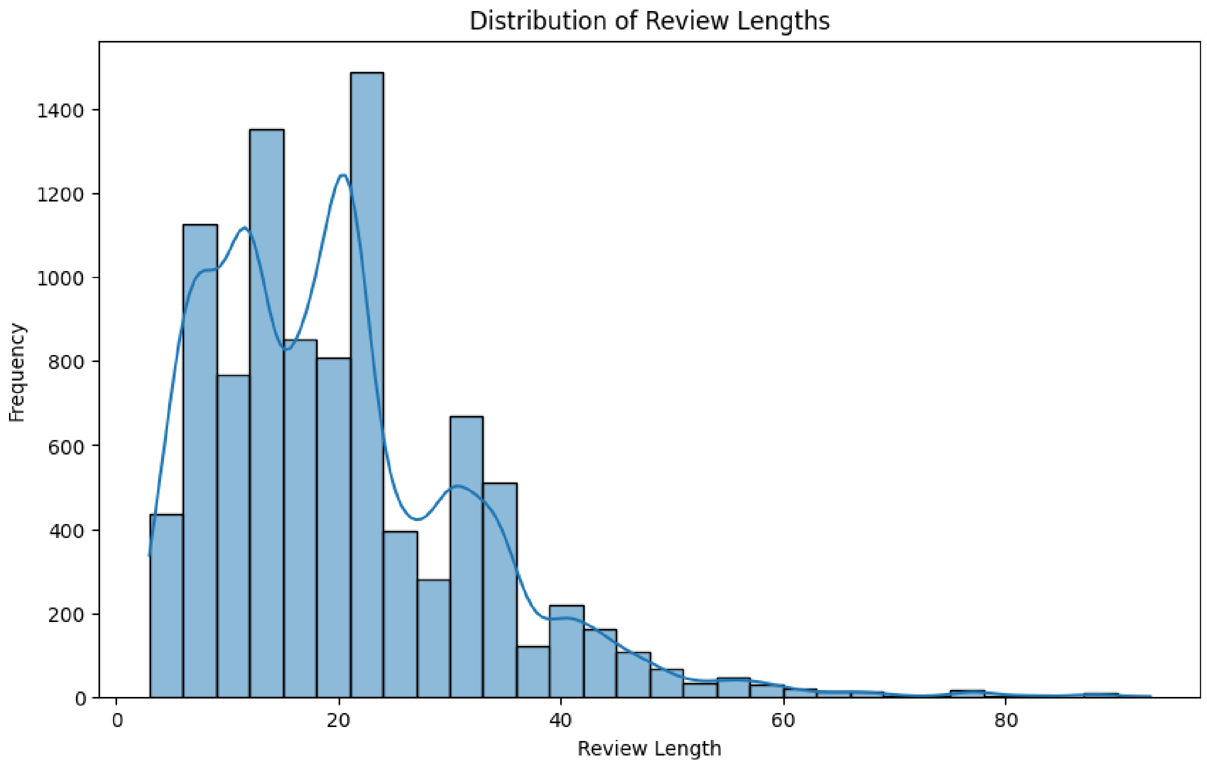
```
Out[90]: 289.42424242424244
```

```
In [91]: df.columns
```

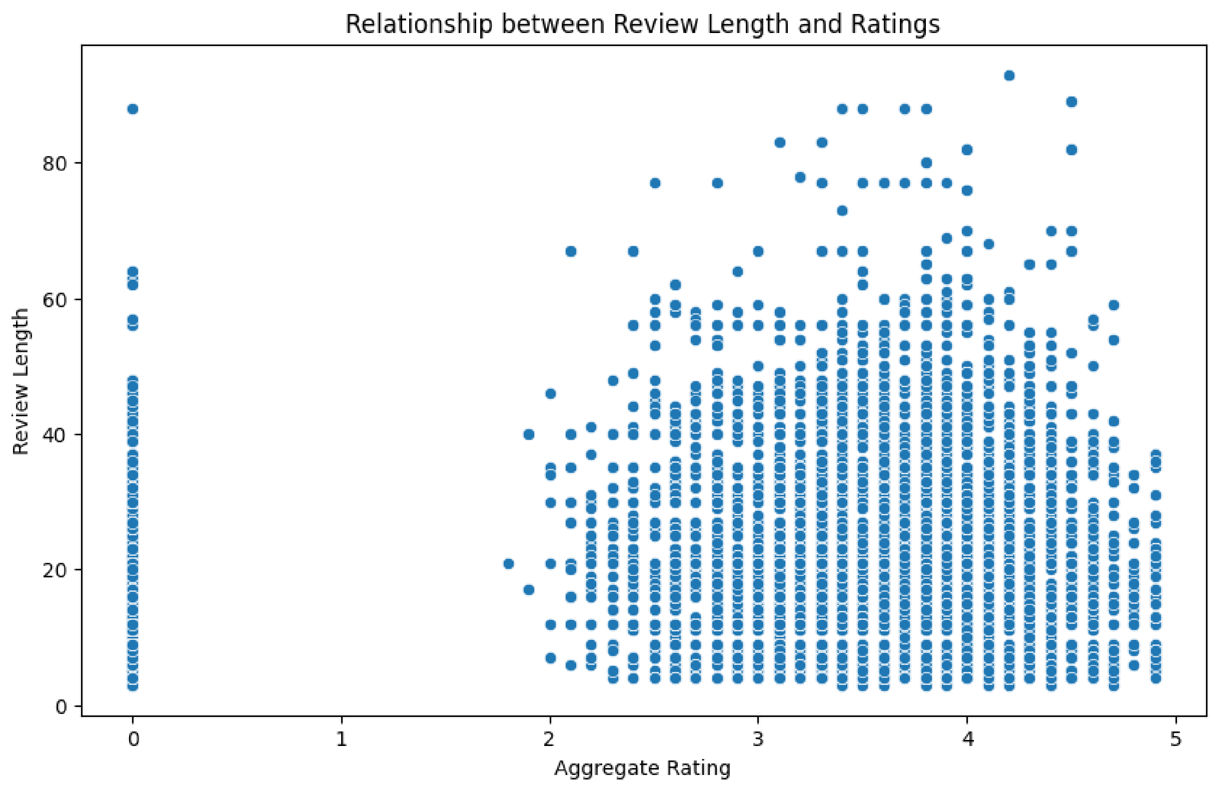
```
Out[91]: Index(['Restaurant ID', 'Restaurant Name', 'City', 'Longitude', 'Latitude',
                'Cuisines', 'Table_booking', 'Online_delivery', 'Price range',
                'Aggregate rating', 'Rating text', 'Votes'],
               dtype='object')
```

```
In [92]: import pandas as pd
         import seaborn as sns
         import matplotlib.pyplot as plt

         # Step 1: Calculate Review Length (using 'Cuisines' as a proxy)
         df['Review Length'] = df['Cuisines'].apply(lambda x: len(str(x)))

         # Step 2: Explore Review Length Distribution
         plt.figure(figsize=(10, 6))
         sns.histplot(data=df, x='Review Length', bins=30, kde=True)
         plt.title('Distribution of Review Lengths')
         plt.xlabel('Review Length')
         plt.ylabel('Frequency')
         plt.show()

         # Step 3: Calculate Average Review Length
         average_review_length = df['Review Length'].mean()
         print(f'Average Review Length: {average_review_length:.2f} characters')

         # Step 4: Explore Relationship with Ratings
```

```python
plt.figure(figsize=(10, 6))
sns.scatterplot(data=df, x='Aggregate rating', y='Review Length')
plt.title('Relationship between Review Length and Ratings')
plt.xlabel('Aggregate Rating')
plt.ylabel('Review Length')
plt.show()

# Step 5: Correlation Analysis
correlation_coefficient = df[['Aggregate rating', 'Review Length']].corr().iloc[0, 1]
print(f'Correlation Coefficient: {correlation_coefficient:.2f}')

# Step 6: Statistical Analysis (Optional)
from scipy.stats import pearsonr

correlation, p_value = pearsonr(df['Aggregate rating'], df['Review Length'])
print(f'Correlation: {correlation:.2f}, p-value: {p_value:.4f}')
```



```
Average Review Length: 19.91 characters
```



```
Correlation Coefficient: 0.19
Correlation: 0.19, p-value: 0.0000
```

Level 3 = Task 2 Task: Votes Analysis

Identify the restaurants with the highest and lowest number of votes.

In [142…

```
Restautant_votes = df.groupby(['Restaurant Name'])['Votes'].mean()
print(Restautant_votes.max())
print(Restautant_votes.min())
```

```
10934.0
0.0
```

In [141…

```
Restaurant_highest_votes = df.loc[df['Votes'].idxmax()]
print('Restaurant with the highest vote number is:')
print(Restaurant_highest_votes[['Restaurant Name', 'Votes']])
print('\n')
Restaurant_lowest_votes = df.loc[df['Votes'].idxmin()]
print('Restaurant with the lowest vote number is:')
print(Restaurant_lowest_votes[['Restaurant Name', 'Votes']])
```

```
Restaurant with the highest vote number is:
Restaurant Name     Toit
Votes              10934
Name: 728, dtype: object


Restaurant with the lowest vote number is:
Restaurant Name    Cantinho da Gula
Votes                             0
Name: 69, dtype: object
```

Analyze if there is a correlation between the number of votes and the rating of a restaurant.

In [99]:

```
df[['Votes', 'Aggregate rating']].head()
```

Out[99]:

	Votes	Aggregate rating
0	314	4.8
1	591	4.5
2	270	4.4
3	365	4.9
4	229	4.8

In [100…

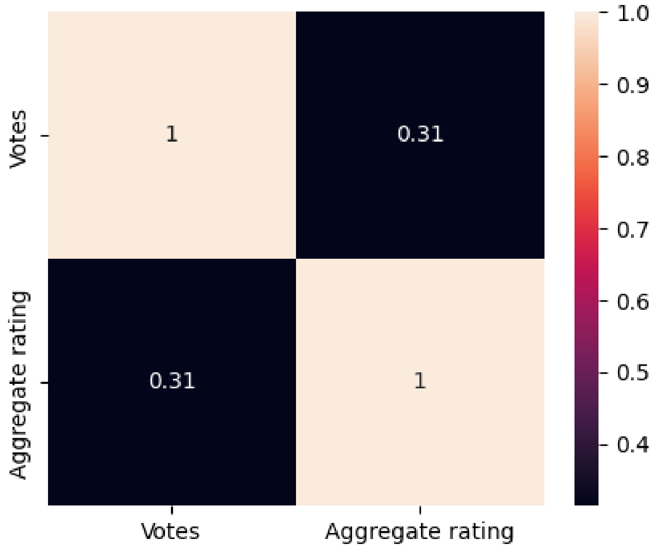
```
correlation = df[['Votes', 'Aggregate rating']].corr()
correlation
```

Out[100]:

	Votes	Aggregate rating
Votes	1.000000	0.313691
Aggregate rating	0.313691	1.000000

In [101…

```
plt.figure(figsize=(5, 4))
sns.heatmap(correlation, annot=True)
plt.show()
```



Level 3 = Task 3 Task: Price Range vs. Online Delivery and Table Booking

Analyze if there is a relationship between the price range and the availability of online delivery and table booking.

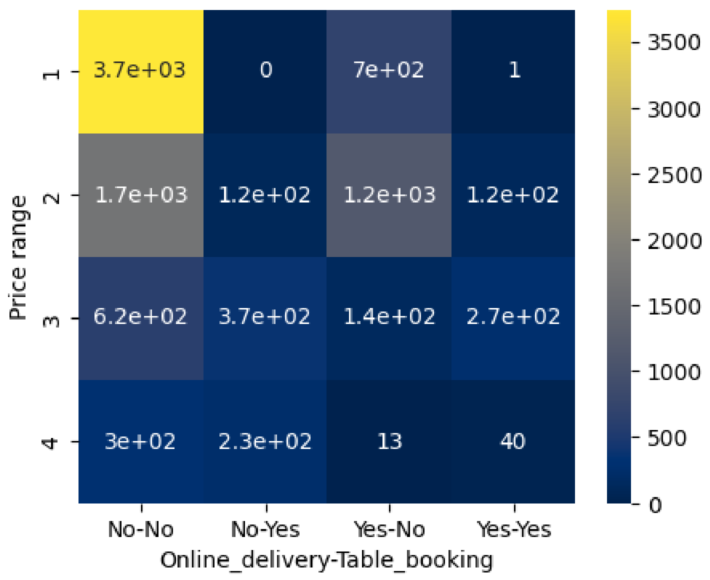
In [148…

```
cross_tab = pd.crosstab(index=df['Price range'], columns=[df['Online_delivery'], df['Table_booking']])
cross_tab
```

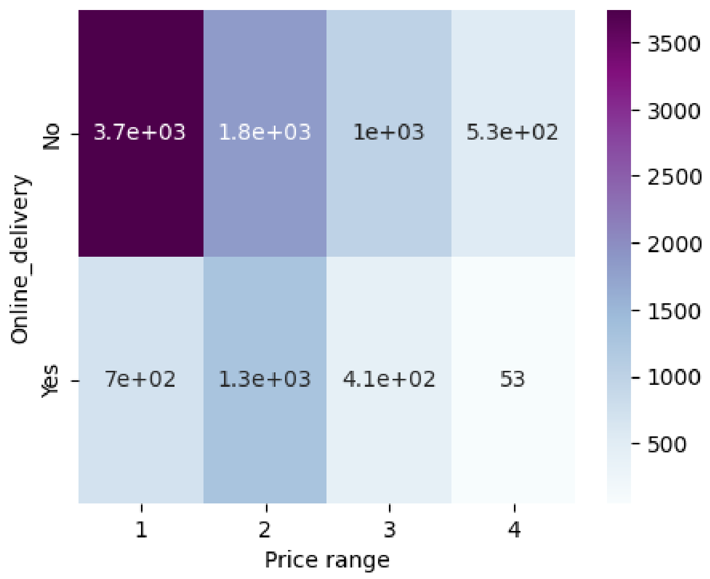
Out[148]:

Online_delivery	**No**		**Yes**	
Table_booking	**No**	**Yes**	**No**	**Yes**
Price range				
1	3743	0	700	1
2	1711	116	1163	123
3	624	373	140	271
4	299	234	13	40

```
In [150…  plt.figure(figsize=(5, 4))
          sns.heatmap(cross_tab, annot=True, cmap='cividis')
          plt.show()
```

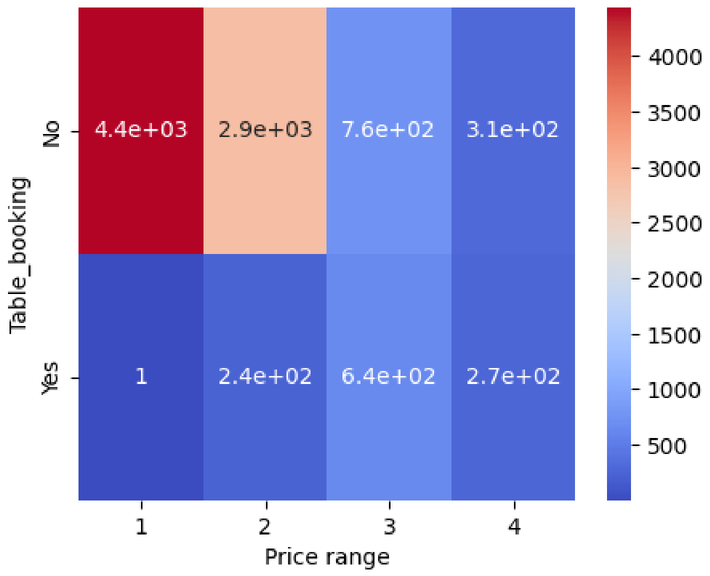


```
In [102…  df['Table_booking'].unique()

Out[102]: array(['Yes', 'No'], dtype=object)

In [103…  df.groupby('Online_delivery')['Price range'].mean()

Out[103]: Online_delivery
          No     1.763380
          Yes    1.924929
          Name: Price range, dtype: float64

In [104…  crosstab = pd.crosstab(df['Online_delivery'], df['Price range'])
          plt.figure(figsize=(5, 4))
          sns.heatmap(crosstab, annot=True, cmap='BuPu')
          plt.show()
```



```
In [105…  df.groupby('Table_booking')['Price range'].mean()

Out[105]: Table_booking
          No     1.636006
          Yes    3.028497
          Name: Price range, dtype: float64

In [106…  crosstab = pd.crosstab(df['Table_booking'], df['Price range'])
          plt.figure(figsize=(5, 4))
```

```
sns.heatmap(crosstab, annot=True, cmap='coolwarm')
plt.show()
```



Determine if higher-priced restaurants are more likely to offer these services.

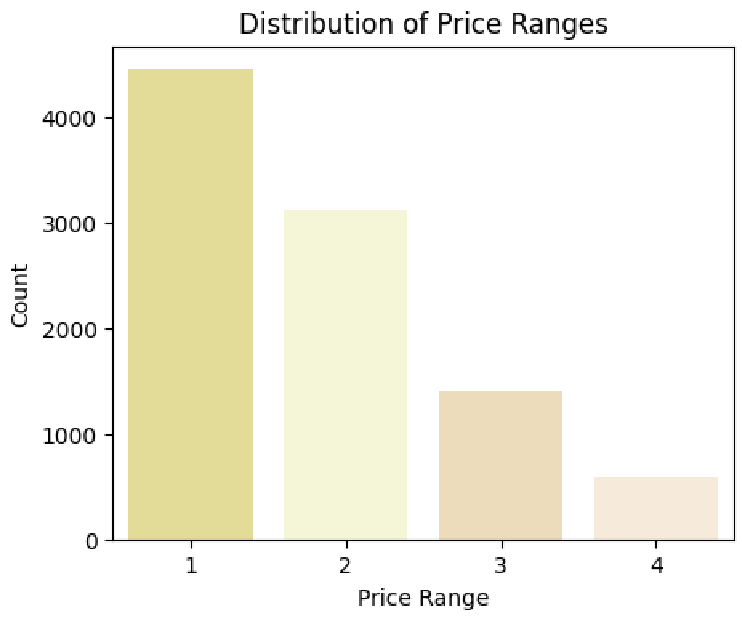
In [107…
```
df['Price range'].max()
```

Out[107]:
```
4
```

In [108…
```
df['Online_delivery'].value_counts()
```

Out[108]:
```
Online_delivery
No      7100
Yes     2451
Name: count, dtype: int64
```

In [175…
```
plt.figure(figsize=(5, 4))
custom_palette = ["khaki", "lightgoldenrodyellow", "wheat", "antiquewhite"]
sns.countplot(x='Price range', data=df, palette=custom_palette)
plt.title('Distribution of Price Ranges')
plt.xlabel('Price Range')
plt.ylabel('Count')
plt.show()
```



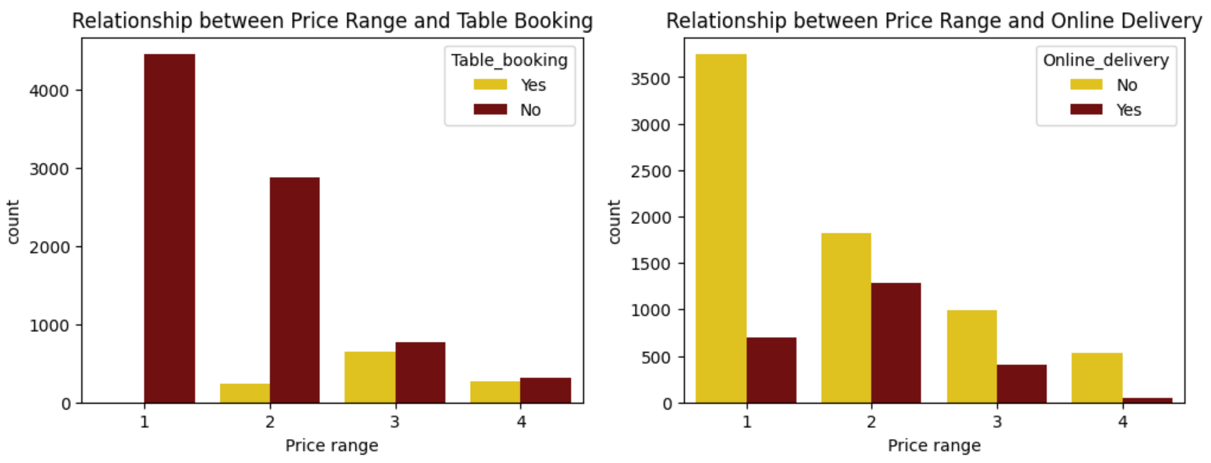
In [110…
```
table_booking_proportion = df['Table_booking'].value_counts(normalize=True)
online_delivery_proportion = df['Online_delivery'].value_counts(normalize=True)
```

```
print("Proportion of Restaurants Offering Table Booking:")
print(table_booking_proportion)

print("\nProportion of Restaurants Offering Online Delivery:")
print(online_delivery_proportion)
```

```
Proportion of Restaurants Offering Table Booking:
Table_booking
No      0.878756
Yes     0.121244
Name: proportion, dtype: float64

Proportion of Restaurants Offering Online Delivery:
Online_delivery
No      0.743378
Yes     0.256622
Name: proportion, dtype: float64
```

In [191…

```
plt.figure(figsize=(12, 4))

plt.subplot(1, 2, 1)
custom_palette = ["gold", "maroon"]
sns.countplot(x='Price range', hue='Table_booking', data=df, palette=custom_palette)
plt.title('Relationship between Price Range and Table Booking')

plt.subplot(1, 2, 2)
custom_palette = ["gold", "maroon"]
sns.countplot(x='Price range', hue='Online_delivery', data=df, palette=custom_palette)
plt.title('Relationship between Price Range and Online Delivery')

plt.show()
```



In [ ]:

In [ ]: