In [1]:
```
#load the libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

from textblob import TextBlob #to understand natural language processing
from wordcloud import WordCloud #to create wordcloud

#load the dataset
df = pd.read_csv("food_dely.csv")
```

In [2]:
```
#data exploration
df.head()
```

Out[2]:

	res_id	name	establishment	url	addre
0	3400299	Bikanervala	Quick Bites	https://www.zomato.com/agra/bikanervala-khanda...	Kalya Poi Near Tu Cinem Bypa Road
1	3400005	Mama Chicken Mama Franky House	Quick Bites	https://www.zomato.com/agra/mama-chicken-mama-...	Ma Mark Sad Baza Ag Can Ag
2	3401013	Bhagat Halwai	Quick Bites	https://www.zomato.com/agra/bhagat-halwai-2-sh...	62/ Near Ea Day, We Shiv Naga Goalp
3	3400290	Bhagat Halwai	Quick Bites	https://www.zomato.com/agra/bhagat-halwai-civi...	Ne Anja Cinem Neh Naga Civil Line
4	3401744	The Salt Cafe Kitchen & Bar	Casual Dining	https://www.zomato.com/agra/the-salt-cafe-kitc...	1C,3 Floo Fatehaba Roa Tajga Ag

5 rows × 26 columns

In [3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 211944 entries, 0 to 211943
Data columns (total 26 columns):
 #   Column                Non-Null Count   Dtype  
---  ------                --------------   -----  
 0   res_id                211944 non-null  int64  
 1   name                  211944 non-null  object 
 2   establishment         207117 non-null  object 
 3   url                   211944 non-null  object 
 4   address               211810 non-null  object 
 5   city                  211944 non-null  object 
 6   city_id               211944 non-null  int64  
 7   locality              211944 non-null  object 
 8   latitude              211944 non-null  float64
 9   longitude             211944 non-null  float64
 10  zipcode               48757 non-null   object 
 11  country_id            211944 non-null  int64  
 12  locality_verbose      211944 non-null  object 
 13  cuisines              210553 non-null  object 
 14  timings               208070 non-null  object 
 15  average_cost_for_two  211944 non-null  int64  
 16  price_range           211944 non-null  int64  
 17  currency              211944 non-null  object 
 18  highlights            209875 non-null  object 
 19  aggregate_rating      211944 non-null  float64
 20  rating_text           211944 non-null  object 
 21  votes                 211944 non-null  int64  
 22  photo_count           211944 non-null  int64  
 23  opentable_support     211896 non-null  float64
 24  delivery              211944 non-null  int64  
 25  takeaway              211944 non-null  int64  
dtypes: float64(4), int64(9), object(13)
memory usage: 42.0+ MB
```

In [4]:
```
df.shape
#len(df) or df.shape[0] -> no. of rows
#df.shape[1] -> no. of columns
```

Out[4]: (211944, 26)

In [5]:
```
df.describe()   #statistical analysis of numeric datatype columns.
```

Out[5]:

	res_id	city_id	latitude	longitude	country_id	average
count	2.119440e+05	211944.000000	211944.000000	211944.000000	211944.0	2
mean	1.349411e+07	4746.785434	21.499475	77.615276	1.0	
std	7.883722e+06	5568.766386	22.781261	7.500104	0.0	
min	5.000000e+01	1.000000	0.000000	0.000000	1.0	
25%	3.301027e+06	11.000000	15.496071	74.877961	1.0	
50%	1.869573e+07	34.000000	22.514181	77.425971	1.0	
75%	1.881297e+07	11306.000000	26.841214	80.219323	1.0	
max	1.915979e+07	11354.000000	10000.000000	91.832769	1.0	

In [6]:
```
#data cleaning
df.duplicated().value_counts()
```

Out[6]:
```
True     151527
False     60417
Name: count, dtype: int64
```

In [7]:
```
df = df.drop_duplicates() #remove rows that are completely identical across all
df.duplicated().value_counts()
```

Out[7]:
```
False    60417
Name: count, dtype: int64
```

In [8]:
```
df.isna().sum()[df.isna().sum()>0].sort_values(ascending=False)
```

Out[8]:
```
zipcode              47869
establishment         1920
timings               1070
highlights             743
cuisines               470
opentable_support       19
address                 18
dtype: int64
```

In [9]:
```
df["res_id"].duplicated().value_counts()
```

Out[9]:
```
res_id
False    55568
True      4849
Name: count, dtype: int64
```

In [10]:
```
df["res_id"] = df["res_id"].drop_duplicates().astype(int) #replace the duplicate
df["res_id"] = df["res_id"].replace(np.nan, "Not Registered")
```

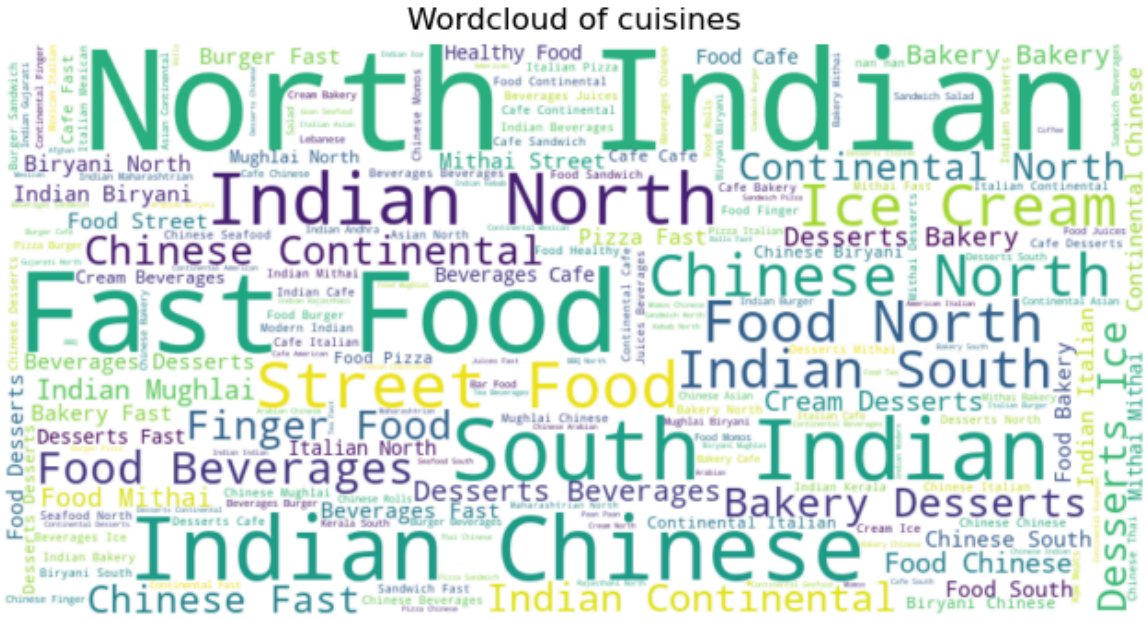
In [11]:
```
df["establishment"] = df["establishment"].replace({np.nan : df["establishment"].
df["address"] = df["address"].fillna("Unknown")
```

In [12]:
```
df["zipcode"] = df["zipcode"].where(df["zipcode"].str.len()==6, "Not Provided")
```

In [13]:
```
df["country_id"].value_counts()
```

Out[13]:
```
country_id
1    60417
Name: count, dtype: int64
```

In [14]:
```
df["cuisines"] = df["cuisines"].astype(str)   #converts None, np.nan(NaN) values

all_cuisines = " ".join(df["cuisines"])

career = WordCloud(width=800, height=400, background_color="White").generate(all

plt.figure(figsize=(8,6))
plt.imshow(career, interpolation="bilinear")
plt.title("Wordcloud of cuisines")
plt.axis("off")
plt.show()
```



In [15]:
```
df["cuisines"] = df["cuisines"].replace("nan", "North Indian, South Indian, Chin
```

In [16]:
```
df["timings"] = df["timings"].fillna("10 AM to 10 PM")
```

In [17]:
```
df["average_cost_for_two"].max(), df["average_cost_for_two"].min()
```

Out[17]:
```
(30000, 0)
```

In [18]:
```
df.loc[df["average_cost_for_two"]<100, "average_cost_for_two"] = 100
df.loc[df["average_cost_for_two"]>5000, "average_cost_for_two"] = 5000
```

In [19]:
```
df["price_range"].value_counts()
```

Out[19]:
```
price_range
1    30681
2    18378
3     8300
4     3058
Name: count, dtype: int64
```

In [20]:
```
df["highlights"].isna().sum()
```

Out[20]: np.int64(743)

In [21]:
```
df["highlights"] = df["highlights"].astype(str)

all_highlights = " ".join(df["highlights"])

career = WordCloud(width=800, height=400, background_color="White").generate(all

plt.figure(figsize=(8,6))
plt.imshow(career, interpolation="bilinear")
plt.title("Wordcloud of all highlights")
plt.axis("off")
plt.show()
```

In [22]:
```
df["highlights"] = df["highlights"].replace("nan", " Indoor Seating, Takeaway Av
```

In [23]:
```
df["aggregate_rating"].max(), df["aggregate_rating"].min()
```

Out[23]: (4.9, 0.0)

In [24]:
```
df["rating_text"].value_counts().head(6)
```

Out[24]:
```
rating_text
Good         17569
Average      16782
Very Good    12714
Not rated    10160
Excellent     2065
Poor           590
Name: count, dtype: int64
```

In [25]:
```
df["votes"].mean(), df["votes"].mode()
```

Out[25]:
```
(np.float64(261.4960524355728),
 0    0
 Name: votes, dtype: int64)
```

In [26]:
```
df["photo_count"].max(), df["photo_count"].min()
```

Out[26]: (17702, 0)

In [27]:
```
df["opentable_support"] = df["opentable_support"].fillna(0)
df["opentable_support"].value_counts()
```

Out[27]:
```
opentable_support
0.0    60417
Name: count, dtype: int64
```

In [28]:
```
df["delivery"].value_counts()
```

Out[28]:
```
delivery
-1    41267
 1    18806
 0      344
Name: count, dtype: int64
```

In [29]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 60417 entries, 0 to 211942
Data columns (total 26 columns):
 #   Column                Non-Null Count  Dtype
---  ------                --------------  -----
 0   res_id                60417 non-null  object
 1   name                  60417 non-null  object
 2   establishment         60417 non-null  object
 3   url                   60417 non-null  object
 4   address               60417 non-null  object
 5   city                  60417 non-null  object
 6   city_id               60417 non-null  int64
 7   locality              60417 non-null  object
 8   latitude              60417 non-null  float64
 9   longitude             60417 non-null  float64
 10  zipcode               60417 non-null  object
 11  country_id            60417 non-null  int64
 12  locality_verbose      60417 non-null  object
 13  cuisines              60417 non-null  object
 14  timings               60417 non-null  object
 15  average_cost_for_two  60417 non-null  int64
 16  price_range           60417 non-null  int64
 17  currency              60417 non-null  object
 18  highlights            60417 non-null  object
 19  aggregate_rating      60417 non-null  float64
 20  rating_text           60417 non-null  object
 21  votes                 60417 non-null  int64
 22  photo_count           60417 non-null  int64
 23  opentable_support     60417 non-null  float64
 24  delivery              60417 non-null  int64
 25  takeaway              60417 non-null  int64
dtypes: float64(4), int64(8), object(14)
memory usage: 12.4+ MB
```

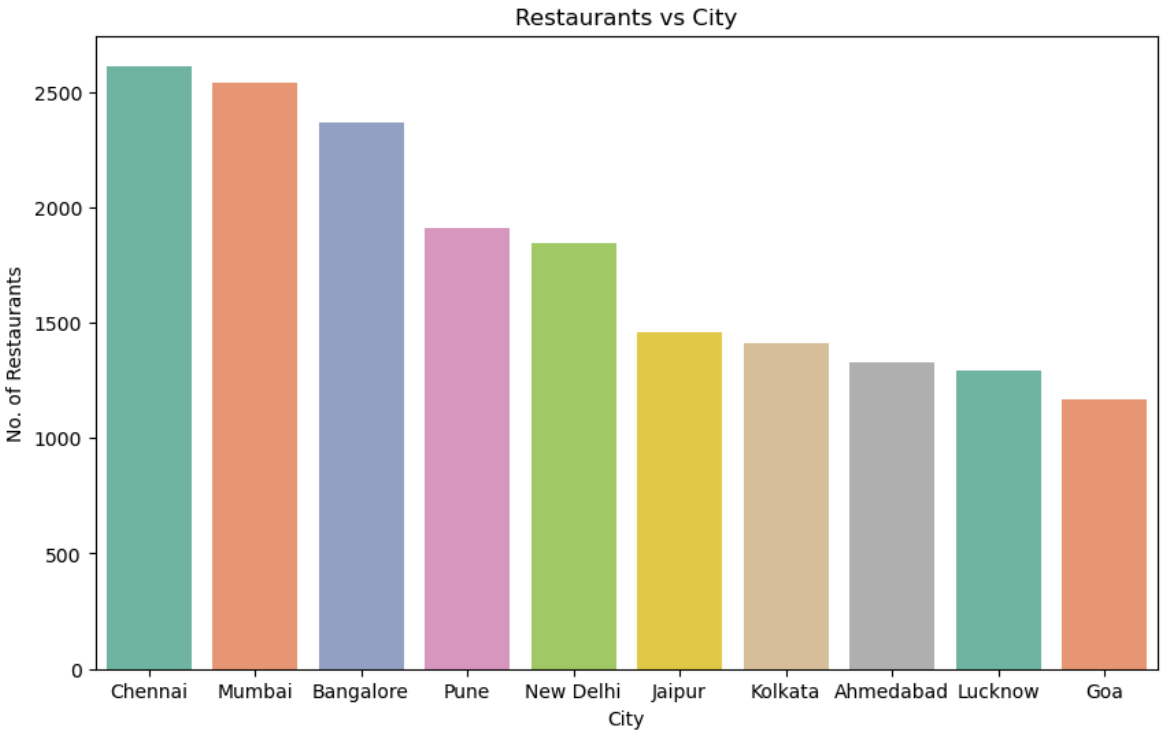
In [30]:
```
career = df["city"].value_counts().sort_values(ascending=False).head(10)
career.values
```

Out[30]:
```
array([2612, 2538, 2365, 1911, 1847, 1456, 1413, 1329, 1290, 1169])
```

In [31]:
```
#Data visualization of top 10 cities having max. number restaurants.
```

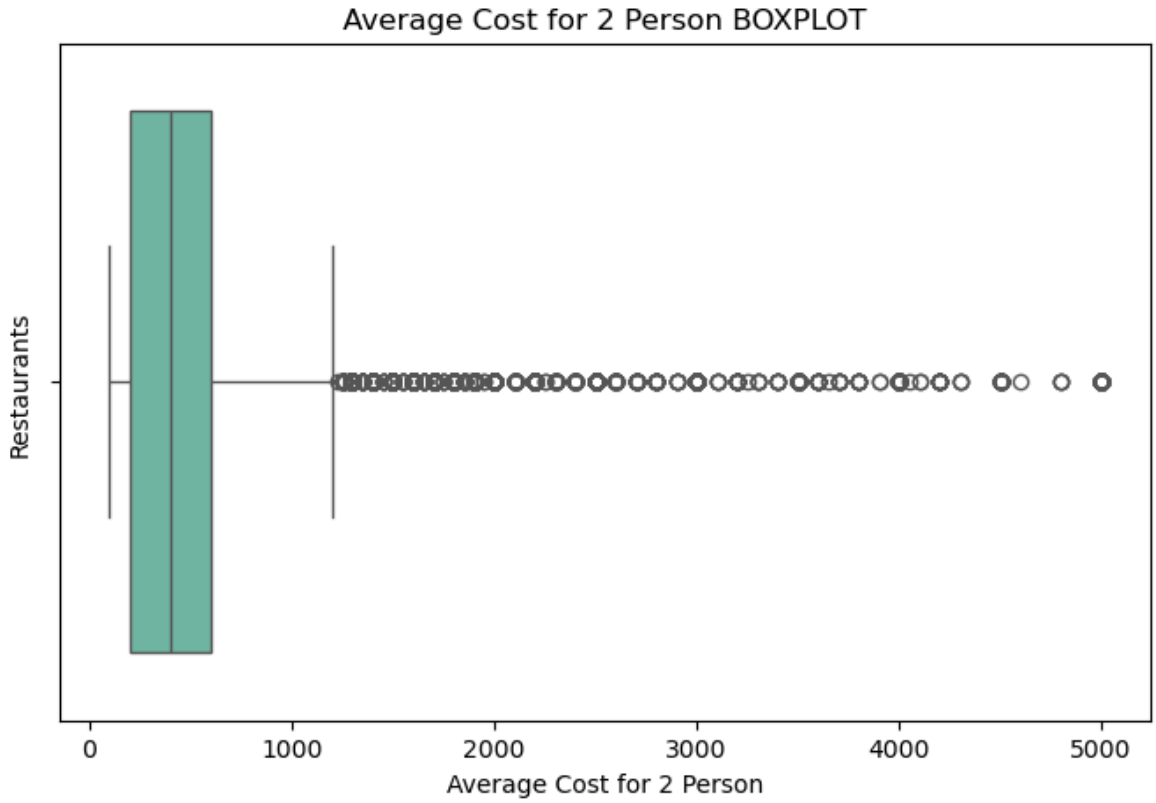
```
career = df["city"].value_counts().sort_values(ascending=False).head(10)

plt.figure(figsize=(10,6))
sns.barplot(x=career.index, y=career.values, data=pd.DataFrame(career), palette=
plt.title("Restaurants vs City")
plt.xlabel("City")
plt.ylabel("No. of Restaurants")
plt.show()
```

```
C:\Users\Sunder Singh Tulera\AppData\Local\Temp\ipykernel_11200\3189720581.py:6:
FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v
0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effe
ct.

  sns.barplot(x=career.index, y=career.values, data=pd.DataFrame(career), palette
="Set2")
```

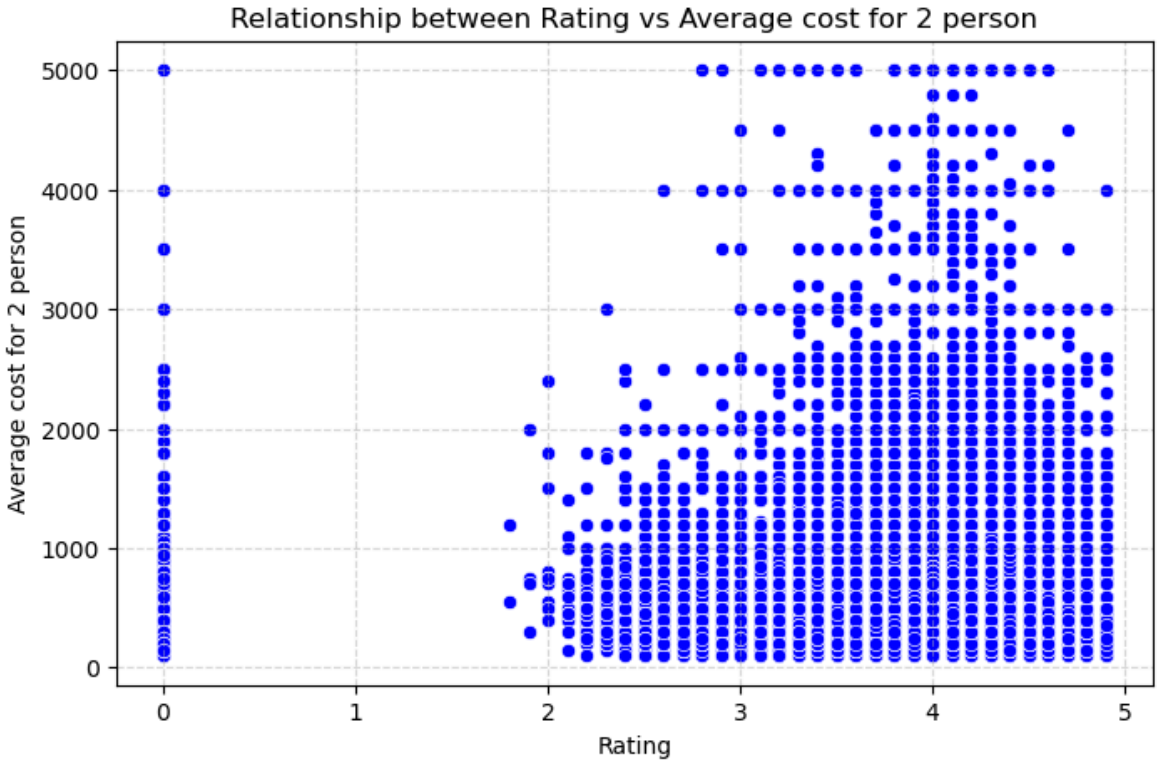


In [32]:
```
#Data visualization based on Average Cost for 2 Person.

plt.figure(figsize=(8,5))
sns.boxplot(x="average_cost_for_two", data=df, palette="Set2")
plt.title("Average Cost for 2 Person BOXPLOT")
plt.xlabel("Average Cost for 2 Person")
plt.ylabel("Restaurants")
plt.show()
```

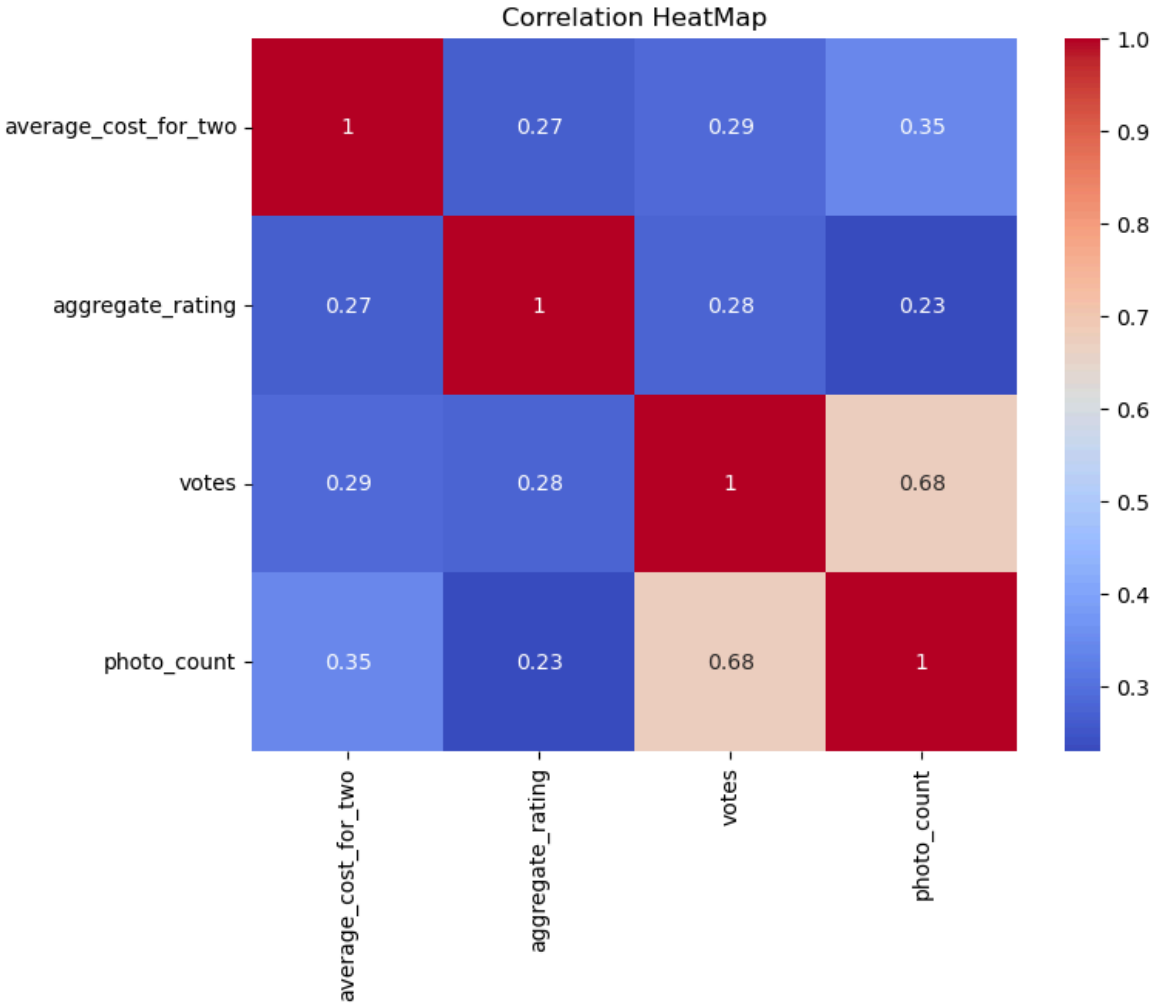
```
C:\Users\Sunder Singh Tulera\AppData\Local\Temp\ipykernel_11200\1124723171.py:4:
FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v
0.14.0. Assign the `y` variable to `hue` and set `legend=False` for the same effe
ct.

  sns.boxplot(x="average_cost_for_two", data=df, palette="Set2")
```



In [33]:
```
#Data visualization of relationship between rating vs average cost for 2 person.

plt.figure(figsize=(8,5))
sns.scatterplot(x="aggregate_rating", y="average_cost_for_two", data=df, color="
plt.grid(True, linestyle="--", alpha=1)
plt.title("Relationship between Rating vs Average cost for 2 person")
plt.grid(True, linestyle = "--", alpha = 0.5)
plt.xlabel("Rating")
plt.ylabel("Average cost for 2 person")
plt.show()
```



In [34]:
```
#Correlation between average_cost_for_two, aggregate_rating, votes & photo_count

data = df[["average_cost_for_two", "aggregate_rating", "votes", "photo_count"]]

plt.figure(figsize=(8,6))
sns.heatmap(data.corr(), cmap="coolwarm", annot=True)
plt.title("Correlation HeatMap")
plt.show()
```



In [35]:
```
#Create a column region.

med_lat = df["latitude"].median()
med_lon = df["longitude"].median()

def check_region(lat, lon):
    if lat==np.nan or lon==np.nan:
        return "Unknown"
    if lat>=med_lat and lon>=med_lon:
        return "NE"
    if lat>=med_lat and lon<=med_lon:
        return "NW"
    if lat<=med_lat and lon<=med_lon:
        return "SW"
    else:
        return "SE"
df["region"] = df.apply(lambda row : check_region(row["latitude"], row["longitud

df["region"].value_counts()
```

Out[35]:
```
region
NE    16703
SW    16702
NW    13506
SE    13506
Name: count, dtype: int64
```

In [38]:
```
df.to_excel("Mini_Project.xlsx", index=False)
```